

A Review Of Diagnostic Criteria For Work Related Upper Limb Disorders (WRULD)

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1. Introduction

1.1 Work related upper limb disorders

Employment related medical conditions affecting the upper limbs have become a problem of increasing concern around the world. The so-called work related upper limb disorders (WRULD) are significant contemporary occupational health problems, estimated to affect many millions of workers around the world annually.

The term upper limb disorder encompasses a variety of musculoskeletal problems, affecting the tissues of the hand, wrist, arm and shoulder. Such problems are relatively common in the general population. Regarding the workplace, WRULD is an umbrella term for conditions thought to be caused by exposure in the workplace. Alternative terms for this are overuse syndrome, repetitive strain injury (RSI) and cumulative trauma disorder (CTD).

1.1.i Causes of WRULD

A basic hypothesis exists that WRULD are caused, aggravated or precipitated through a worker's need to exert undesirable force, use uncomfortable hand grips, or adopt static awkward postures in the workplace, coupled with continuous repetitive work and insufficient rest or recovery.

1.1.ii Disagreements over WRULD

Recently musculoskeletal disorders affecting the upper limb have received considerable attention, following financial claims for damages from employees considered having developed work related upper limb disorder. In a field increasingly influenced by legal proceedings, important differences in opinions still exist, for instance how the disorders should be defined. The term 'repetitive strain injury' is medically imprecise. A more descriptive title would be 'regional pain syndrome'. Controversy also arises from whether certain disorders, such as carpal tunnel syndrome (CTS) are related to the workplace ergonomic factors. Although some of these conditions are known to be related to non-occupational risk factors, such as pregnancy or rheumatoid arthritis, occupational factors play an important aetiological role in other cases.

1.2 Classification of WRULD

The primary purpose of this synopsis, using all the current available literature, is to provide a review of diagnostic criteria for work related upper limb disorders. These occupational related upper extremity disorders can be classified in two ways:

1. By their site of origin:
 - Shoulder (e.g. painful shoulder Syndrome)
 - Elbow (e.g. epicondylitis)

Wrist/Hand (e.g. carpal tunnel syndrome)

2. In relation to their purported cause, e.g. vibration white finger (VWF)

Classification using the latter, even if proof of a link is absent, implies a syndrome of occupational origin, whereas the former, does not distinguish morbidities that arose from the workplace from those that arose sporadically.

1.2.i Criteria for diagnosis and classification

In this review we will present criteria for diagnosis and for classification. The two are distinct notions. Diagnostic criteria are of value to the clinician to make considered decisions about a patient's possible condition. By necessity these criteria need to include the possibility of atypical cases and thereby span the spectrum of available presentations.

Classification criteria, by contrast, aim to identify homogenous subgroups for the purpose of study. In grouping individuals like this, some with the disorder may be classified as negative and vice versa. This is an accepted problem, but the aim of such classification criteria is to maximise discrimination between those with the condition under consideration from those with which it might be confused. From a medico-legal stand point, it is important that failure to satisfy classification criteria does not exclude the possibility that an individual might have the considered syndrome.

1.3 Structure of this review

For the purposes of this report the issues of classification will be considered in three sections. First the use of omnibus terms to cover groups of anatomically heterogeneous disorders, though collectively known to be work-related, will be reviewed. This includes such concepts as WRULD, CTD and RSI.

Secondly the various individual upper limb syndromes will be reviewed as distinct entities categorised by organ at the site of involvement. This includes broad areas, e.g. shoulder; and specific anatomical structures, e.g. extensor tendinitis.

Thirdly the relationship between vibration exposure and upper limb morbidity alternatively termed vibration white finger (VWF) and hand-arm vibration syndrome (HAVS), will be reviewed as a separate item.

The review will cover the various definitions that will be used both for diagnosis and classification and separately consider, where available, grading for severity. In addition, for some disorders, classification has been attempted by level of exposure.

1.3.i Sources of literature

A systematic literature search was undertaken using standard online retrieval systems. 'Medline', 'Embase' (Excerpta Medica) and ISI (Science & Social Science Index) citations were examined, from the Bath Information Delivery System (BIDS); as was the Occupational, Safety and Health

CD-ROM database. Standard textbooks of rheumatology, orthopaedic and musculoskeletal medicine were used to obtain details and references and then a hand search instigated to further relevant publications, within the English language literature.

1.3.ii Search criteria

Literature was sought that contained information pertaining to the classification or diagnostic criteria of anatomically based (*i.e.* shoulder, elbow, wrist *etc.*) or occupationally based (*i.e.* repetitive strain, vibration white finger *etc.*) disorders of the upper limb. Consideration was also given to sources of workplace ergonomic criteria (*i.e.* task variables) and classification (*i.e.* occupational types).

Section I

Non-Specific Work Related Upper Limb Disorders

2. Omnibus Terminology

2.1 Concepts of work related upper limb disorders

The term work related upper limb disorder (WRULD) encompasses a variety of clinical syndromes of the upper extremity disorders that have resulted from occupational trauma. A number of other terms have been used which probably describe the same entities but **in** the strictest sense do not overlap completely. This can be represented simply by the Venn diagram shown below in figure 2.1.

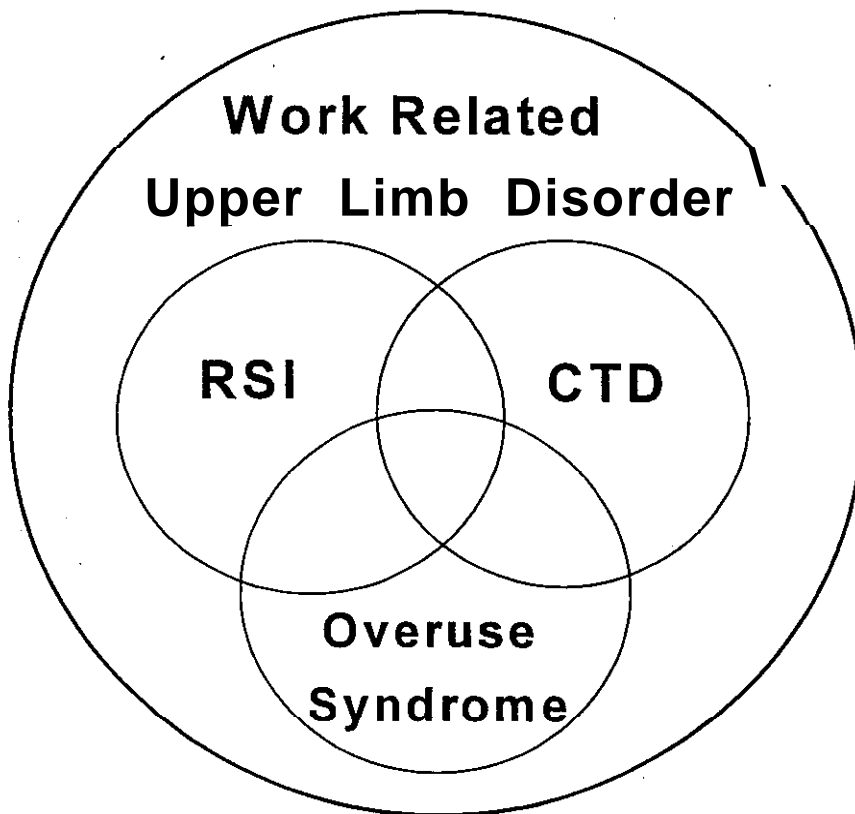


Figure 2.i. Work Related Upper Limb Disorder is an umbrella term.

2.1.i An umbrella term

All three terms, repetitive strain injury (RSI), cumulative trauma disorder (CTD) and overuse syndrome are clearly broadly synonymous, aiming to identify the same entity. Confusion arises as applying published criteria would select as 'positive' different individuals for each of these.

However, in the current literature there is no comparison of the performance of the use of such terms. Definitions are available, but these are not helpful as working criteria and as such there are no published criteria.

2.2 Overuse syndrome

Overuse syndrome is a recent term to describe work related upper limb disorders. The syndrome describes musculoskeletal disorders **characterised** by pain, tenderness, and often functional loss in muscle groups and ligaments subjected to heavy or unaccustomed **use**^(1,2). Tears of the **muscle-tendon** junction, due to high (eccentric) loads are the most obvious pathology; more likely, though less visible, are micro tears within the tendons after undue **loading**⁽³⁾. Tenosynovitis (synovial thickening) can occur due to friction. Fatigue also results from the disruption of the muscle due to static contraction. Hypoxia presents in nerves around the affected region from compression of blood supply by the tendon and muscles

2.2.i Grading

Only one criterion for grading has been proposed for overuse syndrome⁽⁴⁾, which includes three stages of severity:

Stage 1 ▪ Mild when at work.

Stage 2 ▪ Moderate severity lasting more than two hours into the evening.

Stage 3 ▪ Severe where the symptoms are still present the next morning.

2.3 Cumulative trauma disorder (CTD)

Cumulative trauma disorder has been defined as a disorder of the muscles, tendons, nerve and blood vessels that are caused, precipitated, or aggravated by repeated exertions or movements of the **body**⁽²⁾.

2.3.i Exposure

Several views suggest that exposure of **CTD** is attributed to repetitious tasks requiring forceful motions, unusual positions, exposure to vibration or temperature extremes ⁽⁵⁾. All strongly hint at the repetitive nature of the causal factors.

2.3.ii Hand work categories

There has been one attempt at **categorising** the nature of hand working with regard to **CTD's** ⁽⁶⁾. It involves the repetitive risk factors.

Low force-low repetitive (LOF-LOR)

High force-low repetitive (HIF-LOR)

Low force-high repetitive (LOF-HIR)

High force-high repetitive (HIF-HIR)

2.4 Repetitive strain injury (RSI)

This condition is described as common in young adults whose occupation demands repetitive movements of the wrist and hand. Several **synonymous** definitions are available which suggest that RSI is a collective term for a range of conditions characterized by discomfort or persistent pain in muscles, tendons, and other **soft** tissues, with or without physical manifestations. The syndrome is usually caused or aggravated by work, and associated with repetitive movement, sustained or constrained postures and/or forceful movements ⁽²⁾.

2.4.i Grading

There are two types of grading found in the literature. The first concerns modifications to the patient work duties and absence from work⁽⁷⁾.

- Grade 1: Able to perform usual work duties. but with pain.
- Grade 2: Able to work but modification of work activities due to pain,
- Grade 3: Continuous work absence due to pain \leq 6 months.
- Grade 4: Continuous work absence due to pain \geq 6 months

The second grades the clinical signs that the patient presents ⁽⁸⁾.

- Grade 1: Upper limb or neck discomfort of asymmetrical onset and more than one month's duration, increased by repetitive work. Relieved by rest. No physical signs except tenderness but not seeking aid.
- Grade 2: As in 1 but seeking assistance.
- Grade 3: As in 2 with pain at rest and loss of work.
- Grade 4: As **in** 3 with unremitting pain and/or sleep disturbance.

2.4.ii Occupational groups at risk

Musculo-tendinous injuries of this nature, affecting the upper limb, shoulder girdle or neck results in pain, fatigue and decline in work performance". Workers in jobs requiring repeated performance of a given task or set of tasks with cycle times of two minutes or **less**⁽¹⁰⁾, are considered at most risk from disorders such as RSI. Tasks defined as highly competitive typically have cycle times of 30 seconds or less. A cycle time of 1.5 minutes is considered optimal for tasks with a fast pace.

2.4.iii Classification by worker group

One author suggests four categories of worker to which different patients supposedly with RSI can be attributed to⁽²⁾. These can best be represented as the medical, psychiatric, malingering and patienthood models.

- Medical model: Workers are afflicted with a diagnosable physical condition that is causally related to the occupational ergonomic conditions.
- Psychiatric model: Workers are afflicted with a conversion or a somatization disorder. Sufferers experience pain in the absence of organic disease.
- Malingering model: Workers are not afflicted with either organic or psychiatric disorders.

Rather, they are deliberately falsifying symptoms to achieve material benefits.

Patienthood model: Workers are part of a broad movement that provides “a convenient and socially acceptable medium through which discontent about the nature and conditions of work can be communicated symbolically, thereby facilitating personal coping”.

2.5 Chronic upper limb pain syndrome

As the name suggests patients with this syndrome present chronic pain to the upper extremity. Predominant symptoms are defined as pain in all or part of one or both arms with no easily discernable **cause**⁽¹¹⁾.

2.5.i Associated risk factors

It is often associated with, repetitive use of keyboards, sudden changes in work practices, disharmony at work or other forms of anxiety and **sleeplessness**⁽¹¹⁾. Chronic upper limb pain syndrome is regarded as having both physical and psychological **causes**. Increased muscle tension, heightened awareness of normal or increased sensory nerve input, and anxiety driven introspection are considered contributing factors,

2.5.ii Occupational groups at risk

The problem is **often** work related and has achieved a degree of notoriety because of the severity of the symptoms with few physical signs. Prevalent among people who work for long periods without breaks at repetitive keyboard **jobs**⁽¹¹⁾.

2.6 Summary

A number of omnibus terms, each with their own definition, have been proposed to define upper limb syndromes occurring as a result of occupational stress. They all clearly purport to address the same concept though their slightly differing definitions would result in incomplete overlap in ascertainment **from** their use. No working criteria scheme has been proposed and no single term seems preferable.

Section II

Specific Syndromes Of The Upper Limb

3. Hand and wrist disorders

3.1 Introduction ,

Disorders of the upper limb are classified by the anatomical or topographical regions involved (e.g. shoulder, elbow, hand *etc.*) or by the main tissue types affected (e.g. tendons, muscles *etc.*). One source of confusion is that the main effects of symptoms may be at a site distant from the presumed pathology. An example of this is cubital tunnel syndrome which presents with pain distal to the wrist, where in fact the cause of the disorder is an entrapment neuropathy at the elbow. In this and subsequent sections are described diagnostic, classification criteria and details of any grading schemes for specific work related disorders of the upper limb, classified by a combination of topographical and tissue specific schemes.

3.2 Carpal tunnel syndrome (CTS)

In its sporadic form this condition is frequent in women in or beyond middle life, however it is perhaps the most common cause of work related hand discomfort and consequently one in which a large amount of literature has been published.

3.2.i Relation to working practices

Repeated use of the hand while it is held in extension at the wrists grinds the median nerve against the carpal bones (e.g. scrubbing on hands and knees or using clippers). Finger flexor tendons may become irritated and swollen causing an entrapment of the median nerve⁽⁹⁾. After harmful exertion the nerve stays tender, being apt to produce pins and needles on very little provocation for some weeks afterwards^(“).

3.2.ii Typical clinical description

One or more of the following symptoms are suggestive that carpal tunnel syndrome is present: **Paraesthesia**, hypaesthesia, pain or numbness affecting at least part of the median nerve distribution of the hand⁽¹³⁾. Impaired median nerve conduction present in CTS leads symptoms of pins and needles, numbness and pain, which are felt in the radial digits. Though more proximal pain radiation may occur¹⁾. Pins and needles are increased by use of the hand and appear at the anterior aspect of the digits⁽¹²⁾. Some patients report ‘electric shock’ after using the hand and commonly there is wasting of the muscles at the base of the thumb in advanced cases⁽¹⁴⁾.

3.2.iii Acute CTS

This is rare, and typical of a sequela of trauma, with rapid intense development of symptoms.

The pathophysiology is similar to an acute compartment syndrome, but it is difficult to distinguish from contusion injury of the median nerve⁽¹⁵⁾.

3.2.iv Chronic CTS

Chronic CTS is gradual in onset. If present for many months, pain may come on in the palm and the forearm, but pins and needles remain in the hand only ⁽¹²⁾. Sometimes only in one finger. There are three stages to chronic CTS⁽¹⁵⁾.

- Stage I: 'Early Chronic CTS': Sensory latencies (delayed conduction in the sensory nerves) are more likely to be prolonged than motor latencies. Gross alteration of the median nerve has not occurred.
- Stage II: 'Intermediate Chronic CTS': Sensory deficits are constant, motor impairment may be noted in some patients.
- Stage III: 'Advanced Chronic CTS': Patients have severe loss of sensory and motor functions, as well as thenar muscle atrophy.

3.2.v Diagnostic tests for CTS

An array of tests, shown below in Table 3.2.i, are available to clinically diagnose the presence of CTS. Their performance as diagnostic criteria in the workplace has yet to be established. Some require specialist equipment that may not be readily available. The ultimate (gold standard) test is delay in nerve conduction and the cut offs shown in the table below represent typical values.

3.2.vi Exposure categorisation

Categories of hand tool use exist with regard to carpal tunnel syndrome and related **disorders**⁽¹⁶⁾. Each of the following ergonomic risk factors is graded according to the worker's duration of activity. i.e. Less than 1 year, 1 to 20 years and greater than 20 years. A three 'level' system has been proposed to subdivide CTS:

1. Use of hand held vibrating tools
2. Repetitive movement of the wrist
3. Work causing great load on wrist

Table 3.2.i. Diagnostic tests for carpal tunnel syndrome (CTS)

Test	Procedure
Phalen's test	Elbow on table, wrist flexed, forearm vertical. Numbness or tingling on radial side digits within 60 seconds, after measuring paresthesias in response to position.
Tinel's test (Percussion)	Median nerve tapped at wrist proximal to distal. Tingling response in fingers.
Hand diagrams	Sites of pain; altered sensation marked on the outline of a hand diagram. Subjective perception of site of nerve deficit. signs on palmar side of radial digits without signs in palm.
Hand volume stress test	Measure hand volume by water displacement. Repeat after 7 minute stress test and 10 minute rest. Positive if increased by 10 ml.
Vibrometry	Measure threshold of quickly adapting fibres . Vibrometer head is placed on palmar side of digit. 120Hz increased to threshold of perception. Comparison of median, ulnar nerves in both hands. Positive if asymmetry with contra-lateral hand or radial versus ulnar.
Distal sensory latency and conduction velocity	Records orthodromic stimulus and recording across wrist. 1. Measures latency, conduction velocity of sensory fibres. Positive if latency greater than 3.5 mm/sec or asymmetry of conduction velocity greater than 0.5 mm/sec versus contra-lateral hand. 2. Measures latency, conduction velocity of motor fibers of median nerve. Positive if latency greater than 4.5 mm/sec or asymmetry of conduction velocity greater than 1.0mm/sec .
Measure of carpal tunnel pressure	Infusion catheter placed in carpal tunnel. Resting hydrostatic pressure measured and in response to stress position. Resting pressure >25mmHg shows positive result.
Static & moving two-point discrimination	Determines minimum separation of two points perceived as distinct when touched to palmar surface. Measures innervation density of slowly and quickly adapting fibres respectively. Positive if failure to discriminate two points 6 and 5 mm apart respectively.

3.3 Cubital tunnel syndrome (CUTS)

This is an entrapment neuropathy of the ulnar nerve at the elbow. Weakness of the hand may be perceptible to patients. Its cause is decreased activity in the ulnar nerve-innervated intrinsic muscles; in advanced cases these muscles are markedly atrophic.

3.3.i Definition

Ulnar nerve entrapment at the medial aspect of the elbow, causing medial elbow pain and paresthesias in the ring and little finger. This occurs through repetitive activity requiring **flexion**

or extension of the elbow against resistance⁽¹⁷⁾. Frictional stress due to occupational pressure on the ulnar nerve, at the proximal part of the palm, may also result in signs similar to that of **cubital** tunnel syndrome. Many cases have postural **causes**⁽¹²⁾.

3.3.ii Clinical grading

Four categories exist with regard to the clinical grading of CUTCs⁽¹⁸⁾.

- Grade I. Minimal weakness of ulnar innervated forearm and intrinsic hand muscles, no pain or atrophy.
- Grade II. Minimal weakness of ulnar innervated forearm and intrinsic hand muscles with pain and/or atrophy.
- Grade III. Moderate weakness of intrinsic hand muscles with atrophy and/or prominent tenderness or Tinel’s sign on nerve palpation and percussion
- Grade IV. Marked weakness of ulnar innervated forearm and intrinsic hand muscle with severe muscle atrophy.

A subjective, scoring system can be used with the examination of clinical and physical **symptoms**⁽¹⁸⁾. Score value for each item: Severe or marked = 2; Mild, moderate or minimal = 1; Normal or absent = 0. Maximum (severe) score is 20.

<u>Symptom</u>	<u>Physical Finding</u>
Pain	Tinel’s sign
Weakness	Tenderness
Numbness	Sensory loss
Tingling	Weakness in intrinsic hand muscles
Clumsiness	Weakness in long flexor muscles

3.4 Radial tunnel syndrome

This syndrome denotes entrapment of the deep branch of the radial nerve in the proximal forearm; patients present with deep, aching pain. Many cases are misdiagnosed and mistakenly treated as lateral epicondylitis, though the two are quite distinct with a thorough physical examination(“). No grading exists for diagnostic criteria.

3.4.i Definition of radial tunnel syndrome

Radial nerve entrapment in the proximal forearm. Pain in the proximal forearm over the extensor muscle origins. Commonly radiates proximally over the lateral epicondyle region and the lateral arm and distally along the **dorsolateral** aspect of the forearm”““.

3.5 Ulnar tunnel syndrome

The ulnar nerve is vulnerable where it lies in the groove behind the medial epicondyle of the humerus. Its function may be interfered with by constriction or by recurrent friction. The disease is common among labouring occupations.

3.5.i Symptoms of ulnar tunnel syndrome

Numbness and tingling of the ulnar side of the hand (4th and 5th digit) are caused by neural entrapment in the ulnar tunnel of the wrist⁽⁹⁾. Weakness and wasting of the ulnar-innervated muscles of the hand can occur, usually with an inability to straighten out ring and little fingers. No diagnostic criteria are available.

3.5.ii Causal factors of ulnar nerve entrapment

It is caused by severe and repeated pressure neurite in the fleshy part of the hand, behind the thumb. The disease is common among carpenters and maintenance men occupationally.

3.6 Pronator syndrome and anterior interosseous syndrome

Pronator and anterior interosseous syndrome are entrapment neuropathies. Pain develops in the proximal volar forearm and worsens with activity¹⁴. Median nerve entrapment in the proximal forearm causes paresthesias and dysesthesia of the radial digits, in severely painful pronator syndrome.

3.7 Tenosynovitis

Tenosynovitis is inflammation of the synovial lining of the tendon sheath⁽¹⁹⁾. Inflammation of the tendon itself is called tendinitis¹⁴. Tendons most frequently affected are the radial extensors of the wrist and the abductor pollicis longus or extensor pollicis brevis. Can be one of the commonest lesions found in factory workers⁽²⁰⁾.

3.7.i Definition of tenosynovitis

Symptoms may include pain, either aching or shooting pains up the arm, swelling, creaking tendons (crepitus) and restriction of movements^(21 14). Painful impairment of motion involving the tendon can cause an inability to grip items, such as a cup. Tendon sheath inflammation is typically subdivided into three groups: Acute, subacute and chronic^(?).

3.7.ii Acute tenosynovitis

Very short, intensive, unaccustomed, repetitive activity involving strong localised muscle activity can cause acute tenosynovitis. Symptoms are redness of the area over the affected tendon, warmth of the affected area, severe pain, painfulness of the tendon when moved and possibly palpable and audible crepitus.

3.7.iii Subacute tenosynovitis

More commonly seen in industry, subacute tenosynovitis onset is gradual and the findings are less dramatic. Symptoms include a dull ache over the tendon, discomfort with specific activities and some tenderness to the touch.

3.7.iv Chronic tenosynovitis

Repetitive motion is relatively mild or intermittent. Fibrous tissue develops within the sheath and gradually constricts it to form chronic tenosynovitis. Prolonged tenosynovitis can result in stenosing tenosynovitis.

3.7.v Aetiology

Five main factors appear to be concerned in aetiology⁽¹⁷⁾:

1. Occupational changes result in unusual work
2. Return to work after absence
3. Local “strain” either repetitive or a single “strain”
4. Direct local blunt trauma
5. Simple repetitive stereotyped movement associated with intensity of effort and speed.

3.8 De Quervains Tenosynovitis

De Quervains tenosynovitis (sometimes called stenosing tenosynovitis) is a common and **well-recognised** variant of tenosynovitis **characterised** by a localized swelling at the base of the thumb and thickening of the fibrous sheath or reticulum ^(14, 22). De Quervains is a particular **localised** tenosynovitis and not a separate entity. The patient presents with pain over the styloid process of the radius and a palpable nodule in the course of the abductor pollicis **longus** and extensor pollicis brevis tendons. The precise cause is unknown.

3.8.i Possible related risks

Excessive friction from overuse may be a factor, because the condition seems prone to follow oft-repeated actions such as wringing clothes. Some cases are causeless, while others are due to multiple minor trauma, e.g. using a pair of clippers”“.

3.8.ii Symptoms and signs of De Quervains tenosynovitis

Swelling on any of the digital flexor tendons may form just from proximal to the **metacarpophalangeal** joint; when big enough these may give rise to trigger finger or thumb(“). Diagnostic criteria suggest pain and tenderness localized to the radial aspect of the wrist plus a positive Finkelsteins’s test.

3.8.iii Symptoms and signs of trigger finger or thumb

Subjective sensations of locking or impaired extension of the affected digit, combined with either objective demonstration of triggering or palpation of a nodule along the flexor tendon that would be consistent with stenosis at the A1 pulley”“).

3.9 Intersection syndrome

Intersection syndrome can be classified as tenosynovitis of the second dorsal compartment.

Signs and symptoms localise to the intersection of the first and second extensor compartments. Pain and swelling develop in the region of the first extensor compartment muscles. Crepitation is often palpable and audible with wrist movement ⁽¹⁷⁾.

3.10 Beat hand

Symptoms for beat hand include inflammation and bruising of the palm⁽²¹⁾. No specific criteria exist.

3.10.i Occupations causing beat hand

Beat hand results mainly from manual labour causing ‘severe or prolonged friction or pressure on the hand⁽²⁴⁾, known as ‘beat conditions’”““.

3.11 Hand and wrist pain

This is a generalized term that includes a variety of symptoms and causes, but might be useful in examination of occupational categories. It is appropriate to classify according to the following subgroups:

- i. Localised or diffuse
- ii. Unilateral or bilateral
- iii. Aching or sharp
- iv. Present only with use
- v. Present constantly
- vi. Worse at night or at rest
- vii. Associated with sensory symptoms

3.11 .i Occupational exposures

Categories are available for workers to assess their relative ergonomic risk factors with regard to hand and wrist pain. The following table (Table 3. 1 I .I) gives grading for workplace exposure⁽²⁵⁾.

Table 3.11 .i Grades of exposure for occupational hand tasks

Grading	1. Relative Force & 3. Relative Heavy Lifts (Force = Kg.ms ⁻²)	2. Relative Repetitions	4. Keyboard
1	<1Kg	>3 mins/task	None or <1h/day
2	1 to <3Kg	1-3 mins/task	1 to <2 h/day
3	3 to <6Kg	2-5 tasks/min	2 to <3 h/day
4	6 to <20Kg	>5 tasks/min	3 to <4 h/day
5	≥20Kg	>2 tasks/s	≥4 h/day

3.11 .ii Occupational types

Hand use categories for occupational types can be broadly separated into five distinct **groups**⁽²⁵⁾ with examples of typical employment grades as shown:

1. Very light resistance/low repetition (manager)
2. Light resistance/very high repetition (keyboard operators)
3. Moderate resistance/moderately high repetition (assembly line workers)
4. Heavy resistance/moderate repetition (general plant workers)
5. Very heavy resistance/high repetition (grinder/metal workers)

3.1 1.iii Musicians

An example of the impact that pain can have on the hand and wrist can be seen in this classification of pain in **musicians**⁽²⁶⁾.

1. Pain in one site when playing instrument.
2. Pain in two or more sites, difficulty with high work load, some loss of coordination. Difficulty with 'top' performance.
3. Pain persists away from instrument, early involvement of other hand uses, **loss** of coordination or strength. Physical signs with persistent tenderness of upper limb structures.
4. Pain at rest, during night or both. Pain from writing, driving, housework *etc.* Established physical signs and disablement.
5. As for 4 with loss of capacity for most hand-uses. Gross physical signs, career stops or is threatened.

4. Disorders of the elbow

4.1 Epicondylitis

Epicondylitis is a common and well defined clinical entity affecting the elbow⁽²⁷⁾. It is characterised by pain at the epicondyle due to tendon-bone attachment problems⁽²¹⁾. It is more frequent laterally ('tennis elbow') than medially ('golfer's elbow').

4.1.i Symptoms of epicondylitis

Symptoms usually start with an ache on the extensor aspect of the forearm with certain movements that become localized to the area of the lateral epicondyle. Occasionally, pain radiates to the long and ring fingers. Resisted wrist extension and radial deviation intensify pain. Aching may increase in the evening, with elbow stiffness in the morning on awakening a frequent complaint. Depending on the severity, active wrist extension may be limited secondary to the pain⁽²⁸⁾. Decreased hand grip compared with that of the opposite hand may also present⁽²⁹⁾.

4.1.ii Diagnosis

Epicondylitis is diagnosed if reproducible tenderness is demonstrable with direct pressure on the lateral epicondyle⁽³⁰⁾. The term 'elbow tendinitis' should only be used where the short tendon is tender⁽³⁾.

4.1.iii Causes of epicondylitis

Epicondylitis is due to unusual forces, repetition, forceful gripping or repeated supination and pronation⁽²⁾.

4.2 Lateral epicondylitis

Commonly known as 'Tennis elbow' lateral epicondylitis is common in heavy labouring occupations, and is not restricted to more leisurely pursuits such as tennis.

4.2.ii Signs and symptoms

This disorder exhibits itself as localised tenderness near the lateral epicondyle and pain resisted wrist dorsiflexion⁽³¹⁾. The inflammation at the point where the extensor tendon is attached to the lateral epicondyle⁽¹⁴⁾, is caused by a lesion, situated near the elbow, of the extensor muscles controlling the wrist, The movement that hurts the elbow is resisted extension of the wrist⁽¹²⁾. No specific diagnostic criteria exist.

4.2.iii Clinical classification of lateral epicondylitis

Clinical types, classified by onset and injury’?

1. Acute, precipitated by indirect trauma.
2. Subacute, following indirect trauma, from repeated and forcible extension movements at the wrist
3. Insidious onset following blunt trauma
4. Acute onset following blunt trauma
5. Associated with cervical “strain” with history of hyperextension of **flexion** injury to cervical spine or neck “strain”.
6. Associated with jolt or traction to shoulder
7. Not classified elsewhere

4.2.iv Occupational classification

Lateral epicondylitis may be provoked by an exercise involving repeated and forcible extension movements at the wrist. The following three types of occupational group are classified respect to elbow stress⁽³³⁾.

- Type 1: No or little stress on the elbows (e.g. VDU operators, Driver. Instructor, **Office** worker, clerk, security guard).
- Type 2: Moderate stress on the elbows (e.g. inspectors, electricians. repairmen, unpacker, toolmaker).
- Type 3: Heavy stress on the elbows (e.g. Blaster, driller, polishers, welders, carpenter).

4.3 Medial epicondylitis

Commonly know as ‘golfer’s elbow’, **localised** pain is due to inflammation at the point where the common flexor tendon of the forearm, is attached to the medial **epicondyle**⁽¹⁴⁾. No specific criteria exist

4.3.i Beat elbow or olecranon bursitis.

Beat elbow arises from repeated contact of the elbow (‘beating’) with a hard surface, or through pressure or injury⁽¹⁴⁾. Beat elbow is occasionally seen in manual **labour occupations**⁽²⁴⁾, where the bursa, situated behind the olecranon process, is liable to traumatic bursitis.

4.3.ii Symptoms of olecranon bursitis

The bursa can be distended with clear fluid (an inflamed **swelling**)⁽¹⁴⁾, from prolonged external friction, which causes pain at the elbow. Pain may occur in the absence of any passive or resisted movement. It may even be provoked by leaning on a **table**⁽¹²⁾.

5. Conditions affecting the shoulder

5.1 Painful shoulder

A broad definition of **painful** shoulder syndrome includes any condition about the shoulder that is painful and causes apparent restrictions in motion.

5.1.i Impact on occupations

Localized muscle fatigue is common, among inexperienced welders, in deltoid **trapezius** (upper portion), and supraspinatus muscles during prolonged over head work. Experienced workers showed signs of fatigue in the supraspinatus muscle **only**⁽³⁶⁾.

5.1.ii General criteria for painful shoulder syndromes

Other occupational studies⁽³⁷⁾ that have involved a clinical evaluation of the shoulder have used the following inclusion criteria:

1. Painful stiff shoulder for at least four weeks.
2. Inability to use the affected arm with restriction of movement and loss of full function.
3. Pain at night causing sleep disturbance and inability to lie on the affected side.

Specific shoulder symptoms include those that present with bursitis, tendinitis or capsulitis.

5.1 .iii Welders painful shoulder

Welder's painful shoulder is one of the specific occupationally related painful shoulder syndrome's. Criteria for painful shoulder in welders are shown **below**⁽³⁵⁾:

- 1 - Located in the deltoid area
- 2 - Chronic in duration
- 3 - Aggravated by shoulder motion especially loading of the arm above 60° of abduction and/or **flexion**

5.2 Bursitis

Inflammation of the bursa may occur from mechanical irritation. A mild inflammatory reaction in the wall of the bursa, usually causing an effusion of clear fluid within the sac of the bursa.

5.2.i Patterns of bursitis

Pain felt at the shoulder arising only during, and for some hours after, considerable exertion may be caused by bursitis. Shoulder examinations show one of four **patterns**⁽¹²⁾:

1. Full range; both passive rotations hurt; full elevation is painless; there is no arc; the resisted movements do not hurt.
2. Full range with discomfort at extremes; a painful arc; resisted abduction and lateral rotation both hurt.
3. Changing patterns of pain on resisted movement. Full painful range of passive movement. The resisted movements hurt in an erratic way, the response being pain, then not, when the test is repeated. Slight arc.
4. Slight limitation of passive abduction alone or passive medial rotation alone. The resisted movements are painless or all equally painful. No arc.

5.2.ii Differential diagnosis of bursitis

A differential diagnosis of bursitis is **available**⁽¹²⁾:

1. Absence of a history of severe injury to the front of the joint
2. Absence of the capsular feel and of spasm limiting the amount of lateral rotation range. In consequence, the patient can, by disregarding the pain, allow rather more movement.
3. If the humerus is abducted to the horizontal, a full range of lateral rotation can be achieved in bursitis, but not without pain. In capsular contracture, it is unattainable whatever the position of the arm.
4. Passive **adduction** hurts at the extreme of range.

5.3 Tendon related disorders

There are three broad, though not separate, groups of tendon related disorders that affect the shoulder:

1. Tendinitis: Painful impairment of motion rising from inflammation of **the tendon**⁽²⁾.
2. Impingement: Swelling of the cuff and of the richly **vascularised bursal** wall covering the cuff are often primary lesions leading to impingement³⁸.
3. Rupture: Macro trauma, or a series of microtrauma resulting in limited movement and pain exacerbated by **motion**⁽¹²⁾.

All of these conditions are likely to occur as a result of another. For example rotator cuff tendinitis often leads to a condition that is synonymous to impingement syndrome. Although they will be treated as individual disorders, all three are commonly known as tendon related conditions.

5.4 Tendinitis of the shoulder

Shoulder tendinitis is based on a clinical examination and represents a combination of chronic inflammation and degenerative **changes**⁽³⁸⁾, inflammation of the peritenon is present all the way to the area of the muscle-tendon **junction**⁽³⁹⁾.

5.4.i Occupational origin

Chronic inflammation results from repeated microtrauma affecting the entire shoulder girdle. Pain originating in the cuff tendons and muscles can be of occupational origin. Older

populations suffer disorders attributable to degenerative processes, while younger populations suffer where overuse leads to microtrauma, then instability and subluxation”‘).

5.5 **Bicipital tendinitis**

Bicipital tendinitis results in localized anterior shoulder pain over the long head of biceps tendon; with forearm supination, the tendon sheath is tender with thumb rolling. Shoulder motion is normal⁽³⁴⁾.

5.5.i Diagnosis

Diagnosed by a history of anterior shoulder pain with specific tenderness over the bicipital groove⁽⁴⁰⁾. Yergason’s sign (pain with resisted supination) positive⁽⁴¹⁾.

5.6 **Infraspinatus tendinitis**

The diagnostic criteria for infraspinatus tendinitis is palpation of posterior aspect of greater tuberosity with shoulder abducted to 90° and elbow flexed to 90°⁽⁴¹⁾.

5.1 **Supraspinatus tendinitis**

The diagnostic criteria for supraspinatus tendinitis is palpation of the tendon between acromion and greater tuberosity during resisted abduction”‘).

5.8 **Subscapularis tendinitis**

The diagnostic criteria for subscapularis tendinitis is palpation just medial to lesser tuberosity with elbow flexed to 90° during resisted medial rotation⁽⁴¹⁾.

5.9 **Rotator cuff lesions**

In general rotator cuff lesions present localised pain with tenderness over the humeral head⁽⁴²⁾.

5.9.i Diagnosis of rotator cuff lesions

Shoulder pain exacerbated by movement against resistance in one or more of the following: abduction, external rotation and internal rotation, is a sign of rotator cuff lesions. Although an active range of movement of the joint is limited by pain, passive **range of motion remains approximately normal**⁽¹²⁾. Acute rotator cuff tendinitis is diagnosed if the symptoms are of 12 weeks duration or less. Chronic rotator cuff rupture presents a marked difficulty initiating abduction with weakness and limitation of movement⁽⁴⁰⁾. Pain was usually experienced towards the end of the active range of movement⁽¹²⁾.

5.9.ii Exposure

Persons executing repetitive overhead movements are prone to develop bursal side tears

secondary to impingement in the rotator cuff region⁽³⁸⁾. The majority of complete cuff ruptures start at the **articular** side as incomplete tears. Pain in patients with incomplete tears resembles that seen in impingement and tendinitis.

5.9.iii The extent of rotator cuff tears

Under normal **circumstances** the following classification would only be used under surgical conditions. However with improved technology and the use of **MRI** scans, the possibility exists that shoulder tendon tears may be visualised without the need for surgery.

Extent of **tear**⁽⁴³⁾:

Group I. Partial tears or full-substance tears measuring less than **1cm** in sagittal diameter at bony detachment.

- a) deep, partial tears
- b) superficial tears
- c) small, full substance tears.

Group II. Full substance tears of entire supraspinatus

Group III. Full substance tears involving more than one tendon.

Group IV. Massive tears with secondary OA.

5.9.iv Topography of tears

Topography of tear in sagittal **plane**⁽⁴³⁾:

Segment 1: Subscapularis tear

Segment 2: Coracohumeral ligament tear

Segment 3: Isolated supraspinatus tear

Segment 4: Tear of entire supraspinatus and one half of infraspinatus

Segment 5: Tear of supraspinatus and infraspinatus

Segment 6: Tear of subscapularis, supraspinatus and infraspinatus

Topography of tear in frontal plane:

Stage 1: Proximal stump close to bony insertion

Stage 2: Proximal stump at level of **humeral** head

Stage 3: Proximal stump at level of glenoid

5.10 Impingement syndrome

Impingement syndrome can be defined as a painful arc on abduction above **80°**, often with the inability to overcome it, and some limitation of passive. in addition to active abduction, but without features of the other shoulder **conditions**⁽¹²⁾.

Swelling of the cuff and of the richly vascularised **bursal** wall covering the cuff are often primary lesions leading to impingement”“.

5.10.i Diagnostic criteria

Impingement typically begins at 60” to 70” and is maximum between 100” and 120” of abduction. Recurrent pain from compression of **subacromial** tissue also occurs at **90-100°** of forward **flexion**⁽³⁴⁾.

5.11 Frozen Shoulder

Frozen shoulder is a common but ill understood affliction of the glenohumeral joint. **Characterised** by a marked restriction of all active and passive movements, with external rotation reduced by at least 50% of normal in the absence of bony restriction. Neither synovitis nor a tendinopathy causes the decrease in rotation. The primary site of the lesion is the capsule and the capsule ligament⁽⁴⁴⁾.

5.11.i Onset and the clinical stages of frozen shoulder

Pain is gradual in onset⁽³⁸⁾. Then there are three consecutive clinical stages. The **first** phase is called the painful phase (a duration of between 10 and 36 weeks). Pain is not a feature of the subsequent stiffening (adhesive) stage (which without improvement lasts 4 and 12 months) or the ensuing thawing (recovery, resolution) phase of this syndrome as long as movement is not attempted by force (5 and 26 months). The mean duration, from onset to recovery, is about 30 months⁽⁴⁵⁾. There is commonly limitation of passive motion in the lateral rotation.

First clinical stage?

1. When the pain is confined to the deltoid area
2. When the patient can lie on the affected side at night
3. When there is no pain but on movement
4. When the end-feel is elastic

Second stage: Should the above criteria be satisfied only in part the capsulitis is in the second stage.

Third stage:

1. Severe pain extends from the shoulder to the forearm and wrist
2. Patient cannot **lie** on the affected side at night
3. Pain is greatest at night, and persists even when the arm is kept still
4. The end-feel is abrupt

5.11 .ii Classification of the inflammatory reaction in the capsule

The **inflammatory** reaction in the capsule and synovium that subsequently leads to formation of adhesions, specifically in the axillary fold and in the attachment of the capsule at the anatomic neck of the humerus, has four stages of **maturation**⁽⁴⁶⁾:

Stage I. Pre-adhesive stage, seen in patients with minimal or no limitation of motion.

Stage II. Acute adhesive synovitis, there is a proliferative synovitis and early adhesion formation.

Stage III. Maturation, has less synovitis with loss of axillary fold.

Stage IV. Chronic, adhesions are fully mature and markedly restrictive.

5.11 .iii Causative factors

The primary apparent causative factor is idiopathic in nature. The second causative factors are remote causes (e.g. a cervical **disc**)⁽⁴⁷⁾. Any condition that contributes to the dependency of the arm over an extended period can lead to the development of capsular contracture, and frozen shoulder type symptoms.

Section III

Vibration Exposure

6. Hand-arm vibration syndrome

6.1 Vibration

As a physical phenomenon vibration can be defined as mechanical oscillation: periodical movement of a body between two points in a straight line. The effect of vibration is becoming increasingly important to the clinician. Vibration may cause Raynaud's syndrome, peripheral neuropathy and tunnel syndromes which differ in no way from the same conditions arising *de novo*. Vibration-induced disorders can therefore only be diagnosed on the basis of occupational exposure^(48, 49).

6.1.i Factors determining biological effects of vibration

Apart from the penetration point, the relevant factors regarding the biological effects of vibration appear to be the frequency band, the conditions of work and the individuals sensitivity⁽⁴⁹⁾. Frequency determines which tissues might be damaged; deleterious effects usually occur at 2.8-2800 Hz. Individuals differ but the duration of work and conditions of work, *i.e.* holding tools too tightly, appear to be important to vibration injury.

6.2 Vibration disorders

Hand-arm vibration syndrome, vibration-induced white finger, traumatic vasospastic disease and occupational Raynaud's phenomenon characteristically occur in fingers exposed to vibration. These are conditions identifying similar features and the nature of their terms cover conditions extending past the finger to the forearm.

6.3 Hand-arm vibration syndrome

Hand-arm vibration syndrome can be defined as a vascular component characterized clinically by cold-induced vasospasm, indistinguishable from Raynaud's disease⁽²⁾.

6.3.i Clinical grading

Hand-arm vibration can be graded clinically in four stages of sensorineural exposure⁽⁵⁰⁾.

Stage OSN. Exposed to vibration but no symptoms.

Stage 1 SN. Intermittent numbness, with or without tingling.

Stage 2SN. Intermittent or persistent numbness, reduced sensory perception.

Stage 3SN. Intermittent or persistent numbness, reduced tactile discrimination and/or manipulative dexterity

6.3.ii Vibratory occupational risk factors.

There are many examples of segmental vibration risk factors that can cause arm-hand vibration syndrome, e.g. Pneumatic tools, hand-held and pedestal grinders, power saws or shoe **pounding-up machines**^(2, 49).

6.3.iii Injury from vibration

An alternative definition to the effect of vibratory tools can be found in the following three basic injury types?

- Circulatory disturbances
- Neurological disturbances
- Bone and joint changes

6.4 Vibration white finger (VWF)

Vibration white finger occurs in periodic attacks. usually provoked by cold, of blanched and numb fingers and loss of sensitivity, followed by painful **throbbing**⁽⁵¹⁾.

6.4.i Grading

The Taylor-Pelmar classification considers the clinical grading with regard to the condition of the digits and work interference. This is shown in table 6.4.i.⁽⁵²⁾.

Table 6.4.i Taylor-Pehnar classification.

Grade	Feature	I Interference
0	No blanching	None
0T	Intermittent tingling	None
0N	Intermittent Numbness	None
0TN	Tingling & Numbness	None
1	Blanching of ≥ 1 fingertips, with/without tingling or numbness	None
2	Blanching of ≥ 1 fingers with numbness	Slight interference in social activities, though not at work.
3	Extensive blanching, frequent episodes	Definite interference at work
4	Extensive blanching to most fingers, frequent episodes & finger ulceration	Occupational change to avoid further vibration exposure

6.4.ii Clinical grading cold-induced Raynaud's phenomenon

The Stockholm Workshop scale grades the cold-induced Raynaud's phenomenon in five stages⁽⁵⁰⁾.

0. No attacks.
1. Mild. Occasional attacks affecting tips of fingers.
2. Moderate. Occasional attack affecting distal/middle phalanges of one/more fingers.
3. Severe. Frequent attacks affecting all phalanges of most fingers.
4. Very severe. As 3'with trophic skin changes

6.4.iii Vasospasm

Finger blood flow is an important diagnostic criterion of vibration-related disorders, such as VWF. Using the flux test, measuring blood cell flux in fingertip skin, a five point grading of vasospasm is available⁽⁵³⁾:

4. Very severe: Room, 24°C, finger, 15°C. no occlusion.
3. Severe: Room, 24°C, finger, 15°C, occlusion for 5 minutes.
2. Moderate: Room, 24°C or 20°C, finger. 10°C, occlusion for 5 minutes ± cool room to 16°C.
1. Mild: Room, 20°C, finger, 10°C, occlusion for 5 minutes + cool hand.
0. Negative: No vasospasm induced by any of the above stimuli.

6.4.iv Risk factors in VWF

Extraordinary usage of vibratory tools in the cold is an important risk factor for developing VWF⁽⁴⁸⁾. Hand transmitted vibration usually arises from contact of the fingers and hand with either a powered tool or material being held against a surface. The adverse effects of vibration are not necessarily restricted to the area in contact with the source of vibration”“.

6.4.v Causative factors

Cold and vibrations are the usually triggering factors in vibration-induced Raynaud's phenomenon. The exposure time is also important. In chainsaw workers a minimum of exposure is considered to be one year⁽⁴⁹⁾, but in other occupations the syndrome can occur much sooner. It's aetiology though can be due to the presence of a local fault: either hereditary or idiopathic; or acquired through collagenoses, vibrating tool syndrome or post-frostbite⁽⁵⁶⁾.

Appendices

7. Nomenclature

7.1 Introduction

The tables below represent nomenclature for terms mentioned in this report. They are not suggested as definitive terminology, but are presented as an attempt to clear the confusion resulting from the large number of different reports available. Disorders are placed in chronological order with an aim to show how the terminology has developed temporally.

1.2 Hand and wrist disorders.

Disorder	Synonymous Terminology	Conditions Included	Author
Carpal tunnel syndrome (CTS)		Neuritis	(3) ↑
Hand and wrist pain	Chronic upper limb pain	Flexor tenosynovitis Trigger finger or thumb Carpal tunnel syndrome De Quervain's tenosynovitis Dorsal tenosynovitis Raynaud's syndrome	(11)
Pain Syndrome of the forearm and arm		Tenosynovitis/Tendinitis Peritendinitis.	(57)
Proximal lesion of median nerve	Double crush syndrome		(15)
Stenosing tenosynovitis	De Quervain's disease		(17)
	Trigger finger		(58)
Tendon problems		Flexor tenosynovitis Trigger finger or thumb De Quervain's tenosynovitis Dorsal tenosynovitis Dupuytren's contracture	(11)

7.3 Elbow and shoulder disorders.

Disorder	Synonymous Terminology	Conditions Included	Author
Adhesive capsulitis	Stiff shoulder syndrome	Periarthritis of the shoulder Pericapsulitis Obliterative bursitis Scapulohumeral periarthritis Stiff and painful shoulder Adherent subacromial bursitis	(60)
Heat elbow	Olecranon bursitis Miners or students elbow	Subcutaneous cellulitis	(14)
Epicondylitis	Golfer's elbow Tennis elbow		(14)
Frozen shoulder	Adhesive capsulitis Retractile capsulitis		(38) (47)
Impingement syndrome	Painful arc syndrome Rotator cuff Syndrome		(22)
Occupational cervico-brachial disorder		Disorders of neck and shoulder related to occupational factors: cervical syndrome, tension neck syndrome, humeral tendinitis.	(2)
Painful shoulder		Any condition about the shoulder that is painful and cause apparent limitation of motion.	(46)
		Acute or subacute rotator cuff tendinitis Chronic rotator cuff tendinitis Bicipital tendinitis Soft tissue lesions Frozen shoulder	(61)
		Cervical brachial syndrome Neck and upper-limb disorder Neck-shoulder problems	(29)
Rotator cuff tendinitis		Supraspinous tendinitis	(42)
Shoulder conditions		Bursitis Bicipital tendinitis Impingement syndrome.	(30)
Specific painful shoulder conditions		Subacromial bursitis Supraspinatus tendinitis Bicipital tendinitis Supraspinatus tendon rupture Adhesive shoulder capsulitis	(34)

7.4 Omnibus disorders.

Disorders	Synonymous Terminology	Included Conditions	Author
Cumulative trauma disorder (CTD)	Repetitive strain injuries Overuse syndrome Repetitive motion injuries	A class of disorders "with similar characteristics" including pathogenesis: documented relationship to exposure: chronicity of onset and response to treatment; symptoms that are often poorly localized, nonspecific, and episodic; and association with multiple occupational and nonoccupational factors.	(6) (2)
		Tendinitis Tenosynovitis Carpal tunnel syndrome Ulnar tunnel syndrome Cubit.4 tunnel syndrome Rotator cuff tendinitis Bicipital tendinitis Epicondylitis Trigger finger De Quervain's disease Raynaud's syndrome Thoracic outlet syndrome Ganglionic cysts	(9)
		Tenosynovitis due to continuous motion. Tenosynovitis due to vibration Bursitis due to continuous motion or pressure Neuritis due to repeated motion Ganglion	(62)
Repetitive strain injury (RSI)	Occupational overuse syndrome	Tennis elbow Cubital tunnel syndrome Radial tunnel syndrome Pronator syndrome Anterior interosseous syndrome Intersection syndrome De Quervain's disease Carpal tunnel syndrome Trigger finger or thumb	(2) (17)
Upper limb disorders (ULD)	They may also be known as repetitive strain injuries (RSI) and cumulative trauma disorders (CTD's)	Encompassing a wide range of conditions affecting the soft tissues of the hand, wrist, arm and shoulder...in the context of the workplace.	(14)

1.5 Disorders of vibratory origin.

Disorder	Synonymous Terminology	Conditions Included	Author
Hand-arm vibration syndrome (HAVS).		Group of signs and symptoms which include. vascular, bone/joint disorders, neurological effects and possible damage to the muscles and soft tissue.	(59)
Vibration-induced raynaud's syndrome	Vibration white finger Traumatic vasospastic disease Raynaud's phenomenon White or dead finger		(49)
Vibration white finger (VWF)	Dead hand or dead finger .		(4)

8. International Classification of Diseases

8.1 Chapter VI.

Diseases of the nervous system (G00-G99).

G50-G59 Nerve, nerve root and plexus disorders

G56 Mononeuropathies of the upper limb

G56.0 Carpal tunnel syndrome

G56.1 Other lesions of the median nerve

G56.2 Lesion of the nerve

G56.3 Lesion of radial nerve

8.2 Chapter XIII.

Diseases of the musculoskeletal system and connective tissue (M00-M99).

Sites of musculoskeletal involvement

0 Multiple sites

1 Shoulder region	Clavicle Scapula	Acromioclavicular Glenohumeral Sternoclavicular
2 Upper arm	Humerus	Elbow joint
3 Forearm	Radius Ulna	Wrist joint
4 Hand	Carpus Fingers Metacarpus	Joints between the bones

M00-M25 Arthropathies

M20-M25 Other joint disorders

M25 Other joint disorders, not elsewhere classified

M25.5 Pain in joint

M25.6 Stiffness in joint, not elsewhere classified

M25.8 Other specified joint disorders

M25.9 Joint disorder, unspecified

M60-M79 Soft tissue disorders

M60-M63 Disorders of muscles

M62 Other disorders of muscle

M62.1 Other rupture of muscle (nontraumatic)

M62.6 Muscle strain

M62.9 Disorders of muscle, unspecified

M65-M68 Disorders of synovium and tendon

- M65 **Synovitis and Tenosynovitis**
- M65.2 Calcific **tendinitis**
- M65.3 Trigger finger
- M65.4** Radial styloid tenosynovitis (De **Quervain**)
- M65.8 Other synovitis and tenosynovitis
- M65.9 Synovitis and tenosynovitis, unspecified
- M66 Spontaneous rupture of synovium and tendon
Includes: rupture that occurs when a normal force is applied to tissues **that** are inferred to **have** less than normal strength.
- M66.1 Rupture of synovium (Rupture of **synovial** cyst)
- M66.2 Spontaneous rupture of extensor muscles
- M66.3 Spontaneous rupture of flexor tendons
- M66.4 Spontaneous rupture of other tendons
- M66.5 Spontaneous rupture of unspecified tendon (Rupture at **musculotendinous** junction, nontraumatic)

M70-M79 Other soft tissue disorders

- M70 Soft tissue disorders related to use, overuse and pressure
Includes: soft tissue disorders of **occupational** origin
- M70.0 Chronic **crepitant** synovitis of hand and wrist
- M70.1 Bursitis of hand
- M70.2 **Olecranon** bursitis
- M70.3 Other bursitis of elbow
- M70.4 **Prepatellar** bursitis
- M70.8 Other soft tissue disorders related to use, overuse and pressure
- M70.9 Unspecified soft tissue disorder related to use, overuse and pressure.
- M75 Shoulder lesions
- M75.0 Adhesive capsulitis of shoulder (Frozen shoulder, periarthrits of shoulder)
- M75.1** Rotator cuff syndrome (Rotator cuff supraspinatus tear or rupture {complete/incomplete}, not specified as traumatic. Supraspinatus syndrome)
- M75.2 Bicipital tendinitis
- M75.3 Calcific tendinitis of shoulder (Calcific **bursa** of shoulder)
- M75.4 Impingement syndrome of shoulder
- M75.5 Bursitis of shoulder
- M75.8 Other shoulder lesions
- M75.9 Shoulder lesion, unspecified
- M77 Other **enthesopathies**
- M77.0 Medial epicondylitis
- M77.1 Lateral epicondylitis
- M77.2 Periarthritis of wrist
- M79 Other soft tissue disorders, not elsewhere classified
- M79.6 Pain in limb

M80-M94 Osteopathies and chondropathies

- M89 Other disorders of bone
- M89.0 **Algoneurodystrophy** (Shoulder-hand **syndrome**, Sudecks atrophy, sympathetic reflex dystrophy).

8.3 Chapter XIX.

Injury, poisoning and certain other consequences of external cause (S00-T98)

S40-S49 Injuries to the shoulder and upper arm

- s43 Dislocation, sprain and strain of joints and ligaments of shoulder girdle
- s43.4 Sprain and strain of shoulder joint (Coracohumeral {ligament}, rotator cuff {capsule}).
- s43.5 Sprain and strain of acromioclavicular joint (Acromioclavicular joint)
- S43.6 Sprain and strain of sternoclavicular joint
- S43.7 Sprain and strain of other and unspecified parts of shoulder girdle.

T66-T78 Other and unspecified effects of external causes

- T75 Effects of other external causes
- T75.2 Effects of vibration (Pneumatic hammer syndrome, traumatic vasospastic syndrome).

8.4 Chapter XX.

External causes of morbidity and mortality (V01-Y98).

Place of occurrence code:

- .0 - Home
- 1 - Residential institution
- .2 - School, other institution and public administrative area
- .3 - Sports and athletics area
- .4 - Street and highway
- .5 - Trade and service area
- .6 - Industrial and construction area
- .7 - Farm
- .8 - Other specified places
- .9 - Unspecified place

Activity code:

- 0 - While engaged in sports activity
- 1 - While engaged in leisure activity
- 2 - While working for income
- 3 - While engaged in other types of work
- 4 - While resting, sleeping, eating or engaging in other vital activities
- 5 - While engaged in other specified activities
- 9 - During unspecified activity

W20-W49 Exposure to inanimate mechanical forces.

- w43 Exposure to vibration (Includes: infrasound waves)

X50-X57 Overexertion, travel and privation.

- x50 Overexertion and strenuous or repetitive movements
Include: lifting

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