REPORT

Development of a work-related musculoskeletal disorders codes and conditions list

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Te Kāwanatanga o Aotearoa
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WORKSAFE
Mahi Haumaru Aotearoa

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EXECUTIVE SUMMARY

Work-related musculoskeletal disorders (WRMSDs) have significant impact on people all over the world. Musculoskeletal disorders (MSDs) affect 1.71 billion people worldwide and are the main contributor to the global need for rehabilitation. The prevalence of these disorders in specific working populations and/or occupational sectors is significantly higher than in general populations. In New Zealand, MSDs represent over 30% of the overall burden of harm from work-related ill-health and injury.

The Human Factors/Ergonomics (HFE) team at WorkSafe New Zealand are leading work which targets exposure to musculoskeletal health risks in New Zealand workplaces. The HFE team found there was no clear definition of WRMSDs used in New Zealand, or what specific injuries or conditions were included in the musculoskeletal harm data. This is necessary for accurate WRMSDs data, and to understand the high-risk work activities that result in WRMSDs. Good understanding of high-risk work activities will then determine appropriate risk assessment methods and help WorkSafe to prioritise interventions.

The purpose of this project was to develop a WRMSDs codes and conditions list for use within WorkSafe New Zealand, and to support further research. This was achieved in two stages. First, we conducted a literature review of health classification and WRMSDs classifications systems used in New Zealand and abroad. The second stage involved using the findings of the review to develop the WRMSDs codes and conditions list.

Key findings of the review

Our review found there is no internationally recognised classification system or list for WRMSDs. We found:

- there is a lack of consensus on terminology and definitions used for WRMSDs in research and within countries, and the conditions included under the definition
- there are inconsistencies in how health professionals diagnose these conditions
- there is a lack of agreement amongst researchers on case definitions for WRMSDs
- that government health priorities and the role of compensatory bodies within a country influence and determine what conditions are included as WRMSDs, and
- that WRMSDs are difficult to diagnose and classify as both work-related and individual factors contribute to their development.

There were differences in how each country classified or collected WRMSDs data. We were unable to obtain full data sets from any country, which made it difficult to compare musculoskeletal harm data.

New Zealand mainly uses ACC injury claims data to understand work-related musculoskeletal harm. WorkSafe uses the System of Work-related Injury Forecasting and Targeting (SWIFT) tool to further analyse data. The SWIFT tool provides many benefits – it allows more sophisticated analysis of the data, better understanding of injury causation, and may help WorkSafe with prioritising where to target interventions. WorkSafe uses injuries and conditions that fall into the 'Body Stressing' mechanism for reporting on musculoskeletal conditions at work. This is not without its limitations, and other mechanisms where WRMSDs occur are overlooked, for example from slips, trips and falls, or from exposure to vibration.

Development of the WRMSDs codes and conditions list

The findings of the review were used to develop a WRMSDs codes and conditions list for use within WorkSafe. The HFE team developed an initial codes and conditions list by:

- reviewing and refining the current diagnostic codes used in New Zealand, including the ACC Read codes and ICD-10-AM codes
- establishing criteria for inclusion of codes and conditions. We used the findings of the literature review and the WorkSafe definition for WRMSDs to inform selection criteria. This ensured that we included conditions based on international research and best practice, and not solely determined by the Accident Compensation framework
- working with WorkSafe stakeholders and subject matter experts to consider and justify why the relevant codes or conditions were included.

Conclusion

This report provides a summary of classification systems and data collection methods for WRMSDs in New Zealand and abroad. While there was no international classification system for WRMSDs we applied the review findings to develop the codes and conditions list. This review also found gaps in New Zealand's surveillance of WRMSDs.

Recommendations

Based on the main findings, we recommend that:

- WorkSafe adopts and uses the WRMSDs codes and conditions list for reporting of musculoskeletal harm data
- WorkSafe considers opportunities to collect other sources of musculoskeletal harm data. For example, workplace discomfort data, early intervention monitoring information from health organisations, and other health monitoring data
- WorkSafe, other government agencies, and industry bodies conduct or support research that examines workers' exposure to musculoskeletal risks. Such projects may include nationwide surveys, or applied research within industry
- WorkSafe and ACC (and other relevant organisations) consider how the work by Boocock *et al*. (2009) on the upper extremity classification framework can be further integrated into practice within New Zealand.

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1.0 Introduction

IN THIS SECTION:

1.1 Why are we doing this research?

Musculoskeletal disorders (MSDs) affect 1.71 billion people worldwide and is the main contributor to the global need for rehabilitation (World Health Organization, 2022a). MSDs are a major cause of chronic disability, sick leave, diminished work productivity, and decreased quality of life. (Briggs *et al*., 2018). Data from the 2017 Global Burden of Disease study showed that MSDs were the highest contributor to global disability (16% of all years lived with disability – YLDs) (James *et al*., 2018). The prevalence of these disorders in specific working populations and/or occupational sectors is significantly higher than in general populations (Hagberg *et al*., 2012; Russo *et al*., 2020). In New Zealand, musculoskeletal disorders (MSDs) represent over 30% of the overall burden of harm from work-related ill-health and injury (WorkSafe New Zealand, 2019).

The Human Factors/Ergonomics (HFE) team at WorkSafe New Zealand are leading work which targets exposure to musculoskeletal health risks in New Zealand workplaces. The HFE team found that there was no clear definition of WRMSDs used in New Zealand, or what specific injuries or conditions were being included in the musculoskeletal harm data. This is necessary for accurate WRMSDs data, and to understand the high-risk work activities that result in WRMSDs. Good understanding of high-risk work activities will then determine appropriate risk assessment methods and help WorkSafe to prioritise interventions.

1.2 Purpose

The purpose of this project was to develop a codes and conditions list for WRMSDs for use within WorkSafe New Zealand, and to support further research. This was achieved in two stages. First, a literature review was undertaken to review health classification systems, and to identify whether there are specific classifications for WRMSDs. We also searched for data collection and analysis processes used within New Zealand, and internationally. The findings of the review are presented in sections 2 and 3 of this report.

The second stage involved using the findings of the review to develop the WRMSDs codes and conditions list. This process is outlined in section 4 of this report.

1.3 Methods

As part of the research, the HFE team:

- conducted a literature review of the classification systems for WRMSDs used in New Zealand, other countries, and international organisations
- researched data collection methods, and surveillance methods for WRMSDs used in New Zealand, other countries and international organisations
- interviewed subject matter experts from New Zealand and abroad about data collection and surveillance methods of WRMSDs.

To develop the WRMSDs codes and conditions list, the HFE team:

- researched and obtained codes and classification lists used within New Zealand for WRMSDs by Accident Compensation Corporation (ACC), WorkSafe New Zealand, and other relevant health organisations
- researched and obtained codes and classification lists for WRMSDs used abroad where available
- developed and refined the WRMSDs codes and conditions list based on the findings from the literature review.

1.4 Literature search criteria and limitations

Between January and June 2022, the HFE team conducted an online literature search to identify known WRMSDs datasets, WRMSDs statistics, data collection methods and literature on classification systems.

International and New Zealand MSDs and WRMSDs literature was identified using Google search, Google scholar, and university library online search engines. We found research articles through existing external networks such as ACC, the Human Factors and Ergonomics Society of New Zealand (HFESNZ), regulatory publications (for example, WorkSafe, SafeWork Australia), internal and unpublished documents (provided by WorkSafe and ACC), academic reports, journal articles, textbooks, publications from world health bodies (for example, World Health Organization, International Labour Organization) and relevant standards. Grey literature from international countries was obtained via Google Search.

The online search parameters used the following keywords:

'work-related musculoskeletal disorders **and** classification **or** categories **or** conditions **or** hierarchy', 'WRMSD **and** classification **or** categories **or** conditions **or** hierarchy', 'work-related injury statistics', 'workers compensation data', 'work related musculoskeletal disorders', 'occupational diseases', 'musculoskeletal classification system', 'work related injuries and conditions', 'work-related musculoskeletal disorders **and** Europe **or** New Zealand **or** Australia **or** US **or** Canada **or** (Health and Safety Executive), 'international labour organization **and** occupational diseases **or** WRMSD', 'Accident Compensation Corporation **and** WRMSD'.

2.0 Findings from the literature review

IN THIS SECTION:

This section summarises the key points from the review.

2.1 What is a health classification system?

Health classification systems provide the health sector with a consistent method of diagnosing and categorising health related conditions, identifying their causes and consequences, and treatment interventions (World Health Organization, 2021). They provide a standardised approach for comparing and communicating health information using a consistent language (World Health Organization, 2021). They are used for many purposes, including health statistics, determining health costs and allocation of funding (World Health Organization, 2021).

According to Van Eerd *et al*. (2003) a successful classification system has two components; (1) the disorders/syndromes identified within the classification; and (2) the criteria required for each disorder (Van Eerd *et al*., 2003). There are many different health classification lists and systems, some are specific to a type of condition or disease, and others are more universal. The most recognised international disease and health classification systems were developed by the World Health Organization (WHO) (2022b), which are:

- the International Statistical Classification of Diseases and Related Health Problems (ICD)
- International Classification of Functioning, Disability and Health (ICF), and
- the International Classification of Health Interventions (ICHI).

For more information about these classifications systems see Appendix 4

2.2 The classification of work-related musculoskeletal disorders

Many countries have adopted the WHO systems for classification of health related data (World Health Organization, 2021). However, there is no internationally recognised classification list for work-related musculoskeletal conditions. WHO proposed the need for a universal classification system for work-related conditions to help countries compare occupational disease and work-related injury data (World Health Organization, 1958). Some researchers have developed classification systems for specific WRMSDs (Pereira *et al*., 2021; Tamminga *et al*., 2021), or for application in the clinical context (Pereira *et al*., 2021). Boocock *et al*. (2009) developed a dynamic model for the classification of work-related upper extremity conditions, which classifies them into 3 broad categories. This research provides a foundation for New Zealand to refine the classification for upper extremity conditions, but this still leaves a gap for conditions affecting other areas of the body.

Our research found that there are many barriers that make it difficult to consistently classify WRMSDs. Unlike occupational diseases, which have a clear causal link between the disease and a specific work environment or work group (International Labour Office, 2010), most WRMSDs have multiple causal factors that are work and non-work related (Punnett & Wegman, 2004). WRMSDs may develop from exposure to workplace factors such as physical/biomechanical, organisational, environmental, and psychosocial factors (Bernard *et al*., 1997).

However, worker individual characteristics such as age, personal fitness, and other health comorbidities, may also contribute to their development (Bernard *et al*., 1997). Epidemiological studies show that MSDs that occur outside of the workplace have similar or identical pathophysiology to WRMSDs, and this makes it difficult to determine work as the main causal factor (Pereira *et al*., 2021).

We found that terminology and definitions of WRMSDs vary across research, and within countries (WorkSafe New Zealand, 2022). For example, they are sometimes referred to as cumulative trauma disorders (CTD) in the United States, occupational cervicobrachial disorders (OCD) in Japan, body stressing in Australia and Occupational Overuse Syndrome (OOS) more generally (Forcier & Kuorinka, 2006). New Zealand has used a variety of terms such as OOS, Repetitive Strain Injury (RSI), Discomfort, Pain and Injury (DPI), and sprains and strains (Boocock *et al*., 2018). The variations in terminology and use of different diagnostic labels creates uncertainty about what conditions are included under these umbrella terms.

Accurate diagnosis of the condition is also important and may be influenced by the practitioner making the diagnosis, the training they have received, and their clinical background (Van Eerd *et al*., 2003). Other factors that impact accurate diagnosis include the availability of health information and work exposures, available health resources (for example, access to radiological scans), the worker population, and the level of diagnostic certainty of the criteria (Buchbinder *et al*., 1996). Additionally, health research is constantly improving which may influence diagnostic and classification criteria (Van Eerd *et al*., 2003).

Government occupational health priorities, and the involvement of compensatory bodies have a significant role in a country's definition, and criteria for inclusion of WRMSDs (Davoodi *et al*., 2017). For example, many European countries provide social insurance schemes that compensate injured workers for specific occupational diseases listed on their disease registries (Eurogip, 2016). Some countries exclude certain conditions from their disease registries. In Austria, injured workers cannot get compensation for carpal tunnel syndrome, which results in its prevalence being underreported (Eurogip, 2016). In Spain and Finland, compensation for 'lumbago' (lower back pain) is only possible from an acute accident at work (Eurogip, 2016). In contrast, most Australian workers' compensation bodies provide cover for many WRMSDs provided there has been a causal link between the work activities and the injury or condition (Oakman *et al*., 2019).

2.3 WRMSDs data collection and reporting methods

We reviewed data collection methods to understand how different countries collect, report and analyse musculoskeletal harm data. Our aim was to obtain data sets for WRMSDs from other countries, but we were unsuccessful with this. This review found that WRMSDs data is collected differently across countries, which makes it difficult to compare data internationally. For example, the United Kingdom collects data from nationwide household surveys, and gives estimates on WRMSDs by body region, rather than the specific diagnoses. Safe Work Australia reports on workers' compensation injury and disease statistics (Oakman *et al*., 2019), as does Canada (Association of Workers Compensation Boards of Canada, 2022). In the United States, the Bureau of Labor Statistics provides estimates on work-related illness and injury using the Survey of Occupational Injuries and Illness (SOII) (U.S Bureau of Labor Statistics, 2020). Many European countries use different sources of data when reporting WRMSDs, which may include claims data, sickness and disability data, and self-reported data from national surveys (De Kok *et al*., 2019).

Some countries use taxonomy systems or coding systems to further categorise occupational injury and disease data. The initial diagnosis is no longer available, making it difficult to directly compare the conditions. In many Australian states, coding of compensation data is completed at lodgement of the claim (Australian Safety and Compensation Council Canberra Australia, 2008). In the United States, classification is partially done using computerised text navigation systems on data collected under the SOII, and does not provide a definition of WRMSDs (U.S. Bureau of Labor Statistics, 2021).

Section 2.7 of this report provides detail about data WRMSDs classification, data collection and surveillance methods in individual countries.

2.4 Summary of work-related musculoskeletal harm data in New Zealand

WorkSafe uses several sources of data for reporting of musculoskeletal harm in New Zealand. The main source is Accident Compensation Corporation (ACC) claims data. WorkSafe also draws insights from the Household Survey and the Labour Force Survey which are administered by Stats New Zealand (WorkSafe New Zealand, 2019), and the Workforce Segmentation and Insights Programme (WorkSafe NZ, 2021).

New Zealand uses three main diagnostic health classification systems:

- the Accident Compensation Corporation (ACC) Read code system
- the WHO Statistical Classification of Diseases, Australian Modification (ICD-10-AM), and
- the International Systematized Nomenclature of Medicine Clinical Terms (SNOMED-CT). Currently the SNOMED-CT codes are translated back to Read codes by ACC administrative staff when ACC claims are lodged (Accident Compensation Corporation, 2020a).

These systems are explained in more detail in Appendix 2

It is important to note that there is limited information and research available within New Zealand about the Read code system used by ACC.

There are no specific work-related classification systems for WRMSDs in New Zealand. Injury data that WorkSafe receives from ACC may include acute injuries that have occurred at work (for example, sprains and strains), work-related gradual process injuries, and occupational diseases. It is difficult to understand the risks and work activities that have contributed to the harm without further classification and coding of these conditions.

WorkSafe receives enquiries from workers and businesses about hazardous manual tasks, WRMSDs or management of musculoskeletal risks. The General Inspectorate may also collect information from businesses about musculoskeletal health risks, and hazardous manual tasks during workplace inspections. WorkSafe does not have a coordinated system to analyse this information for inclusion into our musculoskeletal harm reporting systems. This is an area for improvement.

Coding of work-related injuries from ACC claims data

To help further analyse ACC data, WorkSafe has developed the System of Work-related Injury Forecasting and Targeting (SWIFT) tool, which is used to:

- complete an injury count of pre-processed ACC claims and fatalities
- apply an injury mechanism to claims data using a text navigator tool
- determine injury rate broken down for different industries using the Australia New Zealand Standard Industrial Classification 2006 (ANZSIC06), calculated rate as per 1000 employed

- calculate the number of people employed by year, age, sex, industry, and main income
- perform injury rate analysis, which can be broken down to ANZSIC06 level 4 industry description and demographic categories
- perform injury counts and number of full time equivalent (FTE) for all included industries.

The SWIFT tool uses a text navigation function that matches key words from the 'accident description' field of the claims data to an appropriate mechanism of incident. The Australian Type of Occurrence Classification System (TOOCS) is the taxonomy system that is integrated into the SWIFT tool (Oldham *et al*., 2014). The SWIFT tool provides many benefits – it allows more sophisticated analysis of the data, better understanding of injury causation, and may help WorkSafe with prioritising where to target interventions.

When reporting on WRMSDs, WorkSafe currently includes data under the 'body stressing' mechanism of incident. This captures injuries and conditions that have occurred because of muscular stress from lifting, carrying or putting down objects, handling objects, muscular stress from awkward or prolonged postures, and repetitive movement and low muscle loading activities. However, other mechanisms where WRMSDs occur are overlooked, including from slips, trips and falls, from exposure to vibration, and from hitting against or contact with objects.

The SWIFT system relies on accurate data being recorded or present within the claims data. If the information is poor quality, or if information is missing in the accident description, the mechanism of incident cannot be identified. The SWIFT data does not integrate ACC gradual process conditions. While this data only represents 2% of accepted claims, they still provide valuable information about musculoskeletal conditions that develop over time (Basham, 2019b). Finally, a small number of conditions that are not musculoskeletal disorders may be incorrectly coded under the body stressing category.

Other challenges identified within New Zealand

Current data is limited to accepted ACC claims, and only a small portion of the data are work-related gradual process claims (Basham, 2019a). Research has shown that most WRMSDs develop gradually over time. There is likely underrepresentation and underreporting of WRMSDs in New Zealand. Opportunities to improve surveillance to capture other sources of data should be considered.

Many New Zealand workplaces also collect musculoskeletal harm data. This may include early discomfort reporting and health monitoring. In 2006, ACC implemented the Discomfort, Pain and Injury (DPI) programme, which encouraged employers to implement early reporting systems to identify and manage workplace discomfort and pain (Accident Compensation Corporation, 2009). Today, many organisations in New Zealand monitor worker discomfort as part of their health and safety management systems. Currently there is no coordinated system in New Zealand that captures this information.

Current New Zealand musculoskeletal harm data does not include work-related vocal health. This is despite over one-third of workers being critically vocally reliant for work participation (Vilkman, 2004). Internationally, voice is increasingly being considered alongside broader musculoskeletal health issues, such as psychosocial hazards (Sala, 2022).

2.5 WRMSD classification systems in Australia

Information on WRMSDs in Australia is published annually by SafeWork Australia (Oakman *et al*., 2019). There is no official list of musculoskeletal conditions in Australia, and acceptance of WRMSD claims may vary across jurisdictions and states, depending on the legislative framework and work arrangements (Oakman *et al*., 2019). Australia uses two core classification systems of the World Health Organization: the International Statistical Classification of Diseases and Related Health Problems (tenth revision: ICD-10-AM) and the International Classification of Functioning, Disability and Health (ICF) (Oakman *et al*., 2019).

WRMSDs data is mostly based on Australian workers compensation injury surveillance data. All compensation bodies in Australia send injury surveillance data to Safe Work Australia's National Data Set (NDS) (Oakman *et al*., 2019). Australia draws on other sources of data, including the National Health Survey (NHS), the Work-related Injury Survey, the Australian Census and other Australian Bureau of Statistics data, which provides contextual information to assist with understanding and interpretation of NDS data (Oakman *et al*., 2019).

Whilst clinicians and health care professionals use the various classification systems when diagnosing musculoskeletal conditions, all workers' compensation information is coded using the Type of Occurrence Classification System (TOOCS) (Oakman *et al*., 2019). TOOCS allows workers' compensation agencies to fully code disease processes, to avoid the use of 'dump codes', and to align injury and disease descriptions to better match with the ICD-10-AM diagnoses (Australian Safety and Compensation Council Canberra Australia, 2008). It also allows easy comparison of workers' compensation data by Safe Work Australia (Oakman *et al*., 2019).

Under TOOCS, WRMSDs are categorised into two main groups; (1) Traumatic joint/ligament and muscle/tendon injuries which encompasses codes related to injuries; and (2) Musculoskeletal and connective tissue diseases.

Traumatic joint/ligament and muscle/tendon injuries (codes related to injuries or acute events) include:

- trauma to joints and ligaments (for example, sprains, tears, and dislocation)
- trauma to muscles and tendons (for example, strains and tears)
- soft tissue disorders due to trauma or unknown mechanisms.

Musculoskeletal and connective tissue diseases (work related musculoskeletal diseases – gradual onset or cumulative disorders) include:

- joint diseases (arthropathies) and other articular cartilage diseases (for example, inflammatory, or infectious arthritis, acquired musculoskeletal deformities)
- spinal vertebrae and intervertebral disc diseases – dorsopathies (for example, back pain, sciatica, neck pain, disc degeneration)
- diseases involving the synovium and related tissue (for example, synovitis, tenosynovitis)
- diseases of muscle, tendon, and related tissue (for example, non-traumatic muscle or tendon strain, tendinitis, epicondylitis)
- other soft tissue diseases (for example, bursitis, occupational overuse syndrome), and other conditions not elsewhere classified.

For more information see Appendix 3

2.6 International organisations

We reviewed four key international health organisations for information about the classification of work-related musculoskeletal disorders and occupational diseases.

International Labour Organisation (ILO)

The International Labour Organisation (ILO) published a list of occupational diseases and conditions to assist countries with the prevention, recording, notification and compensation of diseases and conditions caused by work (International Labour Office, 2010). The document also provides general criteria for the identification and recognition of occupational diseases and individual diseases. The ILO document defined occupational disease according to two main elements (1) the causal relationship between exposure in a specific working environment or work activity and a specific disease; and (2), the fact that the disease occurs among a group of exposed persons with a frequency above the average morbidity of the rest of the population (International Labour Office, 2010). The identified musculoskeletal conditions listed on the ILO list of occupational diseases are:

- radial styloid tenosynovitis due to repetitive movements, forceful exertions, and extreme postures of the wrist
- chronic tenosynovitis of hand and wrist due to repetitive movements, forceful exertions, and extreme postures of the wrist
- olecranon bursitis due to prolonged pressure of the elbow region
- prepatellar bursitis due to prolonged stay in kneeling position
- epicondylitis due to repetitive forceful work
- meniscus lesions following extended periods of work in a kneeling or squatting position
- carpal tunnel syndrome due to extended periods of repetitive forceful work, work involving vibration, extreme postures of the wrist, or a combination of the three.

This document also acknowledges other musculoskeletal disorders where a direct link is established scientifically, or by other methods appropriate to national conditions and practice, between the exposure to risk factors arising from work activities and the musculoskeletal disorder(s) contracted by the worker. This covers all other conditions not outlined above.

Eurogip

Eurogip is an observatory and resource centre that reviews, and monitors matters relating to insurance, prevention of accidents at work, and occupational diseases across Europe.

In 2016, Eurogip published a report that reviewed musculoskeletal disorders and occupational diseases across ten European countries (Eurogip, 2016). The report also compared incidence rate statistics for MSDs across the European nations.

Musculoskeletal conditions were grouped according to osteoarticular disorders (tendinopathies, meniscopathies, and bursitises), neurological disorders, vascular disorders, angioneurotic disorders, and others. The report identified variances across each country with respect to what conditions are recognised as occupational diseases. The differences were particularly noticeable in the insurance and legislative requirements for individual countries, which influence whether these conditions are recognised as an occupational disease.

European Agency for Safety and Health at Work (EU-OSHA)

The European Agency for Safety and Health at Work (EU-OSHA) is a tripartite organisation that collaborates with European governments, businesses, and worker representatives. EU-OSHA aims to make workplaces healthier, safer and more productive (EU-OSHA, 2021). Musculoskeletal disorders were considered a priority area for EU-OSHA from 2020-2022, evidenced in their Healthy Workplaces Campaign 2020–2022 which focussed on addressing and preventing chronic WRMSDs.

To our knowledge, EU-OSHA has not published recommendations on what WRMSDs should be included in a classification list. However, there are numerous publications and resources available on the website that examine the prevalence of MSDs across European Nations. The publications contain various sources of data including self-reported surveys (for example, European Working Conditions Survey (EWCS), European Health interview Survey, and National surveys) and administrative data (hospitalisations, declared work accidents and reported occupational diseases) (De Kok *et al*., 2019).

European Foundation for the improvement of living and working conditions (EUROFOUND)

EUROFOUND is an agency of the European Union focussed on the development of better work-related, social and employment policies. Among its many work programmes, EUROFOUND instigated the European Working Conditions Survey (EWCS) (Eurofound, 2021). Its objectives were to:

- assess and quantify working conditions of employees and the self-employed
- analyse the relationships between different aspects of working conditions
- identify at risk groups
- monitor trends
- contribute to European policy development on quality of work and employment issue.

The EWCS provides a key source of information about musculoskeletal harm occurring within European workplaces and enables comparisons of WRMSDs data across European nations. EWCS also provides a valuable source of information for EU-OSHA (above) (De Kok *et al*., 2019). The EWCS survey asks participants about their physical and psychosocial risk factors at work, work organisation factors, employment conditions, gender issues, and well-being. Questions about physical health are also included in the survey for example, whether they have experienced specific health problems including backache, muscular pains in the upper limbs, muscular pains in the lower limbs, or injuries.

2.7 Individual countries

The findings of this section showed that most countries adopted the WHO ICD-10 system for classification of morbidity and mortality data. Other countries used medical classification systems in conjunction with taxonomy/coding systems for interpretation or analysis of occupational injury and disease statistics. The following is a summary of WRMSD classification and coding systems used among selected countries.

Austria

Musculoskeletal data can be obtained from three sources (Grabowski & Isusi, 2019):

- The Federation of Social Insurance (Österreichusche Sozialversicherun, SV), which is the umbrella association of social insurance institutions
- Statistik Austria ad hoc module of the micro census labour force survey
- self-reported data from the European working conditions survey.

DATA COLLECTION METHODS

The SV keeps annually updated statistics on approved insurance cases related to work-related illness, occupational disease, and work-related accidents (Sozialversicherung, 2021). There are only a few musculoskeletal conditions that are recognised as occupational diseases, which are listed in Appendix 8. Self-reported data is collected annually through the micro census labour force survey, and also through the European Working Conditions survey (Grabowski & Isusi, 2019).

CODING AND CLASSIFICATION SYSTEMS

Austria uses that World Health Organisation ICD-10 BMSG 2001 classification system for coding of mortality and morbidity data (Busse *et al*., 2013). Information on coding of occupational diseases and work-related conditions was not found.

Canada

The Association of Workers' Compensation Boards of Canada (AWCB) publishes data on accepted time-loss injuries, diseases and fatalities under the National Work Injuries Statistics Program (Canadian Centre for Occupational Health and Safety, 2019). There is no information available on the AWCB website regarding WRMSDs.

All jurisdictions use the Coding of Work Injury or Disease Information manual to classify injuries and conditions (Association of Workers Compensation Boards of Canada, 2022).

DATA COLLECTION METHODS

Data and statistics on work related injuries and diseases are available on the AWCB website. AWCB is the national liaison that links Canada's 12 provincial and territorial member compensation boards and commissions (Association of Workers Compensation Boards of Canada, 2022). Each of the provincial and territorial workers compensation bodies collect injury and disease information from workers, employers and health practitioners within their respective jurisdictions (Association of Workers Compensation Boards of Canada, 2022). Each jurisdiction has an independent occupational health and safety legislation and each having slight differences in the definition, management, and reporting of WRMSDs. The data is then coded and forwarded to the NWISP. It is important to note that AWCB only reports on lost-time injuries. Therefore, claims with no time-lost are not included in these statistics (Association of Workers Compensation Boards of Canada, 2022).

CODING AND CLASSIFICATION SYSTEMS

Canada uses the WHO ICD-10-CA (International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Canada) for classification of morbidity and mortality data, as well as the Canadian Classification of Health Interventions (CCI) (Canadian Institute for Health Information, 2022). This is managed by the Canadian Institute for Health Information (Canadian Institue for Health Information, n.d). Coding for workers compensation statistics is based on the CAN/CSA-Z795-96 (R2001) – Coding of Work Injury or Disease Information where data is published under the following categories:

- nature of injury (the type of injury or disease)
- part of body affected by the injury or disease
- source of the injury (immediate cause of the injury)
- event (type of accident resulting in the injury, for example, 'fall')
- industry in which worker was employed at time of the accident
- occupation of the injured or ill worker
- province or territory in which the injury, disease or fatality occurred
- gender (sex) and age (in age groups).

Finland

The Tapaturmavakuutuskeskus (TVK) is the Finnish Institute of Occupational Health maintains and publishes data on work-related musculoskeletal conditions as part of the Finnish Register of Occupational Diseases and work-related diseases (Finnish Institute of Occupational Health, 2022b). The TVK also maintains statistics and data on registered occupational diseases, and accidents that occur at work. Finland is world leading in considering work-related vocal health alongside broader musculoskeletal health, including WRMSDs (Sala, 2022).

DATA COLLECTION METHODS

TVK and Maatalousyrittäjien eläkelaitos (MELA), which is the Farmers' Social Insurance Institution, submit data on new and suspected occupational diseases and work-related diseases to the Register of Occupational Diseases each year (Finnish Institute of Occupational Health, 2022a). This information is available on the Finnish Institute of Occupational Health website, and the Finnish Workers Compensation website. The European Working Conditions survey also provides valuable information about WRMSDs that do not qualify as occupational diseases or work-related diseases (Bjork & Isusi, 2019).

CODING AND CLASSIFICATION SYSTEMS

The ICD-10 is also used in Finland for classification of morbidity and mortality data (Davoodi *et al*., 2017). For workers compensation data, The Finnish Workers Compensation Centre uses the European Statistics on Accidents at Work (ESAW) classification system (Finnish Workers Compensation Center, n.d.). All conditions are coded under several variables, including working process, specific physical activity, deviation, contact and mode of injury, material agent associated with the mode of injury, type of injury, and part of body injured. Occupational diseases can be found on the website.

France

In France, WRMSDs represent a high portion of the recognised occupational diseases, and there are generally high reporting rates within the country (Eurogip, 2016). Data for musculoskeletal conditions is available from the following three sources (Buffet & Isusi, 2019):

- the Primary French Insurance Fund (Caisse Nationale de l'Assurance Maladie)
- self-reported surveys (European Working Conditions Survey)
- the French Musculoskeletal Disorders Surveillance programme (Public Health France, 2021).

DATA COLLECTION METHODS

The Primary French Insurance fund publishes data on incidence of recognised occupational diseases, and injuries sustained due to occupational accidents. There are many musculoskeletal conditions listed as occupational diseases in France. The Primary French Insurance fund also publish information and data on injuries sustained from accidents at work.

The French Musculoskeletal Disorders Surveillance programme was established in 2002 to assess the incidence and prevalence rates of certain musculoskeletal conditions (Public Health France, 2021). Occupational Physicians in certain areas of France report on carpal tunnel syndrome and lower back pain. The surveillance programme also draws on some administrative data, self-reported surveys and cohorts in the general population (Public Health France, 2021).

CLASSIFICATION AND CODING SYSTEMS

France uses the Classification Commune Des Actes Medicaux (CCAM) classification system for clinical procedural coding (Trombert-Paviot *et al*., 2003). ICD-10-FR is also used in France for coding of morbidity and mortality data (Agence Technique De L'Information SUR L'Hospitalisation, 2022).

Germany

Statistics for WRMSDs in Germany are published by Deutsche Gesetzliche Unfallversicherung (DGUV – German Social Accident Insurance), which is the umbrella association of the accident insurance institutions for industrial and public sectors (DGUV, 2021). The European Working Conditions Survey (EWCS) also provides information on WRMSDs in Germany (Dauber & Isusi, 2019). Further MSD data sources for Germany have been listed in the European Agency for Safety and Health at Work national report (Eurofound, 2022). These sources include the Federal Institute for Employment Protection and Occupational Medicine, the Federal Institute for Occupational Safety and Health and the BKK health report (all are in German) (Eurofound, 2022).

DATA COLLECTION METHODS

In Germany, there are recognised musculoskeletal conditions that are listed within Occupational Diseases section of the German Social Accident Insurance scheme (DGUV, 2021). Other conditions that have been caused by an accident at work, or on the way to work, may also be eligible for cover under the State accident insurance scheme.

CLASSIFICATION AND CODING SYSTEMS

The International Statistical Classification of Diseases and Related Health Problems, 10th revision, German Modification (ICD-10-GM) is the official classification system used for inpatient and outpatient medical care in Germany (Federal Institute for Drugs and Medical Devices, n.d.).

Netherlands

In the Netherlands, data for musculoskeletal conditions is collected in a number of ways (Peereboom & Isusi, 2019):

- Nederlands Centrum voor Beroepsziekten (NCvB) is the Netherlands Centre for Occupational Diseases and reports on occupational diseases (Netherlands Centre for Occupational Diseases, n.d.)
- self-reported surveys (European Working Conditions Survey and Netherlands Working Conditions Survey).

DATA COLLECTION METHODS

The NCvB maintains information and statistics on musculoskeletal conditions via the national notification and registration system. There is no list of occupational diseases in the Netherlands. Under the Working Conditions Act, company doctors or occupational physicians are required to lodge suspected occupational diseases. The NCvB website outlines the process for registration of an occupational disease (The Netherlands Centre for Occupational Diseases, n.d.-a). Registration guidelines for musculoskeletal disorders are outlined on the website. (The Netherlands Centre for Occupational Diseases, n.d.-a).

CLASSIFICATION AND CODING SYSTEMS

Once a diagnosis has been made by a physician, the Classifications for Occupational Health and Safety and Social Insurance (CAS) coding system is used. This information is available on the Netherlands Centre for Occupational Diseases website in Dutch (The Netherlands Centre for Occupational Diseases, n.d.-b).

The United Kingdom (UK)

In the UK there is no official list of WRMSDs. The Health and Safety Executive (HSE) releases annual statistics on work-related musculoskeletal disorders (Health and Safety Executive, 2020). This data is collated from the Labour Force Survey and the Health and Occupational Research Network (THOR-GP). The UK does not report on workers compensation data or injury claims data, except for the THOR-GP data.

DATA COLLECTION METHODS

The HSE mostly reports on WRMSDs data collated from the Labour Force Survey, an annual survey of households living at private addresses in the UK (Health and Safety Executive, 2020). The survey provides insight about the prevalence, incidence, and annual working days lost over the last 12 months, whether participants experienced an illness (or injury) at work, the body part affected; and the severity, nature and causation of the injury (Health and Safety Executive, 2020).

The WRMSDs data is categorised by body location (lower limbs, upper limbs, neck, and back), industry type, occupation, age, gender, workplace size, and causes of the WRMSD (for example, manual handling, awkward or tiring postures, keyboard work or repetitive motion, workplace accident, stress, or other category)(Health and Safety Executive, 2020).

Data from The Health and Occupational Research (THOR) network is also used to support the statistics that HSE publishes. THOR is a voluntary surveillance scheme that is operated by the Centre for Occupational and Environment Health (COEH) at the University of Manchester, which measures the incidence and trends of occupational diseases in the UK (The Health and Occupation Research network., n.d,). Medical practitioners that are registered can report occupational injuries and diseases from their patients.

CODING AND CLASSIFICATION SYSTEMS

In the UK, the ICD-10 and OPCS-4 classification standards are used by health care providers across the National Health Service (NHS). ICD-10 is used to classify diseases and other health conditions for morbidity data, whilst OPCS-4 is used to classify interventions and surgical procedures (NHS Digital, 2021).

The United States (U.S.)

The U.S. Bureau of Labor Statistics publish data on work-related musculoskeletal conditions collected as part of their Injuries, Illnesses and Fatalities programme (IIF) (U.S. Bureau of Labor Statistics, 2020).

DATA COLLECTION METHODS

Within IIF, data on WRMSDs disorders is collected and reported through the Survey of Occupational Injuries and Illnesses (SOII) (U.S Bureau of Labor Statistics, 2020). Around 200,000 private and local government employers are selected at random to participate in the SOII. Employers are required to report work-related injuries or illnesses of their workers particularly those who require medical care beyond first aid from the previous 12 months. The SOII does not include work–related fatalities, nonfatal work injuries, illnesses to the self–employed, injuries to workers on farms with 10 or fewer employees; to private household workers; to volunteers; and to federal government workers.

CODING AND CLASSIFICATION SYSTEMS

The U.S. use the International Classification of Diseases 10th revision, Clinical Modification (ICD-10-CM) and the International Classification of Functioning, Disability and Health (ICF) (Centers for Disease Control and Prevention., 2022).

Injury and disease data from the SOII is coded using the Occupational Injury and illness classification system (OIICS). This system classifies injuries based on the circumstances and characteristics associated with the workplace injury, illness or fatality. With regards to musculoskeletal conditions, the OIICS classification system includes traumatic injuries, disorders, sprains, strains and tears, and conditions impacting the musculoskeletal system and connective tissue diseases and disorders (U.S. Bureau of Labor Statistics, 2021). See Appendix 6 for more information about the U.S.

2.8 Comparison of international WRMSD/MSD classification and coding systems

Table 1 provides a summary of the country information outlined in this section. It compares the sources of WRMSD or MSD data and the classification and coding systems used by different countries. For more detail and examples of conditions, see Appendix 8

COUNTRY	SOURCES OF WRMSD/MSD DATA	CLASSIFICATION AND CODING SYSTEM
New Zealand	– Accident Compensation Claims data	– Accident Compensation Corporation (ACC) Read code system – The International Statistical Classification of Diseases, Australian Modification (ICD-10-AM) – Systematized Nomenclature of Medicine Clinical Terms (SNOMED-CT)
Australia	– Safe Work Australia's National Data Set (NDS) – National Health Survey (NHS), the Work-related Injury Survey – Australian Census – Australian Bureau of Statistics data	– The International Statistical Classification of Diseases, Australian Modification (ICD-10-AM) – International Classification of Functioning, Disability and Health (ICF) – Type of Occurrence Classification System (TOOCS)
Austria	– Federation of Social Insurances (SV) – Statistik Austria ad hoc module of the micro census labour force survey – Self-reported data from the European working conditions survey	– ICD-10 BMSG 2001
Canada	– Association of Workers' Compensation Boards of Canada (AWCB)	– ICD-10-CA
Finland	– Finnish Institute of Occupational Health (Tapaturmavakuutuskeskus), under the Finnish Register of Occupational Diseases and work-related diseases – Register of Occupational Diseases	– ICD-10
France	– The Primary French insurance fund (Caisse Nationale de l'Assurance Maladie) – Self-reported surveys (European Working Conditions Survey) – The French Musculoskeletal Disorders Surveillance programme (Public Health France, 2021)	– Classification Commune Des Actes Medicaux (CCAM) classification system for clinical procedural coding – ICD-10-FR
Germany	– Deutsche Gesetzliche Unfallversicherung (DGUV – German Social Accident Insurance)	– ICD-10-GM

COUNTRY	SOURCES OF WRMSD/MSD DATA	CLASSIFICATION AND CODING SYSTEM
Netherlands	– Nederlands Centrum voor Beroepsziekten (NCvB) via the national notification and registration system – Self-reported surveys (European Working Conditions Survey and Netherlands Working Conditions Survey)	– Classifications for Occupational Health and Safety and Social Insurance (CAS) coding
United Kingdom	– HSE via UK Labour force survey – The Health and Occupational Research Group (THOR-GP)	– ICD-10 – OPCS-4 classification standards
United States	– Survey of Occupational Injuries and Illnesses (SOII)	– ICD-10-CM – Occupational Injury and Illness Classification System (OIICS) – International Classification of Functioning, Disability and Health (ICF)

TABLE 1: International WRMSD/MSD classification and coding systems

2.9 Main findings from the literature

There is no internationally recognised classification list for WRMSDs. We found:

- there is a lack of consensus on terminology and definitions used for WRMSDs in research and within countries, and the conditions included under the definition
- there are inconsistencies in how health professionals diagnose these conditions
- there is a lack of agreement amongst researchers on case definitions for WRMSDs
- that government health priorities and the role of compensatory bodies within a country influence and determine what conditions are included as WRMSDs
- that WRMSDs are difficult to diagnose and classify as both work-related and individual factors contribute to their development.

There were differences in how each country classified or collected WRMSDs data. This made it difficult to compare datasets. For example, some countries relied on nationwide self-reported surveys, and other countries use injury and disease compensation statistics. We found that many countries use a mixture of data collection methods and coding systems to further analyse their data. As evidence accumulates, some countries are broadening how they consider WRMSDs (for example, vocal health, psychosocial) (Buckley, 2022).

In New Zealand, WRMSD research mainly used ACC injury claims data to understand work-related musculoskeletal harm.

- WorkSafe receives workplace injury claims data from ACC and uses the SWIFT system to further analyse the data and to identify musculoskeletal disorders.
- This process applies mechanism of incident to the data, by selecting key words in the injury description.
- WorkSafe use injuries and conditions that fall into the 'Body Stressing' category for reporting on musculoskeletal conditions at work.
- This process is not without limitations:
  - it overlooks WRMSDs that do not fall under the body stressing mechanism of incident
  - it requires accurate data being recorded or present within the claim data. Where there is poor quality information, or where information is missing in the accident description, the mechanism of incident cannot be identified.

2.10 Limitations with the literature

This report focussed on classifications systems used from national level data, programmes, or initiatives impacting the public. Yet we did identify some limitations:

- The literature or publications identified were limited to those which were publicly available and freely accessible on the internet (in English). Other publications may not be available to the public due to privacy and confidentiality.
- There is limited information and research available within New Zealand about the Read code system used by ACC. It is not clear if this list is updated regularly, and whether new conditions are added to the list. There is no further information about the codes and their descriptive terms, creating difficulties determining the case criteria supporting that condition.
- We were unable to obtain full data sets from any country, which made it difficult to compare musculoskeletal harm data. However, this information informed our criteria for the selection of WRMSDs and development of the WRMSDs codes and conditions list. It was also useful to review surveillance methods in other countries, to identify gaps in New Zealand and areas for improvement. Finally, this information will help inform the categorisation of WRMSDs data, for comparability across other countries.

3.0 Development of a WRMSDs codes and conditions list for New Zealand

IN THIS SECTION:

This section outlines the steps used to develop the WRMSDs codes and conditions list, using the findings from the literature review.

3.1 Development of an initial codes and conditions list

The main steps taken to develop the initial codes and conditions list were:

- reviewing the current diagnostic codes used in New Zealand, including the ACC Read codes and ICD-10-AM codes. This is because WorkSafe mainly uses ACC claims data for analysis of musculoskeletal harm
- using international research and recommendations to best guide this process. This was done to ensure that WorkSafe is including conditions based on research and is not solely determined by the Accident Compensation legislation
- establishing criteria for inclusion of codes and conditions. The WorkSafe definition for work-related musculoskeletal disorders was built into the criteria, to ensure it met operational requirements. See Appendix 7 for the WRMSDs criteria
- inclusion of ACC Read codes specifically for vocal health surveillance, as vocal health and musculoskeletal health are linked. Musculoskeletal health consideration for workers that rely on their voice include body posture, muscular tension, and biomechanical loading from poor vocal health.

3.2 Refining the initial list

Based on the literature and the WorkSafe WRMSDs definition, we reviewed the ICD-10 codes and ACC Read codes to decide which codes and conditions to include in the initial 'draft'. The initial draft conditions list totalled 7694 codes. All codes were copied into a spreadsheet. Additional information supporting the diagnosis or condition was included where available. For example, additional information regarding the ICD-10 codes is available on the WHO ICD-10 browser (World Health Organization, 2019). All the codes and conditions that may be caused by either work and non-work-related factors were flagged for review by the WorkSafe Occupational Physician.

The initial draft included the following codes and conditions:

ICD-10 codes

- All ICD-10 M codes (diseases of the musculoskeletal system) – 3418
- Relevant ICD-10 G codes (diseases of the nervous system) – 15
- Relevant ICD-10 K codes (diseases of the digestive system) – 40

ACC Read codes

- Relevant N codes (Musculoskeletal and connective tissue diseases) – 533
- All S codes (Injury and poisoning) – 3471
- Relevant F codes (nervous system and sense organ diseases) – 27
- Relevant J codes (digestive system diseases) – 190

Inclusion of the following ACC Read codes specifically for vocal health surveillance

- H1y54 – Singers' chorditis
- H1y55 – Fibrinous chorditis
- H1y56 – Vocal cord nodule
- H1y5 – Other vocal cord disease
- H1y6 – Oedema of larynx
- H1y6z – Oedema of larynx NOS
- H1y7 – Other diseases of larynx NEC
- H1y70 – Disease of larynx unspecified
- E2615 – Psychogenic aphonia
- E2611 – Psychogenic cough

Only primary diagnostic codes or conditions were included. Any that are 'secondary' in nature were excluded. Codes and conditions that did not meet the WRMSDs definition (for example, non-mechanical factors) were excluded and removed from the list. See Appendix 7 for more information on the excluded conditions.

3.3 The consultation process

There were several steps in the consultation process. Firstly, we reviewed the list of 7694 codes and removed any codes or conditions that did not meet the established criteria. This first draft was then sent to the WorkSafe Occupational Physician for review. There were several reviews until there was consensus with what codes and conditions should be included. Those who participated in the reviews were a New Zealand Registered Occupational Physician, a New Zealand Registered Physiotherapist, a Certified Practicing Speech Pathologist, and a Certified New Zealand Human Factors/Ergonomics professional. As part of the consultation process the codes were also reviewed against current ACC claims.

3.4 Finalising the codes and conditions list

At the end of the review process the codes and conditions list was finalised resulting in the inclusion of 3298 conditions.

The finalised classification and conditions list are provided as a separate Excel© spreadsheet that accompanies this report. It provides some background information, the codes included, the codes excluded, and some explanatory notes.

3.5 Key findings from the codes and conditions list development process

The key findings from this process and some areas for discussion and improvement are:

- **WorkSafe currently only receives accepted claims data from ACC, from the work account**. This assumes that work is where the injury has occurred. Gradual process conditions are not currently included in the body stressing conditions. However, data on these claims are available to WorkSafe.
- **There are numerous musculoskeletal conditions that can arise secondary to work-related processes or exposure, but they do not fit with the criteria for inclusion as WRMSDs**. This is in line with how other countries classify and code WRMSDs. It is important that WorkSafe has visibility of these conditions. Further discussions with the Data and Intelligence team, and other teams within WorkSafe is important, to ensure that these secondary conditions are still captured and recorded, so appropriate interventions can be applied.
- **The diagnostic codes do not provide information about mechanism of injury**. The SWIFT system will be crucial in analysing the claims data and applying the mechanism of incident, which will give further information about the data.
- **Secondary conditions that occurred because of a primary WRMSD are not currently being captured**. For example, an acute knee injury from a fall at work may lead to secondary diagnosis of arthritis many years later. Further analysis of these claims may determine whether they should be included in the data reporting.
- **Inclusion of four additional Read codes be added for vocal health when possible**. These codes have implications for capturing work-related vocal health with considerations for broader WRMSDs. These four areas for future coding are:
  - functional voice disorder
  - muscle tension dysphonia
  - dysphonia NOS
  - long-COVID (post 12 week) related dysphonia.

4.0 Conclusions and recommendations

IN THIS SECTION:

4.1 Conclusions

This report provides a summary of classification systems and data collection methods for WRMSDs in New Zealand and abroad. We found that there was no international classification system for WRMSDs. However, we took the findings from the review and practically applied this information to the development of the WRMSDs codes and conditions list. This was done to ensure that we included conditions based on international research and best practice, and not solely determined by the Accident Compensation framework.

The review of New Zealand data collection methods and surveillance for WRMSDs in other countries has identified opportunities for improvement in surveillance of musculoskeletal conditions in New Zealand.

Over time the WRMSDs list may change with improving knowledge and health information and should be updated to reflect any of these changes.

4.2 Recommendations

Based on the main findings, we recommend that:

- WorkSafe adopts and uses the WRMSDs codes and conditions list for reporting of musculoskeletal harm data
- WorkSafe considers opportunities to collect other sources of musculoskeletal harm data. This may include employer discomfort data, early intervention monitoring information from health organisations, and other health monitoring data
- WorkSafe, other government agencies, and industry bodies conducts or supports research that examines workers' exposure to musculoskeletal risks. Such projects may include nationwide surveys or applied research within industry
- WorkSafe and ACC (and other relevant organisations) consider how the work by Boocock *et al*. (2009) on the upper extremity classification framework can be further integrated into practice within New Zealand.

Appendices

IN THIS SECTION:

Appendix 1: Glossary

TERM	DEFINITION
ACC	Accident Compensation Corporation
Acute	Describes the sudden onset of an injury or condition, usually from a specific event or series of events
Aetiology	The causation of a disease, disorder, or injury
ANZSIC	The Australian and New Zealand Standard Industrial Classification – the standard classification used in New Zealand and Australia for the collection, compilation and publication of statistics by industry
Body stressing	A category in the Australia Type of Occurrence Classification System (TOOCS) mechanism of incident taxonomy for injuries resulting from stress placed on muscles, tendons, ligaments, and bones
Classification	A systematic arrangement of conditions and diseases into groups or categories according to an established criterion
DALY	Disability-Adjusted Life Years. Refers to the quality and length of life lost due to injuries and illness
Diagnosis	The act of identifying a disease from its signs and symptoms
Disease	A disease is normally an established pathological condition, with a defined group of symptoms
Disorder	A disorder is characterised by functional impairment and a disruption to the normal function and structure
DPI	Discomfort, pain, and injury
EU-OSHA	The European Agency for Safety and Health at Work
EUROFOUND	The European Foundation for the Improvement of Living and Working Conditions
Gradual	Describes the onset of an injury or condition occurring over time
HFE	Human Factors/Ergonomics
HSE	Health and Safety Executive (UK)
ICD	The International Statistical Classification of Diseases and Related Health Problems for classification of mortality and morbidity data
ICF	The International Classification of Functioning, Disability and Health is a classification of health and health-related domains
Musculoskeletal	The body system which includes muscles, ligaments, tendons, bones, nerves, and blood vessels
OOS	Occupational Overuse Syndrome
Prevalence	The proportion of a particular population found to be affected by that condition.
RIDDOR	The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (2013) from the United Kingdom
RSI	Repetitive Strain Injury
Sprain	Overstretching or tearing of a ligament
Strain	Overstretching or tearing of muscle or tendon
SOII	Survey of Occupational Injuries and Illnesses.
SNOMED CT	SNOMED Clinical Terms is a clinical terminology system used internationally and in New Zealand
TOOCS	Type of Occurrence Classification System. This is the Australia classification system used for coding of workers' compensation injury data
WHO	World Health Organization
WRMSD	Work-related musculoskeletal disorders

Appendix 2: Classification systems in New Zealand

NZ injury and disease classification systems

There are three main diagnostic classifications systems used within the health care system in New Zealand – ACC Read codes, ICD-10-AM codes and SNOMED-CT codes. SNOMED-CT codes will supersede the ACC Read code system as organisations upgrade clinical information systems (Te Whatu Ora, 2023). However, ACC currently converts these conditions back to ACC Read codes (Accident Compensation Corporation, 2020b).

Read codes

ACC uses the Read code system for clinical coding and classification of injuries and conditions that are lodged to ACC for insurance cover. The Read code system is a multi-level and hierarchical coding system, where each level provides a more specific diagnosis (Accident Compensation Corporation, 2020b). General Practitioners, and other health care professionals can lodge claims and Read codes, within their scope of practice. Read codes give ACC guidance on the level of support, treatment and rehabilitation a claimant can access (Accident Compensation Corporation, 2020b). There are over 33,000 Read codes and conditions on this list.

Many medical and patient management systems in New Zealand have ACC Read codes and services built into their IT systems, or they are able to lodge claims via eBusiness Gateway (Accident Compensation Corporation, 2022). The list of all Read codes can be downloaded on the ACC website (Accident Compensation Corporation, 2020b). Health care providers that are lodging claims on behalf of their patients to ACC are required to select the most appropriate Read code that reflects the diagnosis of their patients' condition.

Musculoskeletal conditions are listed under the 'N' category, but there are other musculoskeletal conditions also listed under the 'S' category (injury and other poisoning). Some nerve related conditions are listed under 'F' codes, and conditions relating to the digestive system are listed under 'J' codes (Accident Compensation Corporation, 2020b), which include hernias. The broader ACC Read codes also provide individual codes that relate to vocal health. These codes are supportive for work-related vocal health surveillance.

There are specific Read codes for gradual onset conditions, which can only be diagnosed by a Medical Practitioner. ACC also has a list of Occupational diseases, which is outlined under the Occupational Diseases Schedule 2 of the Accident Compensation Act (2001). This includes one musculoskeletal condition, which is Hand-Arm Vibration syndrome.

ICD-10-AM codes

New Zealand hospitals use the health classification system developed by the World Health Organisation and modified by permission for Australian Government purposes. This is the International Statistical classification of diseases and related health problems, tenth revision, Australia Modification (ICD-10-AM) (Ministry of Health, 2021). The ICD-10-AM consists of a tabular List of Diseases and an accompanying Alphabetic Index.

Clinical notes from all inpatient and day patients that are discharged are clinically coded in the hospitals patient management system. This information is forwarded to the Ministry of Health, where the information is stored in the National Minimum Data Set (NMDS) (Ministry of Health, 2021).

New Zealand also uses the Australian Classification of Health Interventions (ACHI) and Australian Coding Standards (ACS). A brief description of these systems is included below:

- ACHI – Australian Classification of Health Interventions is a Tabular List of Interventions used in public and private settings.
- ACS – The Australian Coding Standards is a list of standards used in conjunction with ICD-10-AM and ACHI to optimise accurate and consistent application of the classification in clinical coding practice.

Musculoskeletal conditions are listed under the "M" category in the ICD-10-AM tabular list. There are over and there are over 3000 individual codes (World Health Organization, 2019). There is no category or classification for work related or occupation related injuries or conditions.

SNOMED CT codes

SNOMED Clinical Terms (CT) is a new clinical terminology system, that is used around the world. It is a comprehensive clinical system, that contains over 350,000 concepts and 1,200,000 terms in health and social care (Ministry of Health, 2022). This system will replace the Read codes, which are no longer supported. The New Zealand edition includes translation tables which map between Read codes and SNOMED codes (Te Whatu Ora, 2023). At present, ACC translates SNOMED codes into Read codes (Accident Compensation Corporation, 2020a).

Vocal health

More than 33% of workers globally rely on their voice for work (Buckley *et al*., 2022; Eurofound, 2019; Titze *et al*., 1997; Vilkman, 2004). Occupations include teachers, sports coaches, military personnel, barristers and lawyers, healthcare workers, community faith leadership, performing artists, and public facing business workers (Buckley & Carey, 2022; Titze *et al*., 1997; Vilkman, 2001).

Musculoskeletal health is a work-related health concern for workers who rely on their voice (Rantala *et al*., 2018; Vinturri *et al*., 2003; Wilson Arboleda & Frederick, 2008). Workers' experiences of musculoskeletal health, voice use, and working postures influence vocal health (dos Santos *et al*., 2019; McAleavy *et al*., 2008; Rantala *et al*., 2018). WRMSDs and poor working postures may contribute to voice symptoms such as feeling strained, and more severe voice disorders such as laryngitis (dos Santos *et al*., 2019; McAleavy *et al*., 2008; Rantala *et al*., 2018). Biomechanical loading from poor vocal health may also impact on musculoskeletal health for workers relying on their voice (da Rocha *et al*., 2017; de Brito Mota *et al*., 2019; dos Santos *et al*., 2019)

Musculoskeletal health consideration for workers that rely on their voice include:

- workers' body postures while using their voice. For example, unsupported, static, awkward, and unstable postures. The stance of the body and posture of the head and neck, arms, shoulders, upper back, and torso are particularly important (Gilman & Johns, 2017; Rantala *et al*., 2018; Vilkman, 2004)
- muscular loading and vocal over loading (Rantala *et al*., 2018; Vilkman, 2004),
- thrusting the head and chin forwards when using the voice. These postures can contribute to neck tension and changes horizontal gaze placement muscles (Gilman & Johns, 2017; Rantala *et al*., 2018; Rantala *et al*., 2012), and
- uncomfortable, unsupportive, or extreme head and neck postures when using the voice. These postures are associated with muscular tension, voice symptoms, and unhealthy compensatory behaviours (Gilman & Johns, 2017; Kooijman *et al*., 2005; McAleavy *et al*., 2008; Rantala *et al*., 2012).

Vocal health and musculoskeletal health are linked. Work-related burden of harm surveillance could be useful to monitor the vocal health of workers that rely on their voice. The HFE team have included specific vocal health Read codes to the list of WRMSD codes and conditions for surveillance.

Appendix 3: Classification systems in Australia

Australian injury and disease classification systems

Australia uses the ICD-10-AM, which is the International Classification of Diseases and Related health problems, tenth revision, Australian Modification (IHPA, 2019). ICD-10-AM is used in public and private hospitals in Australia to classify episodes of admitted patient care.

The International Classification ICF is used to capture information on various domains of human functioning and disability, including factors that can be modified by intervention. The ICF uses three key health outcomes; impairments, activity limitations, and restrictions in social participation (Oakman *et al*., 2019).

The Australia classification of health interventions (ACHI) is used to classify surgeries, therapies and health interventions (IHPA, 2019).

TOOCS

Australia uses the Type of Occurrence Classification System (TOOCS) to code workers' compensation data before they are reported to compensation agencies (Australian Safety and Compensation Council Canberra Australia, 2008).
The TOOCS codes the following information:

- the nature of injury/disease which identifies the type of hurt or harm that occurred to the worker
- the bodily location of injury/disease which identifies the part of the body affected by the most serious injury or disease identified in step open and allocates an appropriate code
- the mechanism of incident which identifies the action, exposure or event that best describes the circumstances that resulted in the injury or disease
- the object, substance or circumstance that was principally involved in, or most closely associated with, the breakdown event
- the object, substance or circumstance which was the direct cause of the most serious injury or disease.

Appendix 4: International disease classification systems

World health organisation international classification of diseases

ICD-10

The ICD classification system provides a basis for comparison of causes of mortality and morbidity data. Developed over a century ago, the system was initially used to categorise cause of death, but has expanded to include non-fatal conditions (Hirsch *et al*., 2016). Now, it is the most internationally recognised classification list, and used by over 100 countries (Hirsch *et al*., 2016). ICD is updated by the WHO regularly, as information and research regarding medicine and health related conditions improves.

It consists of a hierarchical coding system. There are over 6,000 codes listed for musculoskeletal conditions which are found in Chapter XII Diseases of the Musculoskeletal System and connective tissue (Coleman *et al*., 2021). The codes within this category represent all health-related conditions, including those of the shoulder region, upper arm, forearm, hand, pelvic region, lower leg, ankle and foot, and other. Musculoskeletal conditions are categorised by the following nature – arthropathies, systemic connective tissue disorders, dorsopathies, soft tissue disorders, osteopathies and chondropathies, and other disorders of the musculoskeletal system and connective tissue. It includes all conditions that may impact the musculoskeletal and connective tissue, including infectious, inflammatory, systemic and juvenile causes (World Health Organization, 2019). Importantly, the ICD-10 does not specify occupational related illness, diseases, or conditions.

ICF

The ICF classification list relates to health-related domains (World Health Organization, 2002). It measures health and disability at the individual and population level. ICF is used to help describe changes in body function and structure, what a person with a health condition can do in a standard environment, and what they can do in their usual environment. These domains are classified from the perspective of the body functions and structure, activity, and participation. It considers the health and functioning of an individual in society, rather than the disability experienced (World Health Organization, 2002). But it does not allow direct comparison of musculoskeletal conditions, and was not considered in the context of this report.

ICHI

The ICHI is used for the reporting and analysis of health interventions. This classification system covers the interventions across a wide range of health providers, including diagnostic, medical, surgical, mental health, primary care, allied health, functioning support, rehabilitation, traditional medicine and public health interventions (World Health Organization, n.d.). As with the ICD-10, modifications are made by countries for local use, and New Zealand uses the ACHI, which is the Australian modification (Ministry of Health, 2021).

Appendix 5: United Kingdom – RIDDOR

The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) is the regulation that requires employers, and other people in control of work premises, to report and keep records of:

- work-related accidents which cause death
- work-related accidents which cause certain serious injuries (reportable injuries)
- diagnosed cases of certain industrial diseases
- certain 'dangerous occurrences' (incidents with the potential to cause harm) (Health and Safety Executive, 2013).

Types of reportable injury

There are specified injuries to workers that are reportable under RIDDOR, which include:

- fractures, other than to fingers, thumbs, and toes
- amputations
- any injury likely to lead to permanent loss of sight or reduction in sight
- any crush injury to the head or torso causing damage to the brain or internal organs
- serious burns (including scalding) which covers more than 10% of the body or causes significant damage to the eyes, respiratory system, or other vital organs
- any scalping requiring hospital treatment
- any loss of consciousness caused by head injury or asphyxia
- any other injury arising from working in an enclosed space which leads to hypothermia or heat-induced illness; or requires resuscitation or admittance to hospital for more than 24 hours
- injuries which an employee, or self-employed person is away from work or unable to perform their normal work duties for more than 7 consecutive days

Reportable diseases

Regulation 8 requires employers and self-employed people to report cases of certain diagnosed reportable diseases which may have been caused or made worse by their work (Health and Safety Executive, 2013). Specific WRMSDs that are listed in the regulation are listed below:

- Carpal Tunnel Syndrome: where the person's work involves regular use of percussive or vibrating tools.
- Cramp of the hand or forearm: where the person's work involves prolonged periods of repetitive movement of the fingers, hand, or arm.
- Hand Arm Vibration Syndrome: where the person's work involves regular use of percussive or vibrating tools, or holding materials subject to percussive processes, or processes causing vibration.
- Tendonitis or tenosynovitis: in the hand or forearm, where the person's work is physically demanding and involves frequent, repetitive movements.

Appendix 6: United States

The Survey of Occupational Injuries and Illnesses (SOII)

Businesses and organisations are required to record information regarding injuries and conditions that result in the loss of consciousness, days away from work, restricted work activity or job transfer; and medical treatment beyond first aid.

In addition to the above criteria, employers are required to record any significant work-related condition that is diagnosed by a Physician or other licensed health care practitioner. These may include cancers, chronic and irreversible diseases, fractured bones, or punctured eardrums. Other examples of recordable injuries include needlestick injuries, tuberculosis, and cases whereby the employee has been medically removed under the OSHA health standard requirements.

The SOII (U.S Bureau of Labor Statistics, 2020) defines injuries and illnesses as 'Occupational injury is any injury, such as a cut, fracture, sprain, amputation, and so forth, that results from a work-related event or from a single instantaneous exposure in the work environment', or 'Occupational illness is any abnormal condition or disorder caused by exposure to factors associated with employment, other than those resulting from an instantaneous event or exposure. It includes acute and chronic illnesses or diseases that may be caused by inhalation, absorption, ingestion, or direct contact.' The SOII reports on cases which results in days away from work, or days away from work due to job restriction or transfer.

Coding of injury and disease data

Occupational injury and disease data is coded using the Occupational Injury and illness classification system (OIICS) (U.S. Bureau of Labor Statistics, 2021). Previously, BLS relied on state and local government to code injury and disease information. In recent years this process has been performed by computer text navigation systems. The OIICS classification system provides information regarding the circumstances and characteristics associated with workplace injuries, illnesses, and fatalities. The coding system uses five classifications to describe each incident that has led to a serious nonfatal injury or illness, or a fatal injury. The five classifications reflect the following:

- the nature of injury or illness: the physical characteristics, for example, cuts/lacerations, sprains, strains
- the specific part of body affected
- the specific event or exposure – how the injury or illness was produced or inflicted
- the primary source – the object, substance, exposure, or bodily motion that was responsible for producing or inflicting the disabling condition
- the secondary source – the object, substance, or person, if any, that generated the source of injury or illness that contributed to the even or exposure (U.S. Bureau of Labor Statistics, 2021).

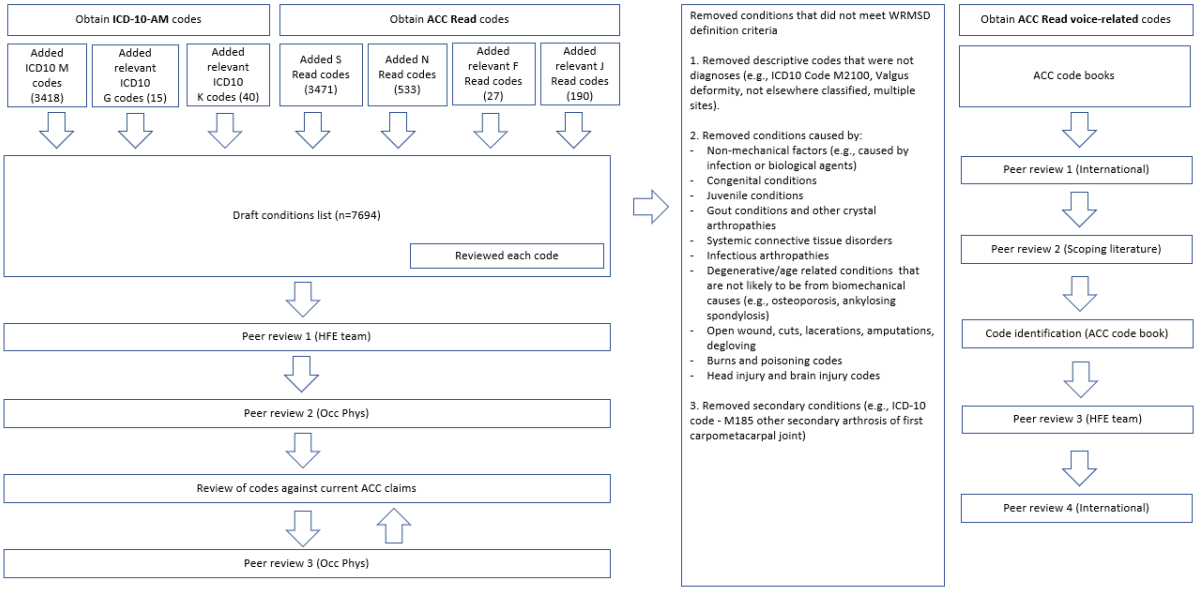
Musculoskeletal conditions are coded under several ways, and data regarding musculoskeletal conditions can be easily found on the BLS website. It includes traumatic injuries and disorders, sprains, strains and tears, and diseases or disorders of the musculoskeletal and connective tissue systems.

Appendix 7: Development of the WRMSD classification codes and conditions list

This section provides further detail for the process of selection of WRMSDs codes and conditions list, and reasoning for inclusion and exclusion of codes.

The development process

A summary of the development process used to refine the list of conditions that are suitable for WRMSDs reporting is shown below:



WorkSafe WRMSDs criteria

The WorkSafe definition for WRMSDs was used to initially develop the list and to guide the review team to help decide which codes to include or exclude.

Codes and diagnoses needed to meet the HFE definition of WRMSDs:

- WRMSDs are injuries and conditions affecting the muscles, ligaments, bones, tendons, blood vessels, and nerves. WRMSDs occur when work demands lead or contribute to pain, discomfort, or injury.
- Conditions whereby work biomechanical factors are a cause or significant contributing factor were considered, as per WorkSafe's WRMSD definition:
  - biomechanical and physical factors
  - load/force (for example, weight of loads, forces to move objects, sudden force)
  - sustained and/or repetitive tasks (for example, repetition, static positions)
  - workplace layout (for example, workstation design)
  - vibration (for example, hand-arm or whole-body vibration)
  - posture (for example, sit, stand, overhead reach, stoop, kneel, constrained).
- Codes and conditions that are caused by non-mechanical factors were removed. Please refer to the spreadsheet to view all excluded conditions. For example, all ICD-10-AM codes that were caused by seropositive rheumatoid arthritis were excluded from the list, as work biomechanical factors are not the causative agent.

- Only primary diagnostic conditions or codes were included. Codes and conditions that are 'secondary' in nature were excluded. For example, Localised secondary osteoarthritis (code N052) was excluded as the osteoarthritis was a secondary factor to the initial condition. Other examples include musculoskeletal conditions that occur secondary to infectious exposure, for example, Staphylococcal arthritis and polyarthritis (code M0001). The initial agency was the staphylococcal infection, and regardless of whether this occurred as a result from exposure at work, it does not meet inclusion criteria for WRMSDs specified above.
- Descriptive codes were removed from the list. For example, Wrist or foot drop (acquired), ankle and foot M2137 is a descriptive term of the symptoms or functional impairment and may be caused by several different conditions.
- All codes and conditions that may be caused by either work or non-work-related factors were flagged for review by the Occupational Physician. Examples include osteoarthritis of a joint, spondylosis of the spine, and degenerative changes of tendons and tissues. Where there was literature to support these conditions being caused by work factors, they were included in the list.
- Contusions have been included if they meet the inclusion criteria for WRMSDs.
- Lacerations and traumatic amputations were not included as WRMSDs.
- Burns were not included as WRMSDs.
- Concussion and head injury were not included as WRMSDs.
- Pain diagnoses – some pain conditions have been included if they meet the inclusion criteria outlined above.

Appendix 8: Occupational diseases and lists

COUNTRY	WRMSDs DATA COLLECTION METHODS	WRMSD CLASSIFICATION SYSTEM/CODING SYSTEM	INCLUDED WRMSDs
New Zealand	ACC claims data	ICD-10-AM ACC Read codes SNOMED TOOCS	WorkSafe includes all codes that fall under Body Stressing mechanism category, listed below. Muscular stress while lifting, carrying, or putting down objects: – lifting, carrying putting down (back) – lifting, carrying putting down (non-back) – lifting, carrying putting down lost footing (back). Lifting, carrying putting down lost footing (non-back) – lifting, carrying putting down animals (back) – lifting, carrying putting down animals (non-back). Muscular stress while handling objects other than lifting, carrying, or putting down: – other handling of objects (back) – other handling of objects (non-back). Muscular stress with no objects being handled: – muscular stress with no objects being handled. Repetitive movement, low muscle loading: – repetitive movement.
Australia	Workers Compensation data from the National Data Set	ICD-10-AM TOOCS	Includes all codes that fall under the following categories in TOOCS: Traumatic joint/ligament and muscle/tendon injuries (encompasses codes related to injuries or acute events) include: – trauma to joints and ligaments (for example, sprains, tears, and dislocation); – trauma to muscles and tendons (for example, strains and tears); and – soft tissue disorders due to trauma or unknown mechanisms. Musculoskeletal and connective tissue diseases (WMSD diseases – gradual onset or cumulative disorders) include the following conditions: – joint diseases (arthropathies) and other articular cartilage diseases (for example, inflammatory or infectious arthritis, acquired musculoskeletal deformities) – spinal vertebrae and intervertebral disc diseases – dorsopathies (for example, back pain, sciatica, neck pain, disc degeneration) – diseases involving the synovium and related tissue (for example, synovitis, tenosynovitis) – diseases of muscle, tendon, and related tissue (for example, non-traumatic muscle or tendon strain, tendinitis, epicondylitis), and – other soft tissue diseases (for example, bursitis, occupational overuse syndrome), and other conditions not elsewhere classified.

COUNTRY	WRMSDs DATA COLLECTION METHODS	WRMSD CLASSIFICATION SYSTEM/CODING SYSTEM	INCLUDED WRMSDs
United Kingdom	Labour Force Survey The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) The Health and Occupational Research (THOR)	ICD-10 OPCS	Under RIDDOR, the following injuries WRMSDs are reportable to the HSE: – Carpal Tunnel Syndrome: where the person's work involves regular use of percussive or vibrating tools. – Cramp of the hand or forearm: where the person's work involves prolonged periods of repetitive movement of the fingers, hand, or arm. – Hand Arm Vibration Syndrome: where the person's work involves regular use of percussive or vibrating tools, or holding materials subject to percussive processes, or processes causing vibration. – Tendonitis or tenosynovitis: in the hand or forearm, where the person's work is physically demanding and involves frequent, repetitive movements. Other conditions that are reportable include: – fractures, other than to fingers, thumbs, and toes – injuries which an employee, or self-employed person is away from work or unable to perform their normal work duties for more than 7 consecutive days.
United States	Survey of Occupational Injuries and Illnesses (SOII)	ICD-10-CM Occupational Injury and Illness Classification System (OIICS)	Musculoskeletal data is presented separately within the website, represented as either 'body part' or 'nature of injury'. Using OIICS, musculoskeletal conditions are categorised under the following classifications: – traumatic injuries to bones, nerves and spinal cord – traumatic injuries to nerves, except the spinal cord. Includes cranial nerves, peripheral nerve injury, pinched nerves, division of nerve, traumatic neuroma – traumatic injuries to muscles, tendons, ligaments, and joints. Includes dislocations, herniated discs, and dislocation of joints – cartilage fractures and tears. Includes meniscal tears, and cartilage fractures/tears – sprains, strains, tears. Includes major tears to muscles, tendons, and ligaments – hernias caused by traumatic incidents – non-specified injuries and disorder. Includes soreness, pain, hurt (non-specified injury), swelling, inflammation (irritation-non-specified injury), numbness (non-specified injury). Other classifications include fractures and whiplash. Musculoskeletal conditions that fall under diseases and disorders of body systems are categorised as following: – disorders of the peripheral nervous system. Includes carpal tunnel syndrome and tarsal tunnel syndrome – digestive system diseases and disorders – includes hernia (nontraumatic) – musculoskeletal system and connective tissue diseases and disorders. Includes arthropathies and related disorders, dorsopathies, sciatica, lumbago, and disc disorders – soft tissue disorders, except the back. Includes bursitis, stenosing tenosynovitis, other tenosynovitis, synovitis, epicondylitis, tendonitis, ganglion or cystic tumour, multiple soft tissue disorders.

COUNTRY	WRMSDs DATA COLLECTION METHODS	WRMSD CLASSIFICATION SYSTEM/CODING SYSTEM	INCLUDED WRMSDs
Canada	Data from Association of Workers Compensation Boards of Canada	ICD-10-CA CAN/CSA-Z795-96 (R2001)	NA
Germany	Deutsche Gesetzliche Unfallversicherung (DGUV), the German Social Accident Insurance European Working Conditions Survey	ICD-10-GM	– 2101: diseases of tendosynovitis of the tendosynovitis glide tissue as well as of tendon and muscle base (Recognition: 1.8.1952). – 2102: meniscus injuries after several years of continuous or frequent repeating activities causing more than average strain for the knee joint (Recognition: 1.8.1952). – 2103: diseases caused by vibrations due to work with compressed air tools or tools or machines with similar effects. – 2104: blood circulation disorders at hands related to vibration. – 2105: chronic disorders of the synovial bursa caused by constant pressure. – 2106: pressure strain on nerves (pressure paralysis). – 2107: demolition fracture of the vertebra furtherance. – 2108: intervertebral disc related disorders of the lower back (lumbar vertebra) after many years of lifting or carrying of heavy weights or of activities in extreme bend of the body. – 2109: intervertebral disc related disorders of the cervical vertebra after many years of carrying heavy weights on the shoulder. – 2110: intervertebral disc related disorders of the lower back (lumbar vertebra) after many years of predominant vertical strain of body vibration while seated (Eurofound, 2022).
Austria	The Federation of Social Insurance – Österreichusche Sozialversicherun, (SV)	ICD-10 BMGS 2001	– Vibration-related circulatory disorders on the hands, other diseases caused by shock at work (arthrosis). – Pressure damage to the nerves (nerves that cannot sufficiently avoid repeated mechanical influences due to anatomical narrowness, for example, above a bony base, within a bony or fibrous canal (for example, sulcus-ulnar syndrome) or at tendon crossings (chronic. Tenosynovitis). – Chronic diseases of the bursa, tendon sheaths and tendon conductive tissue as well as tendon and muscle attachments due to constant pressure or constant vibration. – Demolition fractures of the vertebral thorn processes (occur mainly in shovel work with excessive and oversized throws. Tear fractures can also occur during a work downturn, unusual or rarely performed body movements, for example, when lifting or placing a load). – Meniscus damage in miners after at least three years of regular activity underground and in other persons after at least three years of regular activity in a kneeling or squatting position.

COUNTRY	WRMSDs DATA COLLECTION METHODS	WRMSD CLASSIFICATION SYSTEM/CODING SYSTEM	INCLUDED WRMSDs
Finland	Workers' compensation statistics from Finnish Institute of Occupational health Tapaturmavakuutuskeskus (TVK) European Working Conditions Survey	ICD-10 ESAW classification system	– Tendinitis. – Tenosynovitis. – Epicondylitis. – Bursitis of the knee. – Polyneuropathy of the upper limb. – Carpal tunnel syndrome. – White finger syndrome.
Netherlands	Nederlands Centrum voor Beroepsziekten (NCvB) via the national notification and registration system European Working Conditions Survey Netherlands Working Conditions Survey	Classifications for Occupational Health and Safety and Social Insurance (CAS) coding system	NA
France	Primary French insurance fund European Working Conditions Survey French Musculoskeletal Disorders Surveillance programme	ICD-10-FR Classification Commune Des Actes Medicaux (CCAM)	– Acute non-calcifying unbroken tendinopathy with or without enthesopathy of the rotator cuff. – Chronic non-calcifying unbroken tendinopathy with or without enthesopathy of the rotator cuff documented by MRI Partial or transfixiating rupture of the rotator cuff documented by MRI. – Epicondylian muscle insertion tendinopathy associated or not with a radial tunnel syndrome – Epitrochlear muscle insertion tendinopathy. – Tendinitis (wrist, hand, and finger). – Subquadricipital or rotulian tendinitis. – Crow's foot tendinitis. – Achilles tendinitis. – Chronic lesions of the meniscus of a degenerative nature, and their complications: cracking or rupture of the meniscus. – Hygromas: effusion of the bursae or inflammatory disorders of the subcutaneous tissues in elbow pressing regions. – Acute hygroma of the bursae or inflammatory disorder of the subcutaneous tissues in knee pressing regions Chronic hygroma of the bursae. – Entrapment neuropathy of the ulnar nerve in the epitrochlear olecranon fossa confirmed by electroneuromyography (EMG). – Carpal tunnel syndrome. – Guyon's canal syndrome (wrist, hand, finger). – External popliteal sciatic nerve compression syndrome (knee).

COUNTRY	WRMSDs DATA COLLECTION METHODS	WRMSD CLASSIFICATION SYSTEM/CODING SYSTEM	INCLUDED WRMSDs
			– Chronic complaints of the lumbar rachis: Sciatica due to L4-L5 or L5- S1 disc herniation with radicular injury of concordant topography. Crural radiculalgia by L2-L3 or L3-L4 or L4-L5 disc hernia, with radicular injury of concordant topography. – Chronic complaints of the lumbar rachis: Sciatica due to L4-L5 or L5- S1 disc herniation with radicular injury of concordant topography. Crural radiculalgia by L2-L3 or L3-L4 or L4-L5 disc hernia, with radicular injury of concordant topography. – Unilateral ulnar-palmar vascular disorder (hypothenar hammer syndrome) resulting in Raynaud's syndrome or ischemic manifestations of the fingers confirmed by the arteriogram aimed at discovering an aneurysm or a thrombosis of the cubital artery or the superficial palmar arch. – Angioneurotic disorders of the hand, predominantly on the index and middle finger, which may be accompanied by cramps of the hand and prolonged sensitivity disorders and confirmed by functional tests aimed at discovering Raynaud's syndrome. – Osteoarthritis of the elbow including radiological signs of osteophytoses Osteonecrosis of the lunate (Kienböck's disease) Osteonecrosis of the scaphoid bone (Kölher's disease) Conditions confirmed by X-ray examinations.
ILO	NA	NA	Occupational diseases that are musculoskeletal conditions are listed as follows: – radial styloid tenosynovitis due to repetitive movements, forceful exertions, and extreme postures of the wrist – chronic tenosynovitis of hand and wrist due to repetitive movements, forceful exertions, and extreme postures of the wrist – olecranon bursitis due to prolonged pressure of the elbow region – prepatellar bursitis due to prolonged stay in kneeling position – epicondylitis due to repetitive forceful work – meniscus lesions following extended periods of work in a kneeling or squatting position – carpal tunnel syndrome due to extended periods of repetitive forceful work, work involving vibration, extreme postures of the wrist, or a combination of the three – other musculoskeletal disorders not mentioned in the preceding items where a direct link is established scientifically, or determined by methods appropriate to national conditions and practice, between the exposure to risk factors arising from work activities and the musculoskeletal disorder(s) contracted by the worker.

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