



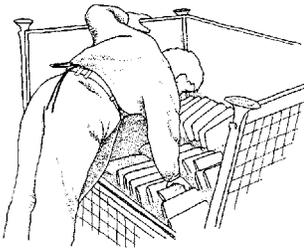
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PRÉVENTEX

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NEWSLETTER
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of RMDs?**

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REGIONAL MUSCULOSKELETAL DISORDERS

A threat to be taken seriously

Tendonitis, bursitis, epicondylitis, carpal tunnel syndrome: unfortunately, such medical terms may be well known to workers. They are frequently the result of regional musculoskeletal disorders in the higher limbs, also called RMDs. What exactly are they? And what are the risk factors involved? How can they be prevented? This information bulletin will provide information on regional musculoskeletal disorders as well as associated risk factors and ergonomic interventions.

WHAT ARE RMDs ?

Pain in the joints (shoulders, elbows, wrists) is often a sign of inflammation. Muscles, tendons and other body structures may be affected. These are regional musculoskeletal disorders.

*"The most frequent pathologies are either characterized clinical conditions such as carpal tunnel syndrome, epicondylitis and tendon pathologies of the sheaths of shoulder rotating muscles, or localized pain syndromes."*¹

According to several sources, regional musculoskeletal disorders are thought to be on the rise in many sectors of industry.

**In Canada, the prevalence of
musculoskeletal disorders in workers of
the textile industry is estimated at 11.6 %²**

WHAT ARE THE CAUSES OF RMDs ?

Musculoskeletal disorders are not the results of accidents. They are caused by repetitive motions and by postures that overuse certain muscles, tendons and other body

structures. Symptoms such as prolonged muscular fatigue and a feeling of pain (inflammation) often precede their onset and should be viewed as danger signals.

Many studies confirm that regional musculoskeletal disorders are rarely brought about by one single cause and may be the cumulative effect of several risk factors. Some lesions may be caused by poor work conditions. They can be made worse, accelerated or exacerbated by exposure to elements of the work environment. Organizational and sociological factors also come into play.

*"Certain prevalence studies show that a correlation exists between the prevalence of regional musculoskeletal disorders and the duration of exposure, yet most studies fail to establish a link between seniority in the company or at the work station and the occurrence of regional musculoskeletal disorders. Some studies have even found a negative relation between seniority at the work station and the carpal tunnel syndrome, which suggests an effect-based, selective process in healthy workers."*³

In preventing regional musculoskeletal disorders, we need to examine the global production process as well as work stations design and work-related motions. On this subject, Kuorinka and Forcier write that *"while the dimensions of work stations as such may not cause musculoskeletal disorders, they may force individuals to adopt postures and work methods that may cause or aggravate musculoskeletal disorders"*.⁴



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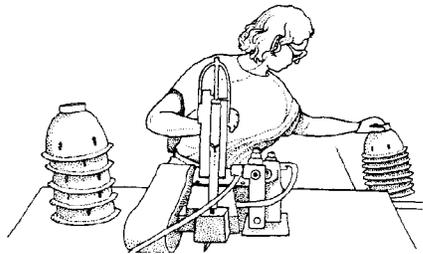
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WHAT ARE THE RISK FACTORS?

Before defining risk factors, it is important to characterize them. "Physical" factors involve four elements:

1. The body part exposed to the risk factor,
2. The extent or intensity of the risk factor,
3. The time variation of the risk factor, e.g. the frequency of the posture,
4. The duration of the risk factor.

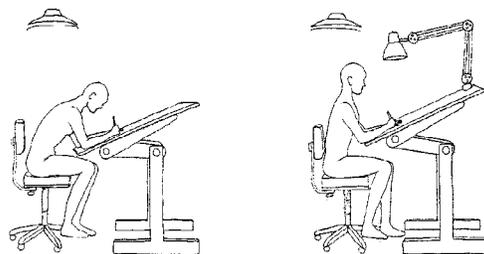


The location of reflectors behind the worker forces her to adopt an awkward posture.

A certain number of risk factors are generally recognized by all specialists. These are mainly ergonomic factors: repetitive motions, force exerted, awkward joint position, but also localized, prolonged pressures, high static muscular load, vibrations, cold temperatures and wearing gloves. Organizational, economic and social factors also have an influence, as well as individual factors of susceptibility. Let's examine the main risk factors.

BEWARE OF AWKWARD POSTURES

Awkward postures may in themselves impose stress on the muscles and tendons of specific joints or restrict blood circulation. Such postures may also require increased muscular strength in order to keep limbs in position, even in the absence of external loads. In the long term, if your work requires you to adopt awkward postures, you may be likely to experience pain and suffer from a musculoskeletal injury.



Poor lighting makes operators to bend forward in order to see well. Adequate lighting corrects the posture.

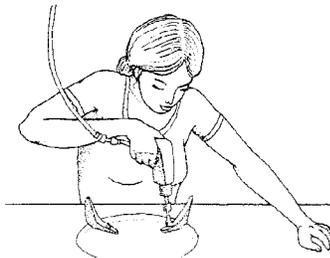
If you have to remain in a fixed position for extended periods of time, you are also exposed to the risk of regional musculoskeletal disorders. Postures that do not allow muscles to function efficiently can also be harmful. For example, maintaining arms stretched out at or above shoulder level reduces blood flow to the muscles and consequently reduces work capacity.

IF YOUR WORK INVOLVES MUSCULAR STRAIN ...

The muscular strain used by workers in the course of their work is referred to as the musculoskeletal load. The musculoskeletal load can be defined as the mechanical strain imposed on the tissues of the musculoskeletal system. There are two types of strain:

1. External strain, which corresponds to the actual weight lifted,
2. Internal strain, or muscular strength, which affects a specific structure of the body.

The intensity of strain can be measured in newtons or pounds. It can be recorded as a percentage of an individual's capacity, as compared for instance to maximum voluntary contraction. The evaluation of the strain exerted is used to establish a correlation with regional musculoskeletal disorders.



The shape of the tool is not adapted to the task and its use causes a cubital deviation of the wrist.

Be aware that straining at work may cause lesions in many ways. Very high strain may cause an immediate rupture of tendons and ligaments, or lesions to muscular tissues if their tolerance level is exceeded. Exercise caution if you are using your muscular strength.

TIME AND AGAIN ...

Work-related repetitive motions are an important risk factor. Task repetitiveness can be described as the cyclical use of the same tissues, either through repetitive motions or through muscular strength applied repetitively without motion. It can be calculated as the number of times when the specific muscular activity is performed, or as the ratio of time with load to time without load. Several reference periods can be used to measure time variations, from short periods to one day, as well as relatively arbitrary subdivisions.

Reading material

Les troubles musculo-squelettiques du membre supérieur liés au travail: physiopathologie et facteurs de risque; Revue de médecine du travail, tome XXI, numéro 3, 1994

Les lésions attribuables au travail répétitif: ouvrage de référence sur les lésions musculo-squelettiques liées au travail; Maloine-IRSST, Paris, 1995, 510 p.

Surveillance active des TMS et de leurs facteurs de risque; Revue de médecine du travail, Tome XXVI, numéro 1, 1999

Les lésions péri-articulaires: quelle intervention de l'ergonome?; Performances Humaines et Techniques, Mai-juin, 1996, numéro 82

Identification and control of work-related disease, WHO, 1985

Recovery time needs for repetitive work, 1987, Seminars in occupational medicine, number 2

Underload and overload in working life: outline of a multidisciplinary approach, 1976, Journal of human stress, September, number 2

According to Kuorinka and Forcier, three elements should be taken into account:

1. Muscle or joint of body part involved,
2. Duration of cycle,
3. Number of motions.⁵

Along with repetitiveness, the number of hours of work per day must be taken into account as it can either contribute to time variation (repetition) or influence the total duration of exposure.

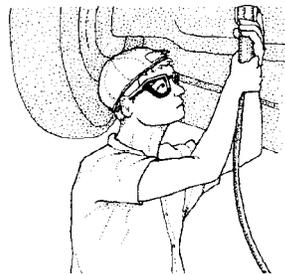
Silverstein (1985) and Sjogaard et al. (1978) established a link between task repetitiveness (over 120 cycles/hour) and regional musculoskeletal disorders.

Hagberg (1981) showed that acute tendonitis of the shoulder can be caused by repetitive flexing of the shoulder over a period of an hour.

Studies have found that the duration of exposure was a contributing factor in the following instances: piece work, exposure to vibrations, sewing.

HANDS UP

In ergonomic literature, static load is universally recognized as a risk factor. If you are required to keep your arms in a position that counters gravity, such as working above head level, you are subjected to a static load.



Working in a fixed position with arms above shoulder level is particularly strenuous.

BOREDOM, MONOTONY AND YAWNING

If you get bored at work, maybe it is because your work is of a monotonous nature resulting from repetitive motions and the absence of intellectual stimuli. Specialists call that invariability, and it is generally the result of highly repetitive tasks that rarely change and that always impose a load on the same tissues in the same way.

Studies have demonstrated that the model for muscular activity in repetitive work presenting little variety plays an important role in the occurrence of muscle pain (Veirsted et al., 1990).

To break the monotony, researchers have introduced the concept of “micro-pauses”, or frequent, short breaks measured in seconds, usually taken every 10 minutes. Do not hesitate to take micro-pauses to break boredom and thereby reduce the risk of regional musculoskeletal disorders.

GLOVES, COLD TEMPERATURES, VIBRATIONS: ANY RELATION WITH RMDs?

These three factors are all involved in the onset of regional musculoskeletal disorders. For example, vibrations of the body or hands can have many effects, some of which are linked to regional musculoskeletal disorders. Most hand-held power tools expose users to arm-hand vibrations.

It is generally recognized that arm-hand vibrations can cause Raynaud's syndrome, a condition involving vascular insufficiency of the hand and fingers.

Gloves are worn to prevent cuts and lacerations to the hands. Yet wearing gloves increases the musculoskeletal load and several researchers have demonstrated that it reduces the maximum prehensile strength of the hand. Wearing gloves also reduces sensitivity and can induce workers to exert greater prehensile force, which increases the level of risk.

COGNITIVE REQUIREMENTS

The extent of the mental strain required to perform a task influences the psychological stress and behavior of workers. Frankenhaeuser (1970) and Gardell (1976) observed that tasks involving a quantitative overload and qualitative underload generate acute stress reactions and negative effects on the well-being, work satisfaction and health of workers. Quantitative overload is an important factor of stress because it influences the level of exposure and the frequency of musculoskeletal actions. Consequently, cognitive requirements can affect the level of stress and the risk of regional musculoskeletal disorders.

In brief, cognitive requirements may play an important role in the onset of regional musculoskeletal disorders, either through increase in muscular tension or general reactions to stress.

ORGANIZATIONAL AND PSYCHO-SOCIAL FACTORS

What exactly are psycho-social factors? Work-related psycho-social factors are the workers' subjective perceptions of the way work is organized, supervised and carried out. To make this concept clearer, let's consider the following example: ill-designed work conditions can generate a stress load for individuals and create an imbalance in the work contents. This stress load may have physiological and psychological consequences for the worker.

Some examples of psycho-social factors: the clarity of the worker's role, the work schedule, the work load and pace, the social environment.

THE ERGONOMIST: A PERFECT FACILITATOR

Regional musculoskeletal disorders have specific features that can influence prevention strategies and as a result, the role of ergonomists. For example, in order to prevent tendonitis, ergonomists will look for ways to limit motions. To prevent neck and shoulder injuries, however, they will try to increase motions or introduce the idea of micro-pauses.

Ergonomists can play two important roles in the prevention process: expert consultants, or facilitators. In the first of these roles, ergonomists provide specialized advice on improvements to work stations or work processes, etc. In their second role, they identify needs and forces for changes within companies and organize them into a coherent process. They will help participants conduct their own analysis as well as identify and implement solutions.

LET'S WORK AT REDUCING THE NUMBER OF RMDs

The human, social and economic costs of regional musculoskeletal disorders are far from negligible. Thus prevention work aimed at reducing the strain on operators will not hinder the company's efficiency. Initiatives that address specific risk factors (e.g. redesigning work stations or reducing strain) are no doubt advisable but may not be sufficient considering the many factors involved in regional musculoskeletal disorders. Because of the significant link between regional musculoskeletal disorders and the organization of production, solutions are beyond the boundaries of individual work stations and have to do with the technical

and organizational aspects of the work situation. This requires that ergonomics be part of the different phases of design and organization of work processes and production methods.

1. Roquebrune, Y et coll.: Les troubles musculosquelettiques du membre supérieur liés au travail : physiopathologie et facteurs de risque ; Revue de médecine du travail ; Tome XXI, numéro 3, 1994 (our translation)
2. Id. 1
3. Id. 1
4. Kuorinka, I. Forcier, L. et al. : Les lésions attribuables au travail répétitif ; publié en collaboration avec les Éditions Maloine, Paris, et l'Institut de recherche en santé et en sécurité du travail ; Éditions Multimondes, Sainte-Foy, 1995, page 165
5. Id. 4

Quiz TRUE OR FALSE ?

1. Regional musculoskeletal disorders (RMDs) are characterized by an inflammation of muscles and tendons.
2. RMDs are strictly accidental.
3. RMDs rarely have a single cause.
4. There is always a direct relation between seniority and the onset of RMDs.
5. Vibrations, cold temperatures and wearing gloves are not linked to RMDs.
6. Repetitive motions and awkward postures are risk factors for RMDs.
7. Poorly designed work conditions can have physiological consequences and are linked to the occurrence of RMDs.
8. When workers suffer from regional musculoskeletal disorders, motions performed to carry out work should always be reduced.
9. Only ergonomists can provide solutions to prevent RMDs.
10. Regional musculoskeletal disorders are said to be on the rise in many sectors of industry.

Answers
1 T, 2 F, 3 T, 4 F, 5 F, 6 T, 7 T, 8 F, 9 F, 10 T