

# PREVENTING HAND-ARM VIBRATION SYNDROME (HAVS)

## WHAT EMPLOYERS NEED TO KNOW



**St. Michael's Hospital  
Occupational Health Clinic  
30 Bond Street  
Toronto ON M5B 1W8  
Phone: 416.864.5074  
Fax: 416.304.1902**

*This information is largely based on a document produced by the United Kingdom's Health & Safety Executive entitled "Health Risks From Hand-Arm Vibration – Advice for Employers." The UK is currently drafting regulations to implement the European Physical Agents (Vibration) Directive as well as a guidance document on the Regulations as they relate to HAVS. European Union member states have until July 6, 2005, to introduce Regulations. Any changes or additions to the document have been made to reflect the Ontario HAVS experience. This document is distributed to HAVS patients for health promotion and educational purposes with the goal of sharing this information with the workplace Joint Health & Safety Committee as an example of a proactive (or best practice) approach to HAVS prevention.*

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## Introduction

Hand-arm vibration is transmitted from work processes into workers' hands and arms. It can be caused by hand-held power tools such as concrete breakers, hand-guided equipment such as lawn mowers or by holding materials being processed by machines such as pedestal grinders.

Hand-arm vibration syndrome (HAVS) is a group of diseases caused by exposure of the hands to vibration. The best known of these is vibration white finger (VWF) which is caused as a result of damage to the blood vessels.

There may also be damage to the nerves and muscles of the fingers and hands, causing numbness and tingling, reduced grip strength and sensitivity. Carpal tunnel syndrome (CTS) is an example of this and is caused by compression of the nerves in the wrist. Pain and stiffness in the hands and joints of the wrist, elbows and shoulders may also occur.

### *When is hand-arm vibration hazardous?*

Regular and frequent exposure to high levels of vibration can lead to permanent injury. This is most likely when contact with a vibrating tool or process is a regular part of a person's job.

The users of hand-guided tools where the hands are directly exposed to high levels of vibration are at greatest risk. The degree of risk depends on:

- Amount of tool vibration.
- Length of time using the tool.
- Whether tool use is intermittent or continuous.
- Workplace and workpiece temperature.
- Individual susceptibility.
- Method of work.
- Ergonomics of the task.

Although in many cases symptoms have taken many years to develop, they can appear after only a few months in susceptible people exposed to high levels of vibration.

To avoid the possibility of carpal tunnel syndrome ergonomic factors that need to be considered are:

- ✦ Tool and workstation design.
- ✦ Static and awkward postures leading to muscle fatigue and decreased blood flow to an area.
- ✦ Repetitive motion.
- ✦ Force used (particularly the wrist) which can also result in muscle fatigue and decreased blood flow.

The operation of tools is noisy, so employers need to keep in mind controlling exposure to noise, to reduce the potential for noise induced hearing loss (NIHL).

### *What effects can hand-arm vibration have on those exposed?*

The injuries can be painful and disabling, such as:

- ✦ Painful finger blanching (turning white) attacks (triggered by cold or wet conditions).
- ✦ Loss of sense of touch and temperature.
- ✦ Numbness and tingling.
- ✦ Loss of grip strength.
- ✦ Loss of manual dexterity.

These injuries can affect both work and leisure activities.

### *Do many people get these injuries?*

One way of examining the extent of HAVS is to look at the number of claims that a work place has filed with the Ontario Workplace Safety & Insurance Board (WSIB).

Diagnosis of work-related hand-arm vibration syndrome signals a sentinel health event of occupation (SHEO). Identification of SHEOs indicates a lack of control of hand-arm vibration risk factors in the workplace and should trigger prevention measures by the employer.

### *In what industries are there risk factors for HAVS?*

Jobs requiring regular and frequent use of vibrating tools and equipment are found in a wide range of industries, such as:

- ✦ Building and maintenance of roads and railways.
- ✦ Concrete products.
- ✦ Construction.
- ✦ Forestry.
- ✦ Foundries.
- ✦ Heavy engineering.
- ✦ Mines and quarries.
- ✦ Plate and sheet metal fabrication.
- ✦ Public services.
- ✦ Public utilities.

### Preventing HAVS

Employers, the Joint Health & Safety Committee (or health and safety representative) and workers all have a role in preventing HAVS. HAVS can be prevented by:

- ✦ Eliminating the source of the hazard (controls at the source).
- ✦ Keeping it from reaching the worker (controls along the path to the worker).
- ✦ Ensuring that every worker is separated from the hazard (controls at the worker).

## Controls at the Source

As with all hazards in the workplace, the preferred method of control is at the source of the problem. This is almost always the most cost-effective method. However, it requires knowledge of the process and what equipment is available.

Almost certainly it will mean that vibration exposure control becomes a team activity, involving health and safety specialists, engineers, purchasing and most importantly, the workers themselves. Workers should not be ignored. Frequently, they, who are confronted with the hazard daily have already thought out an answer, generally one that is very simple and inexpensive.

Controlling vibration at the source can include:

- ✚ Alternative ways of working which eliminate the vibrating equipment altogether.
- ✚ Introducing a purchasing policy specifying low vibration performance for new equipment.
- ✚ Designing the job so that poor posture (which may cause strain on hands and arms) is avoided.
- ✚ Getting advice from the equipment manufacturer on safe use of equipment.
- ✚ Ensuring that workers use the most appropriate equipment for each job (inappropriate equipment may take longer to do the job or vibrate more).

## *How can tool and machine manufacturers help?*

New tools and machines are likely to emit lower vibration than older equipment. Employers should try and introduce a policy of buying the most suitable equipment when tools or machines must be replaced.

Ultimately, manufacturers should attempt to:

- ✚ Design and construct equipment which will cause the minimum risk of vibration injury.
- ✚ Provide employers with warning of any residual risks from vibration.
- ✚ Provide employers with information on vibration levels.
- ✚ Provide employers with instructions on how to use the equipment to avoid risks from vibration.

## Useful Tips on Buying New Equipment

Before buying new equipment, examine whether there is any alternative way of working without using vibrating equipment. If not, a low vibration purchasing policy (in consultation with the Joint Health & Safety Committee) can be introduced and potential suppliers should be informed.

Aim to buy the lowest vibration equipment for the job.

Manufacturers identify vibration levels in units of metres per second (m/s<sup>2</sup>).

When selecting tools, also consider:

- ✚ Tool weight.
- ✚ Handle design/comfort.
- ✚ Grip force needed.
- ✚ Ease of use/handling.
- ✚ Cold from grips or exhausts on compressed air tools.
- ✚ Noise.
- ✚ Dust.

Manufacturers' vibration data needs careful interpretation:

- ✚ Standardized laboratory tests provide data which helps identify equipment that might have lower vibration levels in use at work. However, vibration levels at work can vary widely and may be much

higher than laboratory data quoted in instruction books.

- ✚ For some types of equipment, the range in manufacturers' laboratory data can be wide (e.g., more than 10 m/s<sup>2</sup>). But if the range is narrow (e.g., within 1 m/s<sup>2</sup>) the differences are unlikely to be meaningful when the equipment is used at work.
- ✚ Even equipment with vibration reported as less than 2.5 m/s<sup>2</sup> (based on laboratory tests) may not be without risk and may have a vibration hazard warning because levels at work can be much higher.
- ✚ Vibration controls may reduce the equipment's efficiency – if it is less efficient it may have to be used for longer, wiping out any advantage.

To make the best of this data, employers should:

- ✚ Check equipment manufacturers' literature for standardized laboratory test vibration levels.
- ✚ Short list the equipment within 50% of the lowest levels for further consideration (e.g., if the lowest level is 4 m/s<sup>2</sup>, the shortlist should include equipment with levels between 4 and 6 m/s<sup>2</sup>). Such a shortlist will usually include the equipment with the lowest vibration at work.
- ✚ Seek information on vibration levels at work for your short listed equipment. Discuss with potential suppliers the ways you will use the equipment and ask them for vibration data for these types of use – it is best to compare vibration levels measured during work similar to that you intend to do.
- ✚ Check with your trade association to see if they know of any data that meet your needs.
- ✚ Check whether any vibration controls have reduced the equipment's efficiency.
- ✚ Arrange for independent tests to be carried out if you are still in doubt about vibration performance.

## Controls Along the Path to the Worker

The next most effective way to prevent HAVS is preventing the hazard from reaching the worker. With regards to vibration exposure, examples of this include:

- ✚ Isolating the operator from vibration exposure by providing anti-vibration mounts or by constructing jigs to hold materials.
- ✚ Providing tool support to take the weight off of the tool allowing the operator to reduce grip and feed force.
- ✚ Maintaining tools to manufacturer's specifications to avoid worsening vibration. For example:
  - Replacing vibration mounts before they are worn out.
  - Ensuring rotating parts are checked for balance and replaced if necessary.
  - Keeping tools sharp.

## Controls at the Worker

The least satisfactory controls to prevent exposure are those instituted at the level of the worker, such as relying on the use of personal protective equipment. However, in the case of HAVS, a combination of all three methods of control is probably necessary to reduce the hazard as effectively as possible. In other words, employers should also provide workers with full-finger anti-vibration gloves that meet ISO standards of testing.

Other controls at the level of the worker are:

- ✚ Minimizing the time individuals use the equipment, e.g., by job rotation.
- ✚ Breaking up periods of continuous equipment use by individuals (introduce other tasks).
- ✚ Giving workers information and training on health risks of hand-arm vibration and safe use of the equipment.

- ✦ Providing health surveillance of workers where risks cannot be completely eliminated.

Worker education and training should include:

- ✦ Potential sources of hand-arm vibration.
- ✦ The health effects of hand-arm vibration.
- ✦ Risk factors (e.g., high levels of vibration, daily length/regularity of exposure).
- ✦ Ways to recognize and report signs of injury.
- ✦ Ways to minimize risk, including:
  - Changes to working practices to reduce vibration exposure.
  - Correct selection, use and maintenance of equipment.
  - How to use tools to reduce grip force, strain, etc.
  - Maintenance of good blood circulation at work, e.g., by keeping warm, exercising fingers and not smoking.

Factors to Consider for Cold Weather Operations:

- ✦ In the presence of rain or snow, a water-repellent outer clothing layer should be used.
- ✦ Handgear should be kept dry. If the handgear becomes wet, a change to dry gear should be made and the wet articles should be dried before being used again.
- ✦ In cold conditions (less than 0°C) when wind speeds are greater than 0.8km/hr, wind-resistant coverings for hands and torso should be provided.
- ✦ Warm-up breaks may be required even when the air temperature is above freezing. Warm-up facilities range from portable handwarmers to whole-body warming shelters.
- ✦ Battery-powered, electrically heated handgear is, in some situations, a viable solution to cold-induced vasoconstriction (narrowing of the blood vessels) of the fingers.

The Joint Health & Safety Committee or health and safety representative should be consulted on employer proposals for training and information.

Even where employers have taken precautionary measures, some workers may still be at risk. In cases where regular exposure to hazardous vibration continues or workers are reporting symptoms, a health surveillance program may be useful. The health surveillance program should be under the supervision of a suitably qualified medical practitioner who may train people, for example a nurse or first aider, to help with the administration of the program. Non-clinical information can be fed back to the employer to check whether control measures continue to be effective.

The health surveillance program can include pre-employment and regular health checks including:

- ✦ Questioning about symptoms.
- ✦ Completing questionnaires.
- ✦ Physical examination.
- ✦ Advice to the worker.

### *How quickly will using these tools and machines start to cause health problems?*

This depends on a number of factors including the level of vibration which reaches the hands and how long they are exposed to it. The people most likely to be harmed by vibration are those who regularly use high-vibration tools and machines. For some people, symptoms may appear after only a few months of exposure, but for others it may take several years.

## *How does an employer know if workers are at risk?*

The documentation supplied by the equipment manufacturer should warn of risks from vibration. Also check to see if hand-held power tools, hand-guided and hand-fed machines are regularly used, and if so, whether anyone is, in particular:

- ✚ Using hammer action (up-and-down motion) equipment for more than half an hour each day.
- ✚ Using rotary or other action equipment for more than two hours each day.

If so, workers are probably at risk. Even where workers are using vibrating tools or machines for less than these times, there may still be a risk and employers should regularly (at least every six months) ask workers if they are having symptoms of HAVS.

Some simple questions to ask are:

- ✚ Have your fingers gone white on exposure to cold?
- ✚ Have you had any tingling or numbness in your fingers after using vibrating equipment?
- ✚ Are you experiencing any problems with muscles or joints in your hands or arms?
- ✚ Do you have any difficulty picking up small objects such as screws or nails?

If the answer to any of these questions is “yes,” assume that there is a risk from HAVS to workers. The worker should be referred to a doctor and action taken to reduce exposure.