Hand-arm vibration

Explain dangers

Hand-arm vibration (HAV) is vibration transmitted into workers' hands and arms from work processes. Frequent exposure to moderate- and high-intensity HAV can cause hand-arm vibration syndrome (HAVS) and a variety of musculoskeletal disorders to the upper limbs.

HAVS describes damage to the nerves, blood vessels, muscles, and joints in the hands and arms due to HAV. It affects the nerves first. Symptoms include numbness, tingling, pain, or weakness. It can develop into Raynaud's syndrome or vibration white finger. Blood vessels become narrow, and the reduced blood flow causes the fingers to become pale, waxy-white, or purplish. HAVS can also cause muscle pain and fatigue, joint stiffness, and loss of manual dexterity.

Employers have a legal duty under Section 25(2)(h) of the *Occupational Health and Safety Act* to take every precaution reasonable in the circumstances for the protection of a worker. In Ontario, the Ministry of Labour, Immigration, Training, and Skills Development looks to the HAV exposure limits from the American Conference of Governmental Industrial Hygienists to determine if a worker is at risk of injury.

They set the daily exposure action value (EAV) at 2.5 m/s^2 and the daily exposure limit value (ELV) at 5 m/s^2. The EAV is a daily amount of vibration exposure. If workers are exposed to more than the EAV, employers must reduce exposure. The ELV is the maximum amount of vibration a worker may be exposed to on any single day. This should never be exceeded. Workers exposed to vibration levels above the ELV are at high risk of HAVS.

Identify controls

First, deal with high-risk work tasks. Then, address medium- and low-risk activities.

- Look for alternative work methods that eliminate or reduce exposure to vibration. For example, use an excavating machine rather than a breaker tool to break concrete.
- Make sure that the equipment selected for the task is the lowest vibrating tool that is suitable for the task and can do the work efficiently.
- Improve the ergonomic design of work stations. Awkward postures can increase the load on employees' hands, wrists, and arms.
- Use devices such as jigs and suspension systems to reduce the need to grip and support heavy tools.
- Do not use blunt or damaged tools. Replace worn out items like grinding wheels.
- Limit the time that workers are exposed to vibration. For example, put workers in teams where they switch tasks throughout the day so that one worker is not operating a vibrating tool for the entire day.
- Use gloves to keep hands warm and provide some protection from vibration.

Demonstrate

With your crew, review the vibration levels of the tools you use on site. See the table below, or look up exposure levels from the manufacturer. The National Institute for Occupational Safety and Health (NIOSH) also has a data set of sound power (dbA) and hand-arm vibration levels of powered hand tools: www.cdc.gov/niosh/noise/communication-resources/publications.html

Use this calculator to learn how long you can safely use a tool: www.hse.gov.uk/vibration/hav/calculator-guide.htm

There is a greater risk for HAVs when the exposure level is higher. Employers will need to take more action to reduce the risk in these cases.

Vibration levels for tools and equipment

Low risk (< 2.5 m/s^2)	**Medium risk** (2.5 to 5 m/s^2)	**High risk** (> 5 m/s^2)
Abrasive band Band saw Cordless screwdriver Jet washer Spray gun Threading machine Vacuum cleaner	Air drill Blower Core drill Crosscut saw Chop saw Electric screwdriver Floor sander Hand-held sander	Air chisel Angle grinder Circular saw Chainsaw Hammer drill Impact drill Impact wrench Jackhammer Pneumatic hammer Reciprocating saw

NOTE: The vibration levels are indicative only and will vary depending on equipment type, conditions of use, the age of the tool, how well the tool has been maintained, the task being carried out with the tool, and if the tool has been fitted with various accessories.