

Bad vibrations

Operating power tools, vehicles and heavy equipment can take both an immediate and eventual toll on the body.

For millions of workers in the construction, maintenance, mining, forestry, transportation, agriculture and automotive industries, the effects of sustained on-the-job exposure to vibration – whether hand-arm or whole-body – may lead to various health problems.

So what can be done to help prevent this?

Hand-arm vibration

Workers exposed to vibration through regular use of power tools are at risk of hand-arm vibration syndrome, which NIOSH calls “a collective term for vibration-induced neurological, vascular and musculoskeletal disorders in the hand-arm system.”

Tools linked to hand-arm vibration include chain saws, drills, grinders, riveters and jackhammers. The risk exists regardless of whether the tool is powered by electricity, gasoline or air.

Symptoms of HAVS include tingling, numbness, pain and discoloration in the fingers, as well as weakened grip from nerve and blood vessel damage. Thomas McDowell, program assistant coordinator for the NIOSH Health Effects Laboratory Division, said the “blanching,” or discoloration, typically starts in the tips of one or two fingers and can spread to other fingers and even the opposite hand.

A hallmark disorder of HAVS is vibration white finger, or Raynaud’s syndrome – an irreversible, potentially disabling condition that arises when repeated vibration exposure causes the blood vessels in the affected fingers to collapse.

“Prevention is the key,” McDowell said. “Once the worker starts exhibiting symptoms, you’ve already gone past the point of no return. If employers can become aware of the disease and its development, then they can be cognizant of providing warm and dry work environments and seeing about ... eliminating the need for workers to operate a handheld power tool in the first place.”

OSHA offers tips for reducing the risk of HAVS. Among them:

- Use damping techniques or vibration isolators on equipment.
- Keep machines and tools in proper working order.
- Alternate between vibrating and non-vibrating tools.
- Allow workers to take 10- to- 15-minute breaks each hour.
- Educate workers on vibration hazards and best practices for limiting exposure.
- Advise workers to keep their hands warm and dry and to grip tools lightly.

“If you’re not aware that vibrations can cause these disorders, then it’s very difficult to implement prevention,” said Alice Turcot, occupational health researcher at the National Public Health Institute of Quebec. “So the first step is to give the proper information that vibration is an occupational risk factor.”

Whole-body vibration

Uneven terrain, bumpy roads, potholes and even choppy waves at sea are common contributors to whole-body vibration. When a truck, tractor, ship, etc., traverses these or other obstacles, vibrations transfer through the vehicle and its seat to the operator’s pelvis and lumbar spine. Repeated exposure impacts the spinal discs, and accumulated vibrations can add up – possibly triggering lower back pain and other musculoskeletal disorders.

“Any sort of equipment where an operator is in a seated position has the potential to impart mechanical vibration that could be problematic,” said Nathan Fethke, associate professor of occupational and environmental health in the College of Public Health at the University of Iowa.

According to experts, it takes years of persistent exposure for tissue damage to become apparent. Complicating the issue is that whole-body vibration damage is often mistaken for other common work-related ailments. For example, does a truck driver’s balky back stem from steady vibration exposure or years of lifting cargo?

Although air ride seats are a popular measure to protect vehicle operators from whole-body vibration, some experts also point to advancements in seat suspension systems.

Speaking during an April 17 webinar on vehicle seat design, Peter Johnson, professor in the occupational and environmental exposure sciences program at the University of Washington, said air ride seats, although effective, may present challenges when drivers encounter bumps at moderate to high speeds. A bump amplifies the vibration when the seat strays from its ideal trajectory.

Various active seat suspension systems – although often “fairly expensive in a price-sensitive industry,” Johnson said – include components that can help attenuate more vibration and reduce the effects, such as swaying and side tipping. Using an air suspension system similar to that of a conventional truck seat, the new seats also include technology that processes data from a sensor in the seat base to cancel forces in real time.

“That’s very encouraging,” said David Wilder, professor in the department of biomedical engineering at the University of Iowa. “People have been dreaming about this for decades, and it’s only been within the past 20 years or so that the

electronics and the controls for doing this have gotten good enough to do it well. So that can smooth out the ride quite a bit.”

Standard issue

The European Union has established “action level” regulatory standards for vibration over an 8-hour, time-weighted average, defined as that above which the risk of health effects increase.

Although OSHA doesn’t enforce any such standards, various consensus standards related to vibration – including those from the American National Standards Institute and the International Organization for Standardization – are similar to EU regulations. Threshold limits from the American Conference of Governmental Industrial Hygienists also closely follow ISO 2631-1 (whole-body) and ISO 5349 (hand-arm), and the fundamentals of measuring vibration via frequency weighting in the United States are similar to the EU’s, Fethke said.

“These are consensus standards, and so there’s no requirement to adhere to them,” Fethke said. “But in my experience, organizations that do have individuals exposed to whole-body and hand-arm vibrations pay attention to those.”

McDowell acknowledged a “conundrum” that stems from the lack of vibration regulatory standards in the United States, but said that EU standards influence American workers nonetheless.

In addition to employers addressing worker protections on their own, McDowell said some tool manufacturers have responded as well. For instance, a vibrating tool sold in Europe must meet EU regulations, and manufacturers aren’t likely to make what McDowell calls “good” and “bad” sets for either side of the Atlantic Ocean.

“The United States is going to benefit from these standards

being applied in other countries,” McDowell said. “It’s not like we’re not being protected at all. So as these tools improve, Americans are going to get the benefits of using these improved tools as well.”

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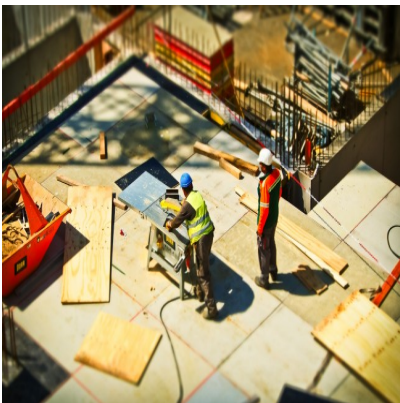
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