

Musculoskeletal Injuries (MSIs)

Sprains and strains (known as musculoskeletal injuries, or MSIs) are injuries of the muscles, tendons, ligaments, or joints. MSIs are the most common type of work-related injury, accounting for approximately 35 percent of all workplace injuries in B.C.

Muscle strains usually happen when a muscle is stretched too far and is torn. Muscle sprains result when the ligaments that hold bones together are stretched or torn as a result of being twisted.

Strains to the back, neck, shoulder, elbow, wrist, or leg are common and can arise from heavy, awkward, or repetitive work. Muscle strains can occur suddenly or develop over time.

Work practices that involve vibration, repetition, duration, contact stress, working in a cold environment, and awkward or unmoving work postures can all contribute to MSIs.

Signs and Symptoms of MSIs

Signs and symptoms of MSIs can include

- Pain
- Numbness and tingling
- Swelling
- Redness
- Inability to move a body part normally

Don't ignore any of these signs and symptoms. Recognizing and reporting them as soon as possible – and seeking medical attention right away – can help them from getting worse.

Experiencing some muscular aches is normal when a person first starts a new job (especially one involving physical labour). However, aching that persists and becomes painful is not normal and should be reported.

Potential Health Effects

If early signs or symptoms of MSI are ignored, they can progress into more serious problems such as tendonitis or bursitis. These conditions can have long-term effects on a person's health, work, recreational options, and other aspects of life. Problems may include persistent pain, pain with movement, or an inability to move limbs normally.

Is Back Pain Different from a Back Strain?

Yes! Up to 60 percent of young people will have back pain by the time they reach age 18 – that 60 percent will also likely experience back pain again as adults, to the point of missing work or having to visit a doctor. Back strain resulting from heavy lifting or working in an awkward position are also common, but generally affects far fewer young people than back pain does.

Fact: Back pain is not just an “old person’s” complaint.

A 12-year-old has a 10 to 15 percent chance of experiencing back pain. An 18-year-old has a 50 to 60 percent chance of experiencing back pain.

Fact: Back pain is one of the biggest reasons for missed work.

Back injuries are the second most common reason for missed work (the common cold is the first).

Fact: Eight out of every 10 people will see a doctor for back pain during their life.

This means you have an 80 percent chance of suffering back pain – unless you work smarter.

Fact: Workers or not, 70 to 90 percent of all people will have some significant low-back problem during their life.

Two common causes of low-back problems in students are carrying overloaded backpacks and carrying them improperly. It’s estimated that 96 percent of students carry backpacks.

Back pain in teens or adults can result from many things. Some reasons include doing awkward or heavy lifting, being overweight, carrying heavy loads (e.g., a backpack), or spending too much time in front of a computer (especially when the workstation is not well set up to fit the needs of an individual).

Strains and Sprains to the Shoulder, Arm, Elbow, and Wrist

Teens work in a variety of workplaces, serving food and bussing tables, washing dishes, mopping floors, cashiering, stocking shelves, using tools on a construction site, and planting trees. All of these jobs can be very repetitive, awkward, or strenuous on the shoulders, arms, and wrists.

Fact: High-repetition jobs pose a greater risk than low-repetition jobs.

Fact: Jobs that are heavy and repetitive are more likely to cause harm than jobs that are not.

What Causes MSIs?

The hazardous activities that contribute to the risk of MSI are called risk factors. A risk factor is something that may cause or contribute to an injury. The risk factors for MSI include job-related factors, awkward postures, and repetitive movements of long duration.

- Job-related factors – The main risk factors for MSI (especially lower back problems) are the physical demands of a job (e.g., forceful exertions during physical work, handling loads – especially if the load is heavy, awkward, slippery, cold, hot, alive, unbalanced, or wet).
- Awkward postures (e.g., reaching down, reaching overhead, holding the neck in a bent position, sitting at a poorly organized workstation)
- Repetitive movements of long duration (e.g., working at a cash register, using tools, using the computer for prolonged periods of time)

Other risk factors for MSI may include

- Environmental conditions of the workplace, including lighting, temperature, and air quality
- Personal factors, including personal work style, age, smoking, height, weight, habits, and education

It is important to recognize such factors in the workplace and be aware of what puts you at a high risk of injury. For example, if you must bend awkwardly to lift a heavy object because you are working in a cramped area, you will be at a greater risk of MSI than someone who uses a mechanical lifting device or has enough room to use safe lifting procedures.

Preventing MSIs

While employers have the primary responsibility for protecting the safety and health of their workers, you are also responsible for following safe work practices outlined by your employer.

At work, any work-related injuries and signs or symptoms of MSI must be reported without delay. Don't ignore early signs and symptoms of MSI. Treatment may be required or steps may need to be taken to prevent the injury from getting worse.

If a worker reports an injury that needs medical attention or an unsafe condition that could lead to injury, the employer must investigate. An investigation will help to identify risk factors that contributed to the injury and lead to workplace changes to eliminate or minimize the risk factors.

Some ways to help prevent or control the risk of MSI include the following:

- Limit lifting by hand. Use equipment such as hand carts, trolleys, forklifts, and pallet jacks to help lift and transport products.
- Do not manually lift heavy loads alone – get help.
- Do not overdo it.
- Be aware of being pressured to do something that may cause injury.
- Minimize the distance the load must be moved or carried.
- Avoid manual lifting tasks for items that lie below knee height (instead, use scissor lifts, pallet jacks, or other equipment).
- Avoid manual lifting tasks for items that lie above shoulder height (instead, limit shelf heights, improve storage practice, or be raised up to the load).
- Avoid handling heavy or unbalanced objects while sitting down (e.g., stand so that stronger muscles are used).
- Improve your grip on the load (e.g., fix good handles on containers; add clamps or other devices to improve grip; use gloves).
- Stack items used most frequently at a convenient waist level.
- Use a stool or ladder to access items on shelves. Do not stand on chairs or boxes that might tip over.

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- Lighten the load to be lifted (e.g., by separating component parts; by encouraging the employer to purchase smaller and therefore lighter cartons of stock).
 - When going up or down stairs, use handrails, avoid undue speed, and carry only items that do not obstruct vision.
 - Avoid grasping vibrating tools with a hard grip.
 - Use a desk, chair, mouse, etc. that is well designed and appropriate to the task.
 - Reduce the total time spent pushing or pulling, or break the total time into smaller blocks of time doing that task.
 - Use proper lifting techniques when performing manual lifts to minimize the risk of injuring the back. Keep in mind, however, that a heavy load can cause an injury even with perfect technique.
 - To avoid repetitive strain injuries, vary your work practices so that you're not doing the same motion over and over for hours at a time. Trade off duties with a co-worker. Sit or stand with proper posture.
 - Use ergonomically engineered equipment and practices to avoid unnecessary strains.
 - Recognize the potential for MSIs even in tasks that seem harmless.

Safe Lifting Techniques

To help prevent injuring your back, use these suggested lifting techniques:

- Warm up your muscles by stretching.
- Size up the load and ask yourself:
 - Is the load an awkward size or shape?
 - Is it too heavy for one person?
 - Do I need help?
 - Do I need a tool to assist me?
- Plan your route: make sure it is free of tripping and slipping hazards.
- Hug the load: keep it close to your body.
- Avoid overreaching.
- Avoid twisting your back: pivot with your feet.
- Squat down; do not bend at the waist.
- Use your legs to do the lifting.
- Use smooth movements.
- Acknowledge your limitations; get help when you need it!
- Use a wide stance.
- Get a good grip; gloves may help.

Noise Hazards

One-quarter of all British Columbia's workers are exposed to occupational noise loud enough to damage their hearing. Noise is the most common health hazard in industry. Excessive noise damages tiny sensory cells deep inside the ear. Hearing loss can occur so gradually that you may not realize it is happening. Noise-induced hearing loss is permanent – it can't be cured or improved.

How Much Is Too Much?

There are maximum limits for noise exposure in the workplace, both for loudness and duration. A simple way to test the noise level is to stand at arm's length from someone and talk to him or her. If you must raise your voice to be heard, the noise around you is probably excessive.

The length of exposure to noise is as critical as the loudness. Continuous noise throughout a shift is more damaging than a few minutes at a time. If your ears ring or sounds seem muffled after the noise stops, your hearing has been affected, at least temporarily.

A noise level greater than 85 decibels (dBA) averaged over eight hours can damage hearing. Work-related noise loud enough to cause damage doesn't just occur in heavy industrial and construction worksites. Potentially harmful noise can also come from a variety of less obvious sources, including

- Kitchen equipment (e.g., blenders)
- Gardening and landscape equipment (e.g., lawn mowers, leaf blowers)
- Musical instruments
- Recorded music or movies
- Public address and amplification systems
- Cleaning equipment (e.g., vacuum cleaners)
- Traffic

Protection Practices

It's an employer's responsibility to reduce workplace noise. Workplace design is the best way to decrease noise exposure. The source of noise can be housed in sound-muffling enclosures (e.g., enclosures for air compressors or punch presses). If this isn't practical, a worker can be enclosed in a booth that protects her or him from noise. Another way to reduce noise is to install sound-absorbent materials on walls or ceilings near noisy machinery. Workers' exposure to noise can also be reduced by using job rotation to decrease the time they spend in noisy areas.

Until noise can be reduced to safe levels, an employer must provide workers with appropriate hearing protection at no cost. Hearing protection equipment includes earmuffs, earplugs, and earcaps. Different types of protection are required depending on factors such as the amount of noise, the temperature, the need to communicate on the job, and the availability of other personal protective equipment on the job.

Environmental Exposure: Heat, Sun, and Cold

Heat Stress

Many jobs require work in hot environments, both outdoors and indoors. Working in the heat and doing heavy physical work can affect the body's cooling system. If the body gains heat faster than it is able to cool itself, body temperature rises and heat stress occurs. When working in hot conditions, be adequately prepared to deal with heat stress. It's an employer's responsibility to make sure that workers are trained properly in how to prevent heat stress. Workers should be able to recognize the symptoms of heat stress in themselves and fellow workers.

Signs and Symptoms of Heat Stress

- Onset of a headache or nausea
- Decreased efficiency, co-ordination, and alertness
- Increased irritability
- Light-headedness or dizziness
- Fainting
- Hands, feet, and ankles swelling, usually one to two days after first exposure

Health Problems Associated with Heat Stress

If heat stress is not recognized and treated in the early stages, more serious and even fatal conditions may quickly develop, such as heat exhaustion and heat stroke.

Prevention Practices

Some things you can do to prevent heat stress include the following:

- Learn to recognize the signs and symptoms of heat stress in yourself and co-workers. Avoid working alone.
- Acclimatize your body (gradually expose yourself to heat at work).
- Drink plenty of water (one glass every 20 minutes). Avoid caffeine and alcohol.
- Wear light-coloured, loose-fitting clothing made of breathable fabric (such as cotton).

It is the employer's responsibility to ensure that workers are properly trained in how to prevent heat stress. Some of the things an employer can do to help prevent heat stress are to encourage workers to:

- Take rest breaks in a cool or well-ventilated area. Take more breaks during the hottest part of the day or when doing hard physical work. Allow the body to cool down before beginning again.
- Schedule work to minimize heat exposure. Do the hardest physical work during the coolest part of the day.

Remember: If there is any doubt about you or your co-worker's condition, get medical advice.

Sun Exposure

Over the long term, exposure to harmful ultraviolet A (UVA) and ultraviolet B (UVB) rays from the sun can cause sunburn and eventually lead to skin cancer. Workers who are working outdoors without proper protection are at risk of unhealthy exposure to the sun.

Protection Practices

- Reduce exposure to the sun between 11:00 a.m. and 4:00 p.m. when harmful UVA and UVB radiation is most intense.
- Wear sunglasses with 100 percent UVB protection.
- Wear clothing with long sleeves and long pants.
- Wear a hat.
- Always wear sunscreen. The B.C. Cancer Agency recommends that you use broad-spectrum sunscreen of SPF (sun protection factor) 15 or higher.
- Even on cloudy days, use protection from the sun. The ultraviolet light that causes sunburns can penetrate light cloud cover, fog, and haze.

Cold Hazards

The two primary hazards when working in cold environments are hypothermia and frostbite.

Hypothermia

One of the major hazards you face when working in the cold is losing your body heat. If your body becomes so cold that it can no longer produce more heat than it loses, you can become a victim of hypothermia. With hypothermia, your vital organs and body systems begin to lose their ability to function.

Hypothermia can happen even on a mild winter's day or on a damp day in fall or spring. Hypothermia often happens so slowly that you don't realize you're in danger. That's why it's important to be able to recognize the early signs and treat hypothermia in its early stages. If no action is taken, the condition may worsen and become moderate or severe hypothermia, and may even result in death. Always stay on the lookout for early signs of hypothermia in both your co-workers and yourself.

Signs of mild hypothermia:

- Bouts of shivering
- Grogginess, poor judgment, muddled thinking, and abnormal behaviour
- Normal breathing and pulse

The onset of hypothermia may be delayed, so watch for early signs.

If you suspect hypothermia, monitor your condition or that of your co-workers, even after you have left work.

Signs of moderate hypothermia:

- Violent shivering, or shivering has stopped altogether
- Inability to think and pay attention (for example, victim cannot understand what is being said)
- Slow, shallow breathing, slurred speech, or poor body co-ordination (for example, a stumbling gait)
- Slow, weak pulse

Signs of severe hypothermia:

- Shivering stopped
- Unconsciousness
- Little or no breathing
- Weak, irregular, or non-existent pulse
- Dilated (wide open) pupils, so that the victim may appear dead but is still alive

Frostbite

Frostbite is caused when body tissue – usually on extremities such as fingers, toes, ears, or nose – freezes due to prolonged exposure to cold. Frostbite can result in permanent damage to affected tissues and in extreme cases, may lead to amputation of affected areas.

Someone suffering with frostbite may experience pain or a prickling sensation at first, progressing to numbness. The affected area will likely exhibit pale, waxy-white skin colour. Skin also often becomes hard and numb.

Preventing hypothermia and frostbite

You can minimize the risk of hypothermia and frostbite by observing the following guidelines:

- Cover as much skin as possible, and wear a warm head covering.
- Wear layered clothing. Layers allow warm air to stay trapped but do not trap perspiration next to the skin.
 - The first layer of clothing should allow the skin to breathe by allowing sweat to escape. Underwear, socks, and glove liners made of polypropylene or knitted silk allow sweat to escape from next to the skin.
 - The second layer of insulating clothing should be one that absorbs perspiration but does not allow heat to escape. Wool is an ideal fabric because it will stay warm even when wet.
 - The third layer of clothing should also trap body heat as well as keep water or dampness out. Quilted coats filled with down or lightweight microfibres that trap heat are ideal, provided they are waterproof.

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- Wear shoes/boots that aren't too tight to allow for proper circulation.
 - Change clothing that gets wet, particularly clothing next to the skin.
 - Drink plenty of non-alcoholic fluids. Doing this will help prevent dehydration and exhaustion, which can lead to hypothermia. Heated drinks can be helpful, but limit your intake of coffee and tea.
 - Pace yourself during vigorous activity. Take regular breaks to get away from the cold environment.
 - When possible, heat the working environment. For instance, heated cabs or shelters help protect construction workers from cold and damp environments.

Exposure to Mineral and Chemical Hazards

The following mineral and chemical hazards are discussed here: asbestos, lead, dust, detergents and cleaning products, and pesticides.

Asbestos

Asbestos is a fibrous material that was once used in many products because it added strength as well as heat and chemical resistance. Until the late 1970s, more than 3000 products containing asbestos were used in building construction. Although few products containing asbestos are used in construction today, the materials used in older buildings still very likely contain asbestos.

Today the many hazards of asbestos are well known. If you do not take proper precautions when you work around asbestos, you may develop serious health problems years from now.

Asbestos is most hazardous when it is “friable” (dry and easily crumbled or powdered by hand). Once crumbled, asbestos fibres are released into the air. When you inhale those fibres, they get into the deepest regions of your lungs – the alveoli – and stay there forever because asbestos is not easily broken down by the body. The accumulation of asbestos in the lungs could cause lung cancer or other serious diseases many years from now.

It is, however, important to use caution even when working with non-friable materials that contain asbestos (such as vinyl-asbestos floor tile or asbestos cement products), because they have the potential to become friable if they are handled in an aggressive manner (e.g., sanded with a power sander).

Asbestos-containing materials that were once commonly used in residential construction include

- Pipe insulation
- Door gaskets
- Furnace insulation
- Vinyl, asphalt, or rubber floor tiles
- Acoustical tile

Health Problems Associated with Exposure to Asbestos

The health effects associated with exposure to asbestos are very serious and many are fatal.

- Asbestosis is a lung disease that results from prolonged exposure to asbestos dust. Once the fibres get into the alveoli – the very small part of the lungs – they stay there. Gradually the lungs become scarred and stiff, and this makes it difficult to breathe.
- Lung cancer may be caused by asbestos fibres in the lung. The combination of exposure to asbestos and smoking dramatically increases the likelihood of developing lung cancer.
- Mesothelioma is a rare but very deadly form of cancer that is caused by exposure to asbestos. Mesothelioma affects the lining of the chest or the abdominal cavity.

Protection Practices

To control asbestos exposure, you must be aware of the work processes that put you at risk and you must take the proper steps to reduce or eliminate exposure.

Jobs that could expose a worker to asbestos

- Removing asbestos-containing pipe insulation
- Removing asbestos-containing vermiculite insulation
- Cleaning up renovation sites where asbestos-containing building materials have been removed
- Sawing, scraping, or sanding old building materials that contain asbestos (such as old dry-wall that contains asbestos)
- Removing old plumbing fixtures

If you have to do work that could expose you to asbestos, it is your employer's responsibility to make sure you are trained properly on how to protect yourself. It is your responsibility to follow safe work practices that are established by your employer for your protection.

Lead

The paint used in older buildings often contained lead. If you have to work in a building or on another type of structure that was built before 1975, you could be exposed to lead when you are removing lead-based paint.

There are two ways that lead can enter your body:

- You can breathe in lead dust or fumes while you are sanding painting
- You can drink or eat food contaminated with lead or transfer lead dust from your skin to your food

Once lead is in your bloodstream, it is carried throughout the body and stored in various body tissues, mostly in your bones. The body can naturally get rid of lead over time; however, if lead enters your body faster than your body can get rid of it, it may build up or accumulate.

Health Problems Associated with Lead Exposure

A person suffering high lead levels may experience a general feeling of tiredness and weakness, general aches and pains, headaches, loss of weight, abdominal pain, and possible constipation. These and other symptoms of lead exposure may take a long time to develop. As well, workers with similar exposures to lead may experience different symptoms, or the same symptom but at different severity.

Possible health effects an adult may experience as a result of lead exposure include

- Anemia
- Nerve damage causing muscle weakness
- Kidney damage
- High blood pressure
- Reproductive problems in both men and women

A developing fetus, when the mother is exposed to even fairly low levels of lead, may experience low birth weight and developmental delays. If a woman has been exposed before pregnancy to a significant amount of lead, then during pregnancy the lead may come out of the body tissues where it is stored and enter the blood and the fetus. Lead is also excreted in breast milk.

Protection Practices

Health problems from lead exposure can be prevented. The solution is to minimize the amount of lead your body absorbs through being breathed in and ingested.

Be aware of the work processes you are doing that increase your risk of being exposed to lead and take the proper steps to reduce or eliminate your exposure. It is your employer's responsibility to develop and implement a plan to make sure you are not exposed to too much lead.

If there is lead exposure in your workplace, make sure you remove your work clothing and shower before going home! The other members of your family – and especially children and pregnant women – will be exposed if you take lead dust home on your work clothes, footwear, skin, or hair.

Dust

Dust can be produced from a whole range of work-related activities including sanding, sawing, paint removal, and sweeping.

Depending on its content, dust can be simply a nuisance, or it can actually cause harm. When dust is in the air you breathe, you inhale it into your respiratory tract. Very small particles of dust can make their way into the alveoli of your lungs where, depending on the particles' chemical characteristics, they can cause diseases. Even dust from "natural" sources – such as dust from wood or flour – can be harmful to your health.

Health Problems Associated with Exposure to Dust

A person exposed to dust may experience eye, nose, throat, and respiratory tract irritation, coughing, and phlegm production. If the dust you are working with contains substances such as asbestos, lead, silica, western red cedar, or other hazardous substances, you could also develop long-term health problems such as breathing difficulties, asthma, or lung cancer. Smoking increases the risk of developing these health conditions.

Protection Practices

- Know what is in the dust you are working with!
- Do not sweep dry dust. To prevent dust from becoming airborne, clean dusty surfaces with water, wet mops, wet rags, and vacuums that have high-efficiency particulate air filters.
- Do not use compressed air to clean up dust.

To control your exposure in the workplace to dust that may contain a hazardous substance, be aware of the work processes you are doing that create dust and take the proper steps to reduce or eliminate your exposure. It is your employer's responsibility to develop and implement a plan to make sure you are not exposed to too much dust that may contain a hazardous substance.

Detergents and Cleaning Products

Substances that are used for cleaning in a variety of jobs (e.g., hotels, restaurants, construction, retail) are often hazardous.

Make sure you know the risks of the cleaning products you are using. Cleaning products in the workplace should be labelled with information about the safe use of the product. They should also come with a Material Safety Data Sheet (MSDS). The MSDS will give you information on the hazards that may be presented by the product and steps you can take to protect yourself from any risks associated with the product.

Health Problems Associated with Exposure to Detergents and Cleaning Products

One of the most common health effects associated with working with detergents or other cleaning products is dermatitis. Many detergents and cleaning products irritate or attack the body's protective organ – the skin – and weaken its job as a barrier.

Pesticides

Insecticides are a type of pesticide used to kill or control insects. When organo-phosphate insecticides – commonly called OPs – enter the human body, they impair the body’s ability to control normal nerve and muscle function.

OPs are used

- On farms and in orchards to control insects that damage crops
- On farms and ranches to control pests that infest animals and farm buildings
- In veterinary products used to control pests that infest livestock and pets
- In nurseries to control pests that attack greenhouse crops and bedding and ornamental plants
- In the forest industry to protect trees and tree seedlings
- In warehouses, retail stores, schools, office towers, and other buildings to control termites, carpenter ants, and other pests

Most OPs have strong odours that smell like garlic. They are very toxic and can enter the body in the following ways.

- Through the skin – The skin is the most likely way for OPs to enter the body. They can be absorbed not only through skin that is cut or scraped, but also through intact skin. Exposure through the skin often occurs with spills or splashes during mixing or spraying. Eyes and genital areas absorb pesticides more easily than hands and forearms.
- Through the lungs – The risk of inhaling OPs is higher if they tend to remain in the air after application. Inhalation of vapours, fine dusts, and fogs are the main concerns. The risk of inhaling OPs may be very high in greenhouses, mushroom barns, warehouses, or other enclosed areas where ventilation is poor.
- By swallowing – The most severe poisonings often result when OPs are swallowed. The stomach and intestines absorb pesticides easily. You can ingest OPs if you eat, drink, or smoke in a contaminated area, or don’t wash your hands before doing any of these things.

Protection Practices

You must wear personal protective equipment to use OPs safely. What you need depends on how toxic the OP is, the type of formulation (solid, liquid, or gas), and the risk of exposure. For example:

- If you are working with concentrated OPs as a mixer or a loader, you need goggles, gloves, a respirator, and protective clothing to guard against splashes, spills, and vapours.
- If you are working as a flagger involved in aerial applications, you could be exposed to spray drift and should protect your eyes and all of your skin.

No one material provides protection against all types of OPs. Check the OP product label for the type of glove recommended for use when handling the product. If the label doesn't tell you, ask your boss or contact the supplier. How often you need to replace your gloves depends on the gloves' thickness, how well they have been taken care of, and their amount of use. Check gloves regularly for wear and tear. Don't use a glove that has a hole or worn spots.

Wear 100 percent cotton coveralls and other clothing, or an outer rain or spray suit. Rain or spray suits worn during pesticide applications should be waterproof, tear-resistant, and resistant to the solvent used in the OP. Pesticides pass through polyester; cotton absorbs them. Check the labels on your clothing to be sure that they are 100 percent cotton, not a cotton-polyester blend.

When using any OP, you should at minimum wear a long-sleeved shirt, long-legged pants, socks, waterproof boots, and gloves.

In addition to wearing personal protective equipment, you should also practise good hygiene, including washing your hands

- After handling OPs
- Before eating, drinking, or using the toilet
- Before going home

For more information

- Learn more about these [hazards](#) and others at worksafebc.com/hazards.
- Find our young worker [exposure prevention guides](#) at worksafebc.com/youngworkers.

Exposure to Biological Hazards

Biological hazards discussed here include blood-borne diseases (e.g., HIV and hepatitis A, B, and C), West Nile virus, tick-borne diseases, and hantavirus.

Blood-Borne Diseases Such as HIV and Hepatitis A, B, and C

Blood and certain body fluids can be infected with tiny organisms that can cause disease in humans. These micro-organisms are known as blood-borne pathogens. Those of most concern are the human immunodeficiency virus (HIV) and the hepatitis B and C viruses. HIV causes the disease AIDS (acquired immune deficiency syndrome), and the hepatitis B and hepatitis C viruses cause diseases with the same names.

Employees who work outdoors in areas where public access can't be controlled, and inside workers who work at places frequented by the public, sometimes find used needles and condoms in their work areas. These items – which could carry HIV and the hepatitis B and C viruses – are often thrown away in parks, streets, alleys, empty lots, public washrooms, and on beaches.

Most workers won't ever come into contact with blood and body fluids that can spread HIV and the hepatitis B and C viruses. Still, even if you work in a setting where contact with blood and body fluids is not expected, you should take some basic precautions, because it is possible to become infected from a single exposure incident – that is, harmful contact with infected blood or body fluids.

Transmission of HIV and the Hepatitis B and C Viruses

HIV and hepatitis B and C viruses can all be spread by infected blood. They can also be spread by certain other infected body fluids. For infection to occur, viruses from infected blood and body fluids must enter the body. Whether the infection will occur depends on each individual's ability to fight infection. Human tissues and organs used for transplant can also transmit these viruses.

Some of the body fluids that spread these viruses include

- Semen
- Vaginal secretions
- Amniotic fluid (fluid that the fetus lives in within the womb)
- Fluid around the heart
- Fluid in the lining of the lungs
- Fluid in the abdomen
- Fluid in joints

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- Fluids surrounding the brain and spinal cord
 - Breast milk (known to transmit only HIV)
 - Saliva (known to transmit only hepatitis B)
 - Any body fluid with visible blood

The following body fluids **do not** spread HIV or hepatitis B or C unless you can see blood in them:

- Tears
- Nasal secretions
- Sputum (coughed up from the lungs)
- Vomit
- Urine
- Sweat
- Feces

These body fluids, however, may spread other infections (e.g., feces can spread hepatitis A and sputum can spread tuberculosis), but they are not of concern in the spread of HIV and the hepatitis B and C viruses.

Exposure to Infected Blood and Body Fluids at Work

For contact with infected blood and certain body fluids to pose a risk of infection, blood-borne viruses must have the opportunity to enter the body. Whether an infection occurs depends on the individual's ability to fight infection. Workers can be exposed to infected blood and body fluids at work in the following ways:

- By puncturing the skin with a sharp object contaminated with infected blood and body fluids (e.g., needles, scalpels, knives, razors, scissors, broken glass, and anything else that can pierce, puncture, or cut skin)
- By splashing infected blood and body fluids into the mucous membranes (the tissue lining of the eyes, nose, or mouth)
- By splashing infected blood and body fluids onto broken skin (e.g., fresh open cuts, nicks, wounds, skin abrasions, chapped or damaged skin, and skin with disease such as eczema and dermatitis)

Although HIV is considered fragile outside the human body, it is not known how long it can live on discarded needles and sharps.

Hepatitis B and C can pose much greater risk to workers than HIV because these viruses are more easily transmitted. The hepatitis B virus is also much hardier – it can survive in a dried state on surfaces at room temperature for at least one week. There is no data on how long the hepatitis C virus can last in the environment, and this has not been established as a route of transmission.

Protection Practices

- Recognize the common work-related risks, such as
 - Cleaning hotel rooms
 - Cleaning bathrooms
 - Picking up litter (e.g., needles, condoms, and other sharp objects) from the ground, alleys, parking lots, and streets
- Follow your employer's or your company's safe work procedures.
- Ensure that biological and other related waste is placed in specially marked containers.
- Wear gloves and a face mask.
- Make sure you cover cuts and scratches.

When exposed to infected or potentially infected blood or body fluids

1. Get first aid immediately.

- If the mucous membranes of your eyes, nose, or mouth have been affected, flush them with lots of clean water at a sink or eyewash station.
- If there is a sharps injury, allow the wound to bleed freely. Then wash the area thoroughly with non-abrasive soap and water.
- If an area of broken skin is affected, wash the area thoroughly with non-abrasive soap and water.

2. Report the incident.

Report the incident as soon as possible to your supervisor and first-aid attendant or occupational health staff. Make sure there is no significant delay in seeking medical attention.

3. Seek medical attention immediately.

Seek medical attention immediately – preferably within two hours – at the closest hospital emergency room or at a health care facility if there's no hospital emergency room in the vicinity. Immunizations or medications may be necessary. These may prevent infection or favourably alter the course of the disease if you do become infected. Blood tests should also be done at that time. You may need to see your family doctor within the next five days for follow-up, such as counselling and medications.

West Nile Virus

West Nile virus infection occurs when the virus is transmitted to humans, primarily by bites from mosquitoes. People infected with the West Nile virus usually either show no symptoms at all, or develop West Nile fever. West Nile fever is a mild disease, like the flu, that typically lasts only a few days and is not believed to have any long-term effects. Severe cases of West Nile virus infection, however, can result in one of the following:

- West Nile encephalitis, an inflammation of the brain
- West Nile meningitis, an inflammation of the membrane around the brain
- West Nile meningoencephalitis, an inflammation of the brain and the membrane around it.

The signs and symptoms of these severe diseases may last several weeks and could result in permanent neurological effects.

Protection Practices

You can reduce or eliminate the risk of becoming infected with the West Nile virus by taking preventive measures to minimize mosquito bites. One of the best ways to do this is to reduce or eliminate mosquito populations. That is usually done by getting rid of sources of stagnant or standing water that serve as mosquito breeding grounds. Mosquitoes need only four days to breed in stagnant or standing pools of water.

If you have to work outside, there are several measures you can take to prevent mosquito bites:

- Cover as much of your skin as possible by wearing long-sleeved shirts, long pants, and socks. Wear light colours, since dark colours attract mosquitoes.
- Cover exposed areas of your skin with an insect repellent. According to the B.C. Centre for Disease Control, insect repellents containing DEET offer the best protection against mosquitoes. (The percentage of DEET in repellents should not exceed 30 percent for adults or 10 percent for children.) Make sure you follow the directions when using insect repellents and do not apply it to skin that is already cut, burned, or otherwise irritated.
- Apply insect repellent to the outside of your clothing, as well as to all exposed skin.
- Do not wear perfume or cologne, which may attract mosquitoes.
- Do not pick up dead birds with your bare hands. The birds may be carrying the virus.

Mosquitoes are most likely to swarm during the late evening and early morning hours, so take extra precautions at these times.

Tick-Borne Diseases

If you are working in a grassy or wooded area, it is important to protect yourself from ticks. Two species of ticks in British Columbia can cause diseases in humans:

- The Rocky Mountain wood tick is found in the British Columbia interior dry belt from the U.S. border north to Williams Lake and east to Alberta. If these ticks remain on the body for several days, their bites can cause tick paralysis, which usually stops shortly after the tick has been removed. Symptoms start with numbness in the feet and legs, making walking or standing difficult. These ticks can also carry Rocky Mountain spotted fever, but that disease rarely occurs in Canada.
- The western black-legged tick lives in vegetation in the warm, moist coastal areas of Vancouver Island and along the mainland from the U.S. border to Powell River. Its range extends eastward along the Fraser River to Hope and north to Boston Bar. The bite is often painful and may result in a slow-healing ulcer. In rare cases, some western black-legged ticks carry bacteria that may cause Lyme disease, with symptoms such as a red skin rash, fever, headache, fatigue, sore throat, and swollen glands.

Protection Practices

- Wear long pants and a long-sleeved shirt. Tuck pants into socks and shirt into pants. Spraying insect repellent containing DEET on your pants may help repel ticks.
- Avoid walking or resting in areas overgrown with vegetation.
- After working, examine your body and clothes closely for ticks.
- Remove ticks immediately when you find them.

Hantavirus

Hantavirus infection is caused by a virus that is found in some rodents, especially deer mice. The virus is rarely transmitted to people, but when it is, it can cause severe illness – hantavirus pulmonary syndrome (HPS) – and even death.

Although only deer mice have been found to carry the virus in British Columbia, other rodents should not be ruled out as potential carriers. The virus does not appear to cause illness in rodent hosts. Infected rodents shed the virus in saliva, urine, and feces, and it is then spread to humans when particles of infected saliva, urine, or feces are inhaled. The virus may be inhaled during direct contact with the rodent, or from breathing airborne dust particles that are generated when rodent excreta are disturbed. The virus can be spread if infected materials contact broken skin or the membrane lining of the eyelids and the eyeball.

It is not known whether someone can become infected from a rodent bite or by eating or drinking food or water contaminated by rodents.

Many of the confirmed cases of Hantavirus Pulmonary Syndrome in British Columbia have been work related, and most of these cases have appeared to involve direct contact with mice or their droppings. Cases of hantavirus in the United States, Alberta, and British Columbia have been associated with activities such as

- Sweeping out a barn and other ranch buildings
- Trapping and studying mice
- Using compressed air and dry sweeping to clean up wood waste in a sawmill
- Handling grain contaminated with mouse droppings and urine
- Entering a barn infested with mice
- Planting or harvesting field crops
- Occupying previously vacant dwellings
- Disturbing rodent-infested areas while hiking or camping
- Living in dwellings with a sizable indoor rodent population

Protection Practices

The primary prevention strategy for minimizing worker exposure to hantavirus is to control rodent populations in and around the worksite. An effective rodent control program requires an integrated approach and includes

- Ongoing inspections for rodents – ensuring the area is inspected by qualified people who can determine if active rodent control is required
- Sanitation – reducing the number of places, both inside the worksite and in the immediate vicinity, where rodents may feed or find shelter
- Rodent proofing – ensuring rodents cannot get into building spaces (e.g., by closing openings where rodents gain entry, installing barrier materials such as steel wool, fine mesh screens, mortar, and sheet metal)
- Rodent population reduction – reducing and controlling the population through the use of poison or traps