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Handbook of Occupational Hazards and Controls for Public Health Workers

Current to January 2011

Government of Alberta

Credits

This document has been developed by the Government of Alberta and derived as a profession-specific summary of information contained in the five volumes of Best Practices in Occupational Health and Safety in the Health Care Industry. Full text of these documents can be found at http://www.employment.alberta.ca/SFW/6311.html

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Occupational Health and Safety Hazards and Controls for Public Health Workers

Introduction

As part of the Alberta Healthcare Initiative, a series of Best Practice documents were produced by Alberta Employment and Immigration – Workplace Health and Safety to better acquaint healthcare workers (HCW) with workplace hazards and appropriate control measures. Five documents have been produced; each developed with the input of a multidisciplinary stakeholder group. The documents are available on the Alberta Employment and Immigration website http://www.employment.alberta.ca/SFW/6311.html as follows:

Overview of Best Practices in Occupational Health and Safety in the Healthcare Industry Vol. 1
http://www.employment.alberta.ca/documents/WHS/WHS-PUB_bp009.pdf
Best Practices for the Assessments and Control of Biological Hazards Vol. 2
http://www.employment.alberta.ca/documents/WHS/WHS-PUB_bp010.pdf
Best Practices for the Assessments and Control of Chemical Hazards, Vol. 3
http://www.employment.alberta.ca/documents/WHS/WHS-PUB_bp011.pdf
Best Practices for the Assessments and Control of Physical Hazards, Vol. 4
Best Practices for the Assessments and Control of Psychological Hazards, Vol. 5

In an effort to focus the hazard assessment and control information for specific healthcare professions, a series of short summaries of relevant information have been produced using excerpts from the five best practice documents. Readers are directed to the original documents for more details and more comprehensive information. *Please note that hyperlinks are provided to reference documents for the convenience of the reader. These links are functional at the time of first availability of this document but, due to the changing nature of web information, may not be functional at a later date. The Government of Alberta does not assume responsibility for updating hyperlinks.*

This document focuses on hazards and controls for workers providing public health services, with a focus on public health inspectors. Much of this information may also be useful for other workers providing some services in homecare or community settings. Other handbooks which may be of interest to public health workers include those designed for emergency responders as well as those designed for homecare workers.

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Hazard Assessment Process

Workers in public health may be exposed to a variety of workplace hazards in the course of performing their functions. The type and degree of exposure is dependent upon a variety of individual factors including client-related factors as well as environmental issues. A key component of a health and safety program is to identify and assess hazards and determine appropriate controls. A systematic approach to hazard assessment includes the following steps:

1. List all work-related tasks and activities.
2. Identify potential biological, chemical, physical and psychological hazards associated with each task.
3. Assess the risk of the hazard by considering the severity of consequences of exposure, the probability that the exposure will occur and the frequency the task is done.
4. Identify the controls that will eliminate or reduce the risk. The hierarchy of controls should be followed. This means that engineering controls are the most effective, followed by administrative controls (such as training and rules), and followed by personal protective equipment (PPE).
5. Implement the controls for each hazard.
6. Communicate the hazard assessments and required controls to all workers who perform the tasks.
7. Evaluate the controls periodically to ensure they are effective.

Potential Hazards and Recommended Controls

The following charts summarize potential hazards for workers in public health and recommended controls to reduce the risk of exposure to the hazards.

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Biological Hazards and Controls

In this section the most commonly encountered biological hazards for workers in public health and methods to control them are presented. Employers should carefully evaluate the potential for exposure to biohazardous materials in all tasks and ensure that they have an effective hazard control plan in place. This information will be useful for inclusion into hazard assessments. Please note, this is not designed to be an exhaustive treatment of the subject, but is rather an overview summarizing the biological hazards most frequently encountered by workers in public health.

Note:
The following chart provides basic information about control strategies for commonly occurring biological hazards. Administrative controls are based on the risk assessment. Worker education and good communication processes are important administrative controls. Any PPE selected must be based upon the risk assessment of the task and the environment in which it is used. All legislation related to the selection and use of controls must be followed.

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Potential Hazards	Summary of Major Control Strategies		
	Engineering	**Administrative**	**PPE**
Exposure to bloodborne pathogens through needle stick injuries, contaminated items and surfaces, exposure to mucous membranes	Medical history of clients. Dedicated handwashing sink. Waterless hand sanitizers. Engineered needle stick prevention devices. Availability of sharps containers for disposal. Vaccines.	Compliance with all infection prevention and control practices. Immunization program. Worker education. Post-exposure procedures.	Gloves, protective clothing, eye and face protection.
Exposure to airborne biological agents through contact with secretions from infectious patients (coughing, sneezing, etc.) or air contaminated with infectious biological agents	Medical history of clients. Vaccines.	TB screening. Compliance with all infection prevention and control practices. Immunization program. Worker education.	PPE where warranted based on level of risk may include gloves, protective clothing, face and eye protection, respiratory protection.
Exposure to droplets containing	Medical history of clients.	Good housekeeping practices.	PPE based on the risk

infectious biological agents through contact with patient secretions, skin to skin contact, or contaminated environmental surfaces or equipment	Vaccines. Disinfection of equipment. Cleaning of toys.	Compliance with all infection prevention and control practices. Immunization program. Proper waste disposal. Worker education.	assessment may include gloves, eye and face protection and other protective clothing (fluid resistant).
Exposure to environmental biological contaminants from ventilation systems, water or food	Maintenance of ventilation systems. Early spill clean-up. Preventive maintenance of ventilation systems and water supply systems with regular testing to ensure proper functioning. Early detection and remediation of mould.	Infection prevention and control practices related to building maintenance and food preparation. Protocols for construction and renovation projects that reduce contamination. Worker education.	Use of proper PPE when cleaning contaminated environmental surfaces, including gloves, respiratory protection, and eye protection.

Notes about controls for biological hazards

Exposure to biological hazards may occur for any healthcare worker. Controls include any mechanisms to reduce the potential for exposure to infectious agents and the immunization of all direct caregivers against infectious diseases to which they may be exposed.

Engineering Controls

In the hierarchy of controls, the highest level of control is directed at the source. From an occupational health perspective, the highest level of control may be immunization of workers who may come in direct contact with infected clients. Good engineering controls such as the use of needleless systems and engineered needle stick prevention devices, and effective biological waste handling also contribute to minimizing the transmission of infectious agents. Engineering controls, once designed and implemented, are not under the control of the worker, but are directed at the source of the hazard. Engineering controls related to the design of the work area are not often elements that are within the worker's control. However, in some cases, modifications may be suggested that provide a safer environment for both client and worker.

Safe Needle Devices

Safe needle devices have built-in engineering features that assist in preventing injuries during and after use of the device. Examples of safe needle devices that have built-in engineering features include:

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- Needleless connectors for IV delivery systems
- Protected needle IV connectors
- Needles that retract into a syringe or vacuum tube holder
- Hinged or sliding shields attached to syringes
- Self-blunting phlebotomy and winged steel needles
- Blunt tip suture needles
- Retractable finger/heel-stick lancets

While some engineered safe needle devices have been available for some time, new engineered safe needle devices continue to be introduced for the healthcare industry. Sharps disposal containers assist in protecting HCWs from injuries when handling and transporting waste sharps. The CSA standard *Z316.6-07 Evaluation of Single-use and Reusable Medical Sharps Containers for Biohazardous and Cytotoxic Waste* should be consulted when selecting sharps containers.

Decontamination[1] of facilities and materials

Decontamination is a term used to describe procedures that remove contamination by killing microorganisms, rendering the items safe for disposal or use. All contaminated materials must be decontaminated before disposal or cleaning for reuse. The choice of method is determined by the nature of the material to be treated. Disinfection refers to the destruction of specific types of organisms but not all spores, usually by chemical means. Disinfection is a means of decontamination. Surfaces must be decontaminated after any spill of potentially infectious materials. Work areas, client rooms, and pieces of equipment may also require decontamination.

General ventilation

Ventilation in many workplaces is often general ventilation, with furnaces, the use of windows and in some cases air conditioning in the summer. Where humidifiers are in use, accumulations of water could stagnate in humidifier trays and may be sources of potential biological contamination. Regular maintenance of humidifiers is required to reduce the risk of microbial growth. Mould growth in the indoor environment can be affected by relative humidity levels. High relative humidity levels may contribute to an increase in the growth of some moulds and lead to condensation developing on surfaces. Control of indoor relative humidity levels is an important factor in preventing mould growth.

[1] This section was modified from Laboratory Safety: CSMLS Guidelines, sixth edition; Gene Shematek & Wayne Wood; Canadian Society for Medical Laboratory Science; 2006.

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Administrative Controls

The next level of controls is administrative controls. Because it is not always possible to eliminate or control the hazard at the source, administrative controls are frequently used for biological hazards in healthcare. Administrative controls focus on ensuring that the appropriate prevention steps are taken, that all proper work procedures are documented, and that workers in public health are trained to use the proper procedures. Administrative controls include policies and procedures that establish expectations of performance, codes of practice, staff placement, required orientation and training, work schedules, and occupational health programs in which baseline immune status is recorded and immunizations are provided.

A comprehensive management system considers the continuum of infection prevention and control efforts across all sites and operations. A comprehensive system should include the following components:

- ☐ A process that ensures site-specific hazard assessments are conducted for all sites and tasks and appropriate controls are identified
- ☐ An infection prevention and control (IPC) plan with clear designation of roles and responsibilities
- ☐ Consistent standards for the cleaning, disinfection and sterilization of equipment, procedures, and policies including Routine Practices, Additional Precautions, hand hygiene policies and available materials, client risk assessments, communication protocols, decontamination of clothing and dedicated clothing
- ☐ Outbreak prevention and management
- ☐ Adequate staffing to comply with OHS and IPC policies and procedures; work scheduling;
- ☐ Required orientation and ongoing education
- ☐ Biomedical waste handling procedures and policies
- ☐ A comprehensive surveillance and monitoring plan
- ☐ Record keeping and regular reporting of outcomes

Routine practices and additional precautions

Procedural controls may include procedures that relate to detection and follow-up of infectious diseases, the use of Routine Practices and Additional Precautions as directed, baseline health assessments and periodic screening of workers, hazard identification and control processes, and outbreak management procedures. Awareness of the infectious disease status of clients is another good control, though this is not always possible for workers in public health. All work procedures should include the consideration and control of the risk of exposure to workers. Routine Practices and Additional Precautions (where required) greatly assist in reducing the transmission of infectious agents from both known and unknown client sources by treating all contacts as potential risks.

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Infection Prevention and Control Definitions:

Routine Practices include a recommended pattern of behaviours to form the foundation of limiting the transmission of microorganisms in all health care settings and is generally accepted care for all clients. Elements of Routine Practices are: hand hygiene: risk assessment related to client symptoms, care and service delivery, including screening for infectious diseases; risk reduction strategies through the use of PPE, cleaning environment, laundry, disinfection and sterilization of equipment , waste management, safe sharps handling, client placement and healthy workplace practices; and education of healthcare providers, clients and families, and visitors.

Additional precautions are practices used to prevent transmission of infectious agents that are spread by direct or indirect contact with the client or client's environment that are necessary in addition to Routine Practices for certain pathogens or clinical presentations. These precautions include Contact Precautions, Droplet Precautions, and Airborne Precautions that are based on the method of transmission.
For more information: http://www.health.alberta.ca/documents/IPC-MRSA-Standards-2008.pdf

Routine Practices include being attentive to all routes of transmission. Awareness of routes of transmission has led to the development of a variety of transmission-route specific strategies. Most of these are well documented in infection prevention and control plans. In particular, hand hygiene is identified as the single most important administrative strategy in infection prevention and control. Other strategies include additional precautions designed to address infections transmitted through the "airborne" route, those transmitted through "droplets" and those transmitted through "contact". It should be noted that though some infection prevention and control plans appear to provide sharp demarcations as to what size of particle is transmitted by which route (particularly by airborne and droplet); it is highly likely that there is a continuum of particle sizes produced at any time and the determination of transmission route is more a probability than a certainty. For this reason, one must be careful in defining control strategies based solely on particle sizes.

In some circumstances, identification of the specific organism responsible for the infection may take considerable time, during which client care is required. In these cases, it is prudent to apply the most stringent precautions until evidence indicates that less are required. In cases where the transmission route or organism has not yet been identified, it is prudent to assume all routes of transmission may be possible, as this would drive the highest level of precautions available and appropriate. Once more information is known about the organism, precautions can be revised to take that knowledge into account.

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Administrative controls related to the prevention of exposure to biological hazards include the development and implementation of infection prevention and control guidelines, including vehicle and equipment decontamination and safe work procedures.

Surfaces must be decontaminated after any spill of potentially infectious materials. Specific written protocols must be developed and followed for each decontamination process. Workers must be trained in all decontamination procedures specific to their activities and should know the factors influencing the effectiveness of the treatment procedure.

Chemical Disinfectants

Chemical disinfectants are used to decontaminate surfaces, reservoirs of infectious material, and to clean up spills of infectious material. The choice of chemical disinfectant must be made carefully based on:

- Types of organisms, suspected or known
- Items or surfaces to be decontaminated
- Hazards posed to the worker by the disinfectant
- Cost of disinfectant
- Corrosiveness of disinfectant
- Shelf life and required dilution of disinfectant
- Material which inactivates the disinfectant

In many cases, the choice of disinfectant for specific uses may be standardized in the organization and made after evaluation by IPC and OHS professionals.

Considerations in the use of chemical disinfectants

- Choose the disinfectant carefully. More than one may be required. Keep in mind the items to be disinfected, and the properties and limitations of the various available disinfectants. If more than one disinfectant is required, ensure that those selected are chemically compatible.
- Follow the manufacturer's directions for making the proper dilutions of the disinfectants.
- The effective life of disinfectants can vary depending on the formulations and the conditions of usage. Follow the manufacturer's directions.
- The effective exposure time that the disinfectant must be in contact with the contaminant will also vary with conditions of usage. Often overnight exposure may be recommended to ensure effective decontamination.

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- Understand the health and safety hazards that may be posed by a particular disinfectant and ensure appropriate precautions are taken. Wear disposable gloves when using any disinfectants. Wear other personal protective equipment or clothing as necessary, depending upon the disinfectants. Consult Material Safety Data Sheets for details.
- Workers in public health with particular sensitivities to specific disinfectants should avoid using those disinfectants.
- Perform tests of the disinfectants to ensure effective disinfection.

Spill response procedures

The efficient and effective control of a biological spill requires that all workers in public health are trained in and have practiced the established spill response techniques. The materials and supplies that are necessary for spill clean-up and decontamination must be readily available to ensure timely spill response. Written spill response procedures should outline spill response actions and roles. The actual procedure used will vary with the size of the spill and the location of spill (including materials, equipment or environmental surfaces affected). All spill responses should be documented as incidents.

To handle biological spills, it is prudent to have these items available:

- Biological liquid solidifying agent
- Disinfectant - small quantities, made fresh daily if phenolics or hypochlorites (such as bleach)
- Forceps for picking up broken glass
- Paper towels, swabs, disposable and heavy-duty gloves
- Metal or polypropylene (autoclavable) dust pan
- Heavy-duty polyethylene bags

Training

Training in biological hazards and controls should be provided to all health care workers (HCWs). Each HCW must understand the employer's IPC and OHS programs as they relate to their job duties. For newly hired HCWs all relevant IPC and OHS policies and procedures must be provided to them before they start work. To ensure that HCWs understand and apply this information to their jobs, specific training should also be provided to address job-specific biological hazards. Periodic refresher training to reinforce policies and procedures and introduce any new practices will benefit all HCWs. Competency assessments should be provided for all training, and training records should be maintained.

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HCW immunization and health surveillance

An immunization policy and program is a proactive mechanism to reduce risk of communicable diseases for HCWs. Each healthcare organization should have an immunization and health surveillance program in place that is appropriate to the size and type of workplace. These programs must be applicable to workers in public health, as appropriate to the risk assessment of their tasks. Immunization and health surveillance programs should include:

- Education about vaccine-preventable diseases
- Risk assessment to determine the need for immunization or surveillance based on potential exposure
- Administration of immunizations (or referral for immunizations, as appropriate)
- Documentation and follow-up of any baseline health assessments, communicable disease status and immunizations

Ideally, the immunization and surveillance programs should provide easy, authorized access to HCW immune status records for follow up of exposure incidents and outbreaks. In some cases, immunizations or baseline testing may be required prior to commencement of work.

Post-exposure follow-up management

Post-exposure management includes management of HCWs exposed to, colonized by, or infected with microorganisms; an outbreak management process for exposures and/or HCWs who are symptomatic or colonized with infectious disease; and access by Occupational Health professionals to utilize medical assessment and diagnostic services for timely follow-up for HCW exposures. This is an important procedure for workers in public health, who are often not working in a hospital facility when exposure occurs.

Personal Protective Equipment (PPE)

Personal protective equipment such as gloves, respiratory protection and eye protection should be used based on the risk assessment. PPE is often used in conjunction with other controls (engineering and administrative) to provide additional protection to workers. The primary types of PPE are designed to protect the worker from infectious disease by breaking the chain of infection at the "portal of entry or exit" of the microorganisms. This means that all PPE is designed to reduce exposure via specific routes of transmission. Gloves, gowns and other protective clothing reduce exposure through the dermal (skin) contact route and help contain the microorganisms to the work environment.

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Gloves

Gloves are the most common type of PPE used for public health. Gloves are made from a variety of materials including latex, nitrile, neoprene, copolymer, and polyethylene and are available in various sizes and levels of thickness. When dealing with infectious materials, gloves must be waterproof. Most client care activities require non-sterile gloves, whereas any invasive procedure should be performed using sterile surgical gloves. Latex gloves should be avoided due to the risk of latex allergy unless there is a demonstrated safety requirement for latex to be used.

The Canadian General Standards Board (CGSB) certifies medical gloves, which is a key factor in selecting gloves for use in healthcare. The choice of gloves must often balance the needs for protection and dexterity. While thicker gloves (or double gloves) may appear to provide greater protection, it may make tasks more difficult and increase the exposure risk. In Recommendations for Canadian Health Care and Public Service Settings[2], it is noted that the *"Selection of the best glove for a given task should be based on a risk analysis of the type of setting, type of procedure, likelihood of exposure to blood or fluid capable of transmitting bloodborne pathogens, length of use, amount of stress on the glove, presence of latex allergy, fit, comfort, cost, length of cuffs, thickness, flexibility, and elasticity."*

Safe Practices for Glove Use[3]

- Wear medical gloves when there is a risk of contact with blood, body fluids or substances, mucous membranes, open wounds or skin lesions.
- Wear gloves that are certified by the CGSB.
- Wear gloves when handling items contaminated with blood, body fluids, secretions or excretions.
- Wear gloves if you have any cuts or lesions on your hands or if you have dermatitis affecting your hands.
- Avoid latex gloves and powdered gloves to reduce sensitization or allergic reactions.
- Ensure that the gloves fit properly.
- Inspect gloves for holes or tears, discarding any damaged gloves.

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[2] *Recommendations for Canadian Health Care and Public Service Settings*; found at http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/97vol23/23s3/index.html

[3] Modified from information provided in Preventing the Transmission of Blood Borne Pathogens in Health Care and Public Service Settings. Found at http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/97vol23/23s3/index.html (See Supplement)

- Put gloves on just before beginning the task, and remove them promptly when finished and before touching any environmental surfaces.
- Do not touch your face or adjust PPE with contaminated gloves and avoid touching uncontaminated items such as light switches, telephones, etc. while wearing gloves.
- Change gloves when they become soiled, during lengthy procedures, and between clients.
- Remove gloves carefully according to the IPC guidelines and dispose of them properly.
- Wash hands before using and after removing gloves.
- Never reuse or wash single-use disposable gloves.

PPE is required when there is the potential for exposure of the face to splashes or sprays of infectious material. The selection of eyewear depends upon the tasks being conducted. Types of eye protection most commonly used by workers in public health include safety glasses and goggles. Regular prescription eyewear and contact lenses are not considered effective as PPE. Safety eyewear should fit the wearer, be clean and well maintained and stored. If necessary, goggles may be fitted with prescription lenses or worn over glasses. Masks protect the mucous membranes of the nose and mouth from exposure to large droplets that may contain infectious materials. Masks are commonly used to contain droplets at the source (for example, the HCW or client with a cough). Masks should fully cover the nose and mouth and fit snugly. Masks worn by clients reduce exposure through droplet containment at the source, and respirators worn by health care workers reduce exposure to the respiratory system.

The Difference between a Surgical or Procedure Mask and a Respirator

Surgical or Procedural Masks	Respirators (i.e. NIOSH approved N95)
• Surgical Masks are <u>not</u> designed to seal tightly against the HCW's face or certified to prevent inhalation of small droplets/particles. • When the HCW inhales, contaminated small droplets can pass through gaps between the face and surgical mask.	• A fit-tested NIOSH approved respirator provides a proper seal at the HCWs face, forcing inhaled air to be pulled through the filter material and not through gaps between the face and the respirator.

• Surgical masks provide a physical barrier for protection from splashes of large droplets of blood or body fluids.
• Surgical masks are used for several purposes including:
  ○ Prevention of accidental contamination of clients wounds with pathogens normally present in mucus or saliva
  ○ Placed on sick clients to limit spread of infectious respiratory
	• Respirators are designed to reduce HCW's exposure to airborne contaminants.
	• Fit tested NIOSH approved respirators are used when required, based on hazard assessment.

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secretions to others ○ Protection from splashes or sprays of blood or body fluid ○ Assist to keep HCWs contaminated hands from contacting their own mucous membranes.	

*Adapted from OSHA (2007) Guidelines on Preparing Workplaces for an Influenza Pandemic

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Chemical Hazards and Controls

This section will provide a brief overview of selected chemicals that workers in public health may come into contact with. **Note that this list is not extensive or all-inclusive.** In the control column, E, A and P are used to designate Engineering, Administrative and PPE controls. These controls are briefly summarized and the reader should link to the references provided for additional information. The proper choice of control measures must be based on a risk assessment for the specific tasks being performed. Safe work practices are administrative controls necessary for working with all harmful substances and educating workers in the practices is vital. Safe work procedures should be designed to:

- Limit the worker's exposure time
- Reduce contact with the substance through any route of exposure to the worker
- Ensure safe disposal of substances and disposable equipment that comes into contact with harmful substances
- Ensure safe handling and decontamination of reusable equipment
- Require the use of all designated controls

Worker education is critical for safely handling harmful substances.

General Resources – Chemical Hazards
For more information about specific chemical hazards, consult the following resources:
NIOSH Pocket Guide to Chemical Hazards (http://www.cdc.gov/niosh/npg/).
CCOHS Cheminfo (http://ccinfoweb.ccohs.ca/).
Alberta Workplace Health and Safety Bulletins (http://employment.alberta.ca/SFW/136.html).

The following charts, taken from Volume 3 – Best Practices for the Assessment and Control of Chemical Hazards in Healthcare, summarize important information about some of the chemical hazards that may be encountered by workers in public health.

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Chemical (category or group)	Common Uses and Examples	Exposure and Health Effects Information	Controls	For more information:
These are examples of chemicals, uses, health effects and controls. For each chemical used in the workplace, specific information MUST be consulted to determine controls based on what the product is used for, how it is used and the environment it is used in. This may be found on MSDSs, information provided by the manufacturer or supplier, or other sources. Individual reactions to chemicals must also be considered in determining appropriate controls.				
Alcohol hand sanitizers	Hand hygiene when water is not available and hands are not visibly soiled	May cause skin dryness. Product is flammable.	**A**- Appropriate storage of product (away from ignition sources and incompatible products). Provision of hand cream to soothe hand dryness.	http://www.ottawa.ca/residents/health/emergencies/pandemic/hand/faq_gel_en.html http://employment.alberta.ca/documents/WHS/WHS-PUB_fex002.pdf http://www.municipalaffairs.alberta.ca/documents/ss/STANDATA/fire/fcb/97fcb026.pdf
Asbestos	Used for fire protection and insulation and in many older building products. Asbestos is often found in older facilities, in a variety of building materials including fireproofing materials, pipe and vessel insulation, floor coverings etc.	Exposure to fibres through inhalation if asbestos containing material is disturbed. Carcinogenic and may cause lung disease. Workers involved in abatement are at highest risk.	**E** – Isolation of abatement areas. Enclosure and encapsulation of asbestos containing materials as appropriate. Elimination of asbestos materials. Substitution with less harmful product. Contracting out abatement activities to qualified contractors. **A**- Development of an asbestos management plan in compliance with legislative requirements. Identification of asbestos containing materials. Safe work procedures including spill procedures. Education of workers in the nature of the hazard. An Asbestos Worker training course may be required depending on the nature of the work being done, in accordance with OHS legislation. Performance of air sampling as required. **P** –PPE as required by hazard assessment - may include protective clothing, face/eye protection, respiratory	http://employment.alberta.ca/documents/WHS/WHS-PUB_ch019.pdf http://www.cdc.gov/niosh/npg/npgd0041.html

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Chemical (category or group)	Common Uses and Examples	Exposure and Health Effects Information	Controls	For more information:
			protection.	
Chemical waste	Waste chemicals can be generated in any area where chemicals are used, including used protective clothing.	Exposure routes of entry and health effects are dependent upon the nature of waste chemicals. Mixed wastes may pose multiple hazards.	**E**- Designated waste storage and collection areas. Adequate ventilation. Use of bonding, grounding and explosion control. **A-** Appropriate storage of products to decrease exposure and minimize fire hazards and chemical reactions. Policies and procedures for safe chemical disposal. Education of workers in the nature of the hazard. **P**- As required based on specific hazard assessment.	http://employment.alberta.ca/documents/WHS/WHS-PUB_fex002.pdf
Chemicals used in terrorist activities	A variety of chemicals that could be used in terrorist activities.	Depending upon the nature of the chemical, its concentration and route of exposure, may cause blistering, choking, neurological or blood system effects.	**E –** Properly designed and maintained ventilation systems. Local exhaust ventilation. Isolation of areas where contamination may be present. Provision of adequate decontamination facilities. Provision of antidotes if available. **A** – Development and implementation of a chemical, biological, radiological and nuclear response (CBRN) plan. Education of workers in the nature of the hazard and emergency procedures. **P** – PPE as detailed in the CBRN plans.	http://www.ajph.org/cgi/reprint/91/5/718.pdf http://www.nae.edu/File.aspx?id=11311
Compressed gases	Commonly used for patient treatment i.e. oxygen, nitrous oxide. Also commonly used in maintenance activities. May be found in a variety of environments.	Asphyxiation, anaesthetic effects. Toxicity is dependent on chemical products. Other hazards include explosions, fire hazards, flying projectiles, and release of gas. Cryogenic gases may	**E-** Substitution with less harmful product. Adequate ventilation. Proper storage of cylinders. **A**- Appropriate store of products to decrease exposure and minimize fire and explosion hazards. Safe work procedures including transportation. WHMIS program and maintenance of MSDSs. Worker education. Good housekeeping. **P**- PPE based on hazard assessment.	http://www.ccohs.ca/oshanswers/chemicals/compressed/compress.html http://www.ccohs.ca/oshanswers/prevention/comp_gas.html http://www.chem.ubc.ca/safety/safety_manual/hazard_chem_gases.shtml

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Chemical (category or group)	Common Uses and Examples	Exposure and Health Effects Information	Controls	For more information:
		also cause skin damage through freezing.		
Detergents	Cleaning a variety of surfaces	Possible eye, skin, and respiratory irritants. Some products may cause allergic dermatitis or contain sensitizers such as nickel or limonene. May react with other products to create hazardous products.	**E**- Substitution with less harmful product. Properly designed and maintained ventilation systems. Automatic diluting machines. **A**- Practice to purchase products in ready to use concentrations to minimize handling. Safe work procedures. WHMIS program and maintenance of MSDSs. Worker education. Accommodation for sensitized workers or those with health issues, **P**- Gloves and eye protection.	http://www.hercenter.org/hazmat/cleaningchems.cfm http://www.museo.unimo.it/ov/fdrEdete.htm
Illicit drugs and chemicals used to make illicit substances	A variety of chemicals found in marijuana growing operations and in the production of illegal drugs (such as methamphetamine).	Most exposures are to public health and law enforcement officers, pre-hospital and emergency room care providers. Exposures are primarily through inhalation and skin contact. Other hazards include chemical reactivity and explosions.	**E**- Isolation of abatement areas. Contracting out abatement activities to qualified contractors. **A**- Education of workers in the nature of the hazard. Safe work procedures. Coordination of response procedures with first responders and law enforcement. Limitation of workers in the area to those deemed necessary. **P-** PPE as required based on hazard assessment which may include protective clothing, gloves, eye and face protection and respirators. High level PPE may be required including full containment suit and self contained breathing apparatus.	http://www.ohsonline.com/Articles/2006/11/Coping-with-Meth-Lab-Hazards.aspx http://www.health.state.mn.us/divs/eh/meth/lab/jhughart.pdf http://www.ufv.ca/Assets/CCJR/CCJR+Resources/CCJR+Publications/Clandestine_Labs_BC_(English).pdf
Isocyanates	Used in a variety of products including insulation, paint products, some glues and adhesives, and anti-	May cause respiratory and skin sensitization. Acute exposure may cause eye, nose and throat irritation. Delayed	**E**- Substitution with less harmful product. Local exhaust ventilation including spray booths. Enclosed processes. **A**- Safe work procedures including storage and disposal. Medical monitoring including pulmonary function testing.	http://employment.alberta.ca/documents/WHS/WHS-PUB_ch005.pdf http://www.cdc.gov/niosh/npg/npgd0356.html

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Chemical (category or group)	Common Uses and Examples	Exposure and Health Effects Information	Controls	For more information:
	corrosive chemicals. May be encountered in a variety of industries.	reactions are common. Skin contact may cause inflammation. May cause occupational asthma.	Good housekeeping. Good hygiene practices. Pre-placement awareness of sensitized individuals. WHMIS program and maintenance of MSDSs. Worker education. **P**- Chemical-protective clothing, gloves, eye and face protection, and respirators.	
Latex	Used in gloves, medical devices, some respirators, elastic bands, balloons, etc.	Exposure can produce irritant contact dermatitis, allergic contact dermatitis, and allergic responses including immediate hypersensitivity and shock.	**E**- Substitution with less harmful product. Properly designed and maintained ventilation systems. **A**- Purchasing controls to limit latex containing materials from entering facility. Safe work procedures. Education of workers in the nature of the hazard, hand washing after glove removal, proper glove donning and removal. Work reassignment for workers with latex allergies to areas where latex is not present. As per hazard assessment.	http://www.worksafebc.com/publications/health_and_safety/by_topic/assets/pdf/latex_allergies.pdf http://www.ccohs.ca/oshanswers/diseases/latex.html?print
Lead	May be present in some paints, batteries, pesticides, solder, and ceramics/ stained glass shops in residences, plumbing connections.	Most exposures are by inhalation of dust and fumes and possible accidental ingestion if hands are contaminated. Effects may impact nervous system and reproductive system. May also affect digestive tract and anemia.	**E**- Substitution with less harmful products. Local exhaust and dust collection systems. Enclosed processes. **A**- Regular medical monitoring of affected workers if there is the potential for overexposure. Exposure monitoring. Safe work procedures. Education of workers in the nature of the hazard. Good housekeeping. Good hygiene practices. Equipment maintenance programs. **P**- Protective clothing, gloves, eye and face protection, and respirators based on hazard assessment.	http://employment.alberta.ca/documents/WHS/WHS-PUB_ch061.pdf http://www.cdc.gov/niosh/npg/npgd0368.html
Low Level Disinfectants	Chlorine compounds,	Most are eye, skin, and respiratory	**E-** Substitution with less harmful product. Properly designed and maintained	http://ehs.virginia.edu/biosafety/bio.disinfection.html

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Chemical (category or group)	Common Uses and Examples	Exposure and Health Effects Information	Controls	For more information:
	alcohols, quaternary ammonium salts, iodophors, phenolic compounds, hydrogen peroxide used widely for disinfection; usually prepared and used in low concentrations.	irritants, particularly when concentrated. Some products may produce sensitization. Toxic effects depending on nature of chemical. May react with other products to create hazardous products.	ventilation systems. Automatic diluting machines. Closed systems. **A-** Practice to purchase products in ready to use concentrations to minimize handling. Safe work procedures. WHMIS program and maintenance of MSDSs. Worker education. Accommodation for sensitized workers or those with health issues. **P**- Gloves and eye protection.	http://www.cdc.gov/niosh/topics/chemical.html http://cms.h2e-online.org/ee/hazmat/hazmatconcern/steril/ http://www.mtpinnacle.com/pdfs/disinfectant-selection-guidelines.pdf
Mercury	Metallic mercury may be found in thermometers, pressure gauges (manometers), other devices, etc.	Exposure is through inhalation of vapours, ingestion and skin absorption. Skin sensitizer. Corrosive as liquid. Target effects to the nervous system, kidneys, cardiovascular and eyes.	**E**- Elimination of mercury containing equipment. Substitution with less harmful product. Enclosed mercury sources. Properly designed and maintained ventilation systems. Local exhaust ventilation may be required. **A**- Safe work procedures including spill procedures. Education of workers in the nature of the hazard. Purchasing controls to restrict mercury containing materials from entering facility. Monitoring of the work environment following a spill. Good hygiene practices. Appropriate storage of products to decrease exposure. **P**- Protective clothing, gloves, eye and face protection, and respiratory protection based on hazard assessment.	http://employment.alberta.ca/documents/WHS/WHS-PUB-CH004.pdf http://www.cdc.gov/niosh/npg/npgd0383.html http://www.mtpinnacle.com/pdfs/MERCURY-USE-%20HOSPITALS-AND-CLINICS.pdf
Organic solvents	Used in many cleaning, degreasing solutions, paint thinners, etc. Found in many industrial environments.	May cause a variety of effects including skin, eye and respiratory effects, neurological effects (central nervous system depressant) and acute and chronic organ	**E**- Elimination of solvent use. Substitution of solvent with less harmful products. Adequate ventilation. Local exhaust ventilation may be required including spray booths. Enclosures and automated processes. Grounded and bonded transfer equipment. **A-** The purchase of products with the highest dilution that is appropriate for the	http://www.ccohs.ca/oshanswers/chemicals/flammable/flam.html http://www.ccohs.ca/oshanswers/prevention/flammable_general.html http://www.ee.byu.edu/cleanroom/solvent_safety.phtml

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Chemical (category or group)	Common Uses and Examples	Exposure and Health Effects Information	Controls	For more information:
		damage. May be absorbed through skin. May be flammable.	task. Safe work procedures including spill procedures. WHMIS program and maintenance of MSDSs. Worker education. Appropriate storage of products to decrease exposure and minimize fire hazards. Maximum storage volumes allowed based on flammability and container material. Maintenance of inventory of products and removal of unused products. Routine exposure monitoring. **P-** Gloves, eye protection and solvent-resistant protective clothing. Respiratory protection based on hazard assessment.	http://employment.alberta.ca/documents/WHS/WHS-PUB_fex002.pdf http://www.sustainablehospitals.org/cgi-bin/DB_Index.cgi
Paints	Building maintenance and renovation activities; may be applied as a solid, aerosol or liquid	Paints are composed of pigments and organic solvents that may cause skin, eye and respiratory irritation. May cause neurological effects. and central nervous system depression. Isocyanates in urethane paints are respiratory sensitizers. Pigments often contain heavy metals that are toxic to specific organs. Exposures are typically greater with spray paints.	**E**- Substitution with less harmful products (water based products). Properly designed and maintained ventilation systems. Local exhaust ventilation may be required including spray booths. Enclosed and automated processes. **A**- The purchase of appropriate quantities of products. WHMIS program and maintenance of MSDSs. Worker education. Appropriate storage of products to decrease exposure and minimize fire hazards. Safe work procedures. Maintenance of an inventory of products and removal of unused products. Scheduling work to decrease workers' exposures. **P**- Gloves, eye protection and protective clothing. Respiratory protection may be required for some applications.	http://employment.alberta.ca/documents/WHS/WHS-PUB_ch004.pdf http://www.esao.on.ca/downloads/pamphlet_pdfs/workplace_painting.pdf
Personal care products, scents and	A wide range of products including personal care items	May cause a variety of mild to severe symptoms. Allergic,	**E**- Elimination of scented products. Substitution with less harmful products. Properly designed and maintained	http://www.ccohs.ca/oshanswers/hsprograms/scent_free.html

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Chemical (category or group)	Common Uses and Examples	Exposure and Health Effects Information	Controls	For more information:
fragrances	such as shampoos, soaps, perfumes, creams, deodorants, etc. Also contained in, cleaning products.	asthmatic and sensitive workers may experience reactions.	ventilation systems. **A-** Development, implementation and enforcement of scent-free policies. Signage in work areas where affected workers work. Worker education.	
Pesticides/ rodenticides/ insecticides	Pest and rodent control in facilities and residences	Exposure may occur by inhalation, skin contact and accidental ingestion. Effects are dependent upon specific products used and may include neurological effects. Warfarin may cause liver damage and impact blood system. Products may also contain solvents as carriers.	**E**- Substitution with less harmful product. Adequate ventilation. **A**- Safe work procedures. Application of products when the fewest workers may be present. Use of qualified and licensed contractors to apply products. Education of workers in the nature of the hazard. Good housekeeping. Good hygiene practices. **P**- Protective clothing, gloves, eye and face protection, and respirators based on hazard assessment.	http://www.ccohs.ca/oshanswers/chemicals/pesticides/general.html http://www.hse.gov.uk/pubns/biopestindex.htm http://www.osha.gov/SLTC/healthguidelines/warfarin/recognition.html http://employment.alberta.ca/documents/WHS/WHS-PUB_ch056.pdf
Second-hand tobacco smoke	May be present in public places where smoking is permitted. Also may be encountered in homes or establishments where public health workers provide services.	Lung cancer and other cancers. Associated with heart disease, respiratory irritation, aggravation of allergies and other pre-existing conditions. Impacts developing fetus.	**E**- Elimination of smoking within and around facilities. Properly designed and maintained ventilation systems. Isolation of areas where smoking is permitted with dedicated ventilation systems. Substitution with smoking cessation aids. **A**- Development, implementation and enforcement of no smoking policies and policies related to worker exposure in homes. Substitution with smoking cessation aids. Smoking cessation programs. Worker education. Good housekeeping. Provision of services in an alternate location if client is uncooperative	http://www.lung.ca/protect-protegez/tobacco-tabagisme/second-secondaire/index_e.php http://www.ccohs.ca/oshanswers/psychosocial/ets_health.html

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Chemical (category or group)	Common Uses and Examples	Exposure and Health Effects Information	Controls	For more information:
			with no smoking policies.	
Vehicle exhaust (e.g., Carbon monoxide)	Present in garages, vehicle maintenance areas, loading docks, emergency generators, helipads, in areas where (internal combustion) forklifts are used etc. Carbon monoxide is present in vehicle exhaust and concentrations may vary considerably based on the machinery, maintenance and other factors. Other contaminants present will include particulates, nitrogen and sulphur compounds.	A variety of components of exhaust produce acute and chronic effects, including irritation of respiratory tract, eye, nose and throat, neurological impacts, and may be carcinogenic; exposure may occur through ventilation system if air intakes are located near loading docks or locations in proximity to vehicle traffic. .	**E**- Substitution with less harmful products or equipment, battery/electrical powered equipment. Properly designed and maintained ventilation systems. Local exhaust ventilation. Isolation of workers. Installation of emission control devices and alarm systems. Facility design to control exhaust build up and migration especially in proximity to facility air intakes. **A**- Development and enforcement of policies and procedures that require vehicle engines to be shut off in loading areas and in proximity to facility air intakes. Vehicle maintenance to reduce emissions. Education of vehicle operators (workers, patients, clients or residents families, visitors and suppliers) in the nature of the hazard for areas when entrainment of vehicle exhaust into a facility may be an issue. Monitoring systems for carbon monoxide and nitrogen oxides. **P**- PPE not typically required however, based on hazard assessment PPE may be required	http://www.osha.gov/SLTC/dieselexhaust/ http://erd.dli.mt.gov/images/stories/pdf/safety_health/programs/dieselexhaust.pdf http://employment.alberta.ca/documents/WHS/WHS-PUB_ch031.pdf

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In this section the potential chemical exposure hazards most commonly encountered by public health personnel and methods to control them are presented. Employers should carefully evaluate the potential for exposure to chemical hazards in all public health tasks and ensure that they have an effective hazard control plan in place. This information will be useful for inclusion into hazard assessments. Please note, this is not designed to be an exhaustive treatment of the subject, but is rather an overview summarizing the chemical hazards most frequently encountered by public health personnel.

Note:
The following charts taken from Volume 3 – Best Practices for the Assessment and Control of Chemical Hazards in Healthcare provide basic information about control strategies for commonly occurring chemical hazards related to public health tasks. The selection of controls must be based on a risk assessment of the tasks and environment. Worker education and good communication processes are critical administrative controls. All legislation related to the assessment of hazards, selection and use of controls must be followed.

Potential Chemical Hazards	Summary of Major Control Strategies		
	Engineering	**Administrative**	**PPE**
Exposure to chemicals used in terrorist activities through contact with individuals contaminated with chemical agents	Maintain adequate general ventilation. Local exhaust ventilation. Isolate areas where contamination may be present. Provide adequate decontamination facilities. Provide antidotes if available.	Develop and implement chemical, biological, radiological and nuclear response (CBRN) plan. Educate workers in the nature of the hazard and emergency procedures.	PPE as detailed in the CBRN plans.
Exposure to a variety or chemicals that may contaminate individuals or their clothing	Controls should be chosen to protect workers based on the chemicals encountered, quantities, concentrations and required tasks. Maintain adequate general ventilation. Local exhaust ventilation. Isolate areas where contamination may be present. Provide adequate decontamination facilities.	Safe work procedures. Educate workers in the nature of the hazard and work procedures. Triage procedures. Communication between first responders and site where patient was exposed.	PPE as required based on risk assessment. Refer to individual MSDSs and the links provided.
Exposure to chemicals used in illegal activities (e.g. grow ops, clandestine labs, etc.)	Isolate abatement areas. Contract out abatement activities to qualified contractors.	Educate workers in the nature of the hazard. Develop safe work procedures. Coordination of response procedures with first responders and law enforcement.	PPE as required based on risk assessment which may include protective clothing, gloves, eye and face protection and respirators. High level PPE may be required including full containment suit and self contained breathing apparatus.

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Exposure to chemicals present in client facilities	Controls should be chosen to protect workers based on the chemicals encountered, quantities, concentrations and required tasks. Elimination. Substitution with less harmful product. Maintain adequate general ventilation.	Safe work procedures and worker training.	PPE as required based on risk assessment. Refer to individual MSDSs and the links provided.
Exposure to second hand smoke in client facilities or homes	Eliminate smoking. Substitution with smoking cessation aids. Maintain adequate general ventilation. Isolate areas where smoking is permitted.	Develop no smoking policies. Gather patient smoking information on patient intake forms in home or community settings. Maintain good housekeeping.	
Exposure to scented products that may induce sensitization	Elimination of scented products. Substitution with less harmful products. Maintain adequate general ventilation.	Develop scent-free policies. Educate worker in the nature of the hazard. Post signage in work areas where affected workers work.	

Notes about controls for chemical hazards

Engineering Controls

Many engineering controls are available for controlling the hazard at the source and along the path of transmission. For chemical hazards, common engineering controls include:

- Elimination
- Substitution
- Local exhaust ventilation
- General ventilation (only appropriate for non-toxic chemicals)
- Isolation/enclosed processes
- Proper chemical storage
- Facility design

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For public health personnel, chemical exposures may be limited by ensuring the public health vehicles are well designed, have effective ventilation and emission control devices, adequate storage for any chemicals carried and have easily cleanable surfaces.

Administrative Controls

Policies and procedures, training

As administrative controls, policies and procedures should be in place to ensure that there are safe work procedures for storing and using chemicals and discarding chemical wastes appropriately. Public health personnel may come into contact with a number of chemicals through exposure to individuals contaminated with chemicals, as well as chemicals that may be present at various client locations. Workplace hazardous materials Information System (WHMIS) training should be provided to all public health personnel. In addition, emergency call lines that provide expertise and advice regarding toxic chemicals should be made available.

Exposure follow-up – emergency response equipment

Two types of exposure follow-up are considered as administrative controls. The first is the provision of appropriate emergency response equipment to reduce the impact of the exposure. The second is the medical follow-up for workers who had a chemical exposure. In the first case, emergency response equipment for public health personnel usually refers to emergency eyewashes that can provide sufficient water to dilute the contaminant before it can cause extensive damage. Wherever chemical exposure could pose a hazard to eyes and skin, emergency wash devices (often portable) are required. Appropriate signage that is easily visible must be provided to indicate where the eyewashes are kept.

Medical follow-up of the exposed worker

A worker who has had a chemical exposure may require medical follow-up. Guidelines are available to provide information on the treatment and monitoring of workers with exposure to specific chemicals.

Personal Protective Equipment

Personal protective equipment (PPE) is considered the lowest level of protection in the hierarchy of controls. This reflects the reliance on proper selection, fit, use and maintenance of the equipment by the organization and individual HCWs. PPE is often used in conjunction with other controls (engineering and administrative) to provide additional protection to workers. PPE is designed to protect the worker from exposure to chemicals by blocking access to the route of entry into the body. Gloves, aprons and other

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protective clothing reduce exposure through the dermal (skin) contact route. Eye and face protection reduce exposure through skin and mucous membrane contact. Respirators reduce exposure to the respiratory system.

Gloves

The most frequently used PPE by HCWs to prevent exposure to chemicals is gloves. When choosing gloves, the following must be considered:

- The nature and concentration of the chemicals
- The amount of time the gloves will be exposed to the chemical
- Dexterity required performing the task
- Extent of protection needed (to wrist or higher)
- Decontamination and disposal requirements

Rules for glove use for chemicals[4,5]

- Wear the appropriate gloves for the task when needed; for reusable gloves, follow the manufacturer's guidelines for care, decontamination and maintenance. Choose gloves resistant to holes and tears.
- Ensure gloves fit properly and are of the appropriate thickness to offer protection; ensure adequate supplies of gloves in appropriate sizes.
- Avoid using latex gloves (due to latex allergies).
- Do not use worn or defective gloves.
- Wash hands once gloves have been removed.
- Disposable gloves must be discarded once removed. Do not save for future use.
- Dispose of used gloves into the proper container. Have separate disposal locations for gloves contaminated with chemicals which pose a toxic hazard if mixed.
- Non-disposable/reusable gloves must be washed and dried, as needed, and then inspected for tears and holes prior to reuse.
- Remove gloves before touching personal items, such as phones, computers, pens and one's skin.

[4] OSH Answers- Chemical Protective Clothing – Gloves; http://www.ccohs.ca/oshanswers/prevention/ppe/gloves.html
[5] Glove Use in Laboratories; University of Florida Chemical Hygiene Plan; http://www.ehs.ufl.edu/Lab/CHP/gloves.htm

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- Do not wear gloves into and out of areas. If gloves are needed to transport anything, wear one glove to handle the transported item. The free hand is then used to touch door knobs, elevator buttons, etc.
- Do not eat, drink, or smoke while wearing gloves. Gloves must be removed and hands washed before eating, drinking, or smoking.
- If for any reason a glove fails, and chemicals come into contact with skin, remove the gloves, wash hands thoroughly and obtain first aid or seek medical attention as appropriate.

Eye and Face Protection

For most HCWs who use chemicals, goggles or face shields are necessary. In most cases, goggles are considered re-usable. All reusable PPE must be properly decontaminated and maintained. Selection of protective eyewear should take into account:

- Level of protection required
- Comfort of the wearer
- Secure fit that does not interfere with vision or movement
- Ease of cleaning and disinfection
- Durability
- Compatibility with prescription glasses and other PPE that must be worn at the same time (e.g. respirators)

Protective Clothing

Chemical protective clothing is available as gowns, aprons, uniforms, coveralls, foot covers and full body suits. The choice of protective clothing relies on an accurate hazard assessment. Should protective clothing become contaminated with a chemical or damaged, the clothing must be removed and handled according to organizational procedures (disposal or proper decontamination).

Residual chemicals such as acids on clothing may continue to present an exposure hazard. Workers must not wear clothing that is contaminated with chemicals home, as this may pose a danger to themselves and others.

Worker Decontamination
If a worker is contaminated by a harmful substance at the worksite, the employer must ensure that only those items that have been properly decontaminated or cleaned are taken from the worksite by the worker.
OHS Code, Part 4, Section 23

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Physical Hazards and Controls

There are many potential physical hazards to which public health personnel may be exposed. The nature of the work may pose ergonomic hazards, the potential for slips, trips and falls, exposure to environmental conditions, driving hazards, hazards related to the storage and use of compressed gas cylinders, cuts, and electrical hazards.

In this section the physical hazards most commonly encountered by public health personnel and methods to control them are presented. Employers should carefully evaluate the potential for exposure to hazards for all public health tasks and ensure that they have an effective hazard control plan in place. This information will be useful for inclusion into hazard assessments.

Note:
The following chart provides basic information about control strategies for commonly occurring physical hazards in public health work. The selection of controls must be based on a risk assessment of the tasks and environment. Worker education and good communication processes are critical administrative controls. All legislation related to the assessment of hazards, selection and use of controls must be followed.

Potential Physical Hazards	Summary of Major Control Strategies		
	Engineering	**Administrative**	**PPE**
Ergonomic hazards associated with computer use or workstation design	Ergonomically designed workstations, chairs and equipment. Incorporate adjustable workstation to accommodate shared use by employees of various sizes.	Adjustment of workstation and chair to fit user. Worker education regarding ergonomic hazards and control strategies. Self assessment tools to assist workers in identifying and controlling risk factors. Safe work procedures. Early reporting of signs and symptoms of ergonomic concerns. Stretches and micro-breaks. Purchasing standards for ergonomically designed computer workstations, chairs and equipment. Ergonomic assessments. Maintenance of	

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		workstations, chairs and equipment.	
Ergonomic hazards associated with driving include sustained postures (and potentially awkward posture) and duration	Select an appropriately designed vehicle which incorporates ergonomic and adjustable features. Consider a retrofit back support if the lumbar support in the vehicle seat is inadequate.	Adjust the seat and other features of the vehicle to fit the worker. Follow safe work procedures. Early reporting of signs and symptoms of ergonomic concerns. Stretches and micro-breaks. Vary driving position and vary tasks, when possible. Maintain vehicle.	
Falling hazards associated with slips, trips and falls in the field		Safe work procedures for working in client facilities. Train workers to check outdoor walkways and entrances for tripping hazards. . Check indoor environment for tripping hazards and put controls in place (e.g. close drawers, tuck cords out of the way, etc.). Use handrails while climbing stairs. Carry loads in both hands to keep your balance, and look where you are going.	Appropriate footwear with gripping soles and good support.
Falling hazards associated with slips, trips and falls	Install slip resistant flooring. Design stairwells according to accepted safety standards. Ensure adequate lighting.	Perform regular maintenance on flooring, stairwells, hallways, handrails, etc. Inspect ladders prior to use. Worker education. Implement a spill cleanup program that includes prompt spill cleanup, use of warning signs, etc. Maintain good housekeeping practices and minimize clutter and tripping hazards.	Appropriate footwear with gripping soles and good support.
Noise from equipment and machinery in noisy work areas, or from operation of noisy machinery or tools	Substitution with quieter equipment or processes. Alteration of machinery to reduce noise at the source or along path including modification, isolation and maintenance.	Noise Management program. Worker training. Audiometric testing. Assess noise levels and perform routine exposure monitoring. Preventative maintenance program. Signs notifying of noisy areas.	Hearing protection devices.
Fire, projectiles, or physical injury if	Install protective valve caps	Safe work procedures that includes	PPE based on hazard

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compressed gas cylinders used for a variety of procedures and maintenance activities are damaged, dropped or mishandled	when cylinder is not in use if the cylinder is equipped with a means of attaching caps. Secure and restrain cylinders.	use, care, maintenance, storage and transport. Worker training.	assessment and type of compressed gas. Protective footwear for impact hazard when handling large cylinders.
Electrical hazards arising from use of electrical cords and appliances	Ground fault circuit interrupters when used close to water sources.	Safe work procedures that include use of electrical cords, power bars and appliances that includes facility approval requirements. Worker training.	
Motor vehicle collisions from driving vehicles	Purchasing standards for vehicles.	Safe work procedures for driving including the issue of cell phone use. Confirm driver qualifications. Driver training. MVA incident reporting process. Owner maintains and inspects vehicle. Work scheduling to prevent fatigue.	
Mechanical hazards from machinery operation	Safeguarding of machinery.	Control of hazardous energy (lockout) program. Inspections and preventative machine maintenance. Safe work procedures. Only authorized workers operate specific machinery. Worker training. Signs informing of guards.	PPE based on hazard assessment and machinery hazards. No loose clothing, gloves, or jewellery or other items that could entangle workers in machinery.

Notes about controls for physical hazards

Engineering Controls

Ergonomic hazards - Computer Workstations

The use of computers is ubiquitous in a variety of HCW positions and healthcare settings, including most public health workers. The key biomechanical risk factors for computer use are awkward postures, excessive force, repetition and compression and impact forces. In addition to biomechanical risk factors, there may be other risk factors related to the work environment (e.g. lighting, noise), workstation design and personal factors. Examples of personal risk factors include state of health, fitness level, casual addictions (e.g. caffeine and smoking), poor posture, poor typing technique (e.g. pounding the keys), and poor typing posture (e.g. bent wrists).

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In addition to MSIs, it should be noted that the signs and symptoms related to poor computer workstation ergonomics may include eye fatigue and discomfort, and in some cases headaches.

A self assessment is a useful tool to assist workers to evaluate biomechanical risk factors related to their computer workstations and to provide recommendations for control measures. Ideally, healthcare organizations should provide workers with self assessment tools and, when concerns persist, an ergonomics assessment should be performed by someone with specialized training. The goal of the hazard assessment is to identify hazards and control strategies to reduce the risk of injury.

Computer workstation ergonomics resources
OSHA, e-tools: Computer workstation checklist, 04/04/2008 www.osha.gov/SLTC/etools/computerworkstations/checklist.html
Occupational Health Clinics for Ontario Workers, Office Ergonomics Handbook, 5th Ed., May 2008
www.ohcow.on.ca/resources/workbooks/ergonomics.pdf
UCLA, Computer workstation self evaluation; www.ergonomics.ucla.edu/Seval_Gen.cfm
WCB – Alberta, Office Ergonomics: Think Detection, Think Prevention, Think Activity, 2007;
www.wcb.ab.ca/pdfs/public/office_ergo.pdf

Engineering controls related to computer ergonomics include

- Providing ergonomically designed equipment and furniture – The goal is to purchase and provide equipment and furniture that will support ergonomically correct work postures and behaviours.
- Designing workstation layout and arrange equipment to minimize biomechanical risk factors. For example, frequently accessed equipment and materials should be located in easy reach (and located to minimize awkward postures).

Trips, Slips and falls

Trips, slips and falls are common injuries for public health workers. In order to prevent slips, trips and falls, adequate lighting should be available. Cords and other tripping hazards should not be in the path of traffic. Ensure that driveways and outdoor walkways are cleared of snow and ice. The following are common engineering controls used to reduce the risk of slips, trips and falls in any environment:

- Layout equipment to minimize cords and avoid creating tripping hazards.
- Keep hallways clear of obstructions.
- Ensure nothing is sticking out of surfaces on the stairs, handrails or banisters (e.g. nails or splinters).
- Maintain lighting levels.

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In order to prevent slips, trips and falls, try to ensure adequate lighting is available. Cords and other tripping hazards should not be in the path of traffic. Non-slip flooring should be provided in public health facilities. At field sites, check the indoor environment for tripping hazards and put controls in place (e.g. close drawers, tuck cords out of the way, etc.).

Cuts

The most effective controls to reduce cuts are engineering controls. Common engineering controls include

- Substitution of medical sharps with safety engineered medical devices (SEMDs)
- Substitution of a sharp instrument with a less sharp alternative (e.g. engineered sharps injury prevention devices)
- Safety cutters as bag and box openers
- Carts or carrying trays for carrying breakable items
- Proper storage and disposal of sharps

Temperature Extremes

To protect workers from environmental temperature extremes, ensure that vehicles are well maintained and that heating and air conditioning systems are working properly.

Pressure

Compressed gas cylinders are designed to safely hold their contents during regular use and the demands expected to be placed on them. Regulators, fittings and delivery systems must likewise meet manufacturers' requirements. Oxygen cylinders should be stored away from any heat sources or combustible material; they should be stored upright and not be able to move freely in the vehicle. Protective valve caps are an engineering control to protect the valve head from damage when the cylinder is not in use. If the cylinder has a valve cap, the cap should always be placed on cylinders when the cylinder is not expected to be used for a period of time, such as for a work shift. All cylinders must be restrained from tipping by means of racks, chains, strap or other suitable means.

Electrical Hazards

Insulation protects workers from contact with electricity. All equipment, wiring and cords must be maintained and used in a manner that keeps electrical insulation intact.

Electric appliances and equipment are protected from overloading by means of electric overloading devices such as fuses or circuit breakers. Although these devices will stop the flow of current when too much current flows through them, they are intended to protect equipment but not workers. All overloading devices must be of sufficient ratings. Replacing fuses or circuit breakers with

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overloading devices that trip at a higher current than specified is a dangerous practice as is replacing overloading devices with a conductor. Ground fault circuit interrupters (GFCIs) are safety devices that will interrupt the flow of current by monitoring the flow of current to and from the device. GFCIs are important engineering controls that should be used in wet environments and to power tools and equipment outdoors.

Another important engineering control is grounding. Grounding of electrical equipment refers to creating an electrical path to earth (ground). Grounding provides some protection to equipment operators if there is a fault in the equipment or insulation that energizes the equipment housing; electricity would flow to ground rather than through the worker. Grounding for equipment that is plugged into electrical receptacles can be identified by the third prong on the electrical plug. Similarly electrical cords commonly have a third prong on the plug end. The third prong that facilitates grounding must not be removed or defeated. The housings of all equipment should be suitably grounded. Some electrical cords for tools or other equipment do not have a third grounding prong. This equipment is double insulated, meaning that it has been designed with additional insulating considerations to prevent the housing of the device from becoming energized. Such a device will be labelled with the term "double insulated" or with a symbol comprised of a square box within another square box.

Motor Vehicle Collisions

Employers should review and evaluate the safety features of all vehicles to be considered for use. When selecting new vehicles, collision-worthiness and overall safety rating should be part of the selection criteria. In addition to reducing the risk of injury or injury severity in the event of a collision, this approach also conveys to workers that driving safety is a company priority. Engineering controls to prevent collisions are often designed into vehicles. Vehicles should be chosen that have safety features. Vehicles should be well maintained to ensure all safety features function properly. Snow tires are an important consideration for vehicular safety in Alberta in the winter.

Administrative Controls

Ergonomic hazards

Controls that focus on how work is performed and organized are administrative controls. Administrative controls include policies, procedures, work practices, rules, training, and work scheduling, including:

- Establish ergonomic purchasing standards for tools and equipment, including patient lifting devices and vehicles.
- Conduct user trials to test new equipment and tools with input from workers.
- Maintain equipment, vehicles and tools to optimize their operation.

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- Provide training programs to educate workers regarding biomechanical risk factors, signs and symptoms and safe work practices (including proper lifting methods and proper use of lifting devices).
- Provide self assessment tools to identify and control biomechanical hazards.
- Optimize work shift scheduling to minimize extended work hours and overtime.
- Design break schedules to reduce biomechanical hazards.
- Encourage monitoring and early reporting of the signs and symptoms of MSIs

Many public health workers drive as part of their daily work tasks and must deal with the ergonomic issues associated with driving, and in many cases transporting materials in their vehicles. It is important for drivers to remember to vary their work activities and work position frequently during the work day for optimal comfort. During long periods of driving, this may mean stopping at a safe location and getting out of the vehicle for a stretch or varying the adjustable seat controls slightly in order to maintain comfort.

Manual handling from a vehicle is a potential risk factor for MSIs and may incorporate factors such as high forces and awkward postures. Useful strategies to reduce the risk associated with manual handling from a vehicle include;

- Use safe postures when handling a load. Obtain training if you are unsure of recommended lifting postures.
- Organize the trunk so that items can be moved with minimal reaching.
- Get as close to the material as possible to decrease forces.
- Use wheeled carts or suitcases to minimize the forces required to move the load.
- Consider making two or more trips to decrease the weight of each load.
- Ask for assistance if another person is available to help.
- Check the carrying path to ensure there are no tripping hazards.

Trips, Slips and falls

Administrative controls to prevent slips, trips and falls include:

- Education of workers and enforcement of the use of proper footwear
- Timely clean-up of any spills
- Eliminate the use of extension cords that may pose tripping hazards
- Keep walkways free of clutter

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Cuts

Administrative controls widely used to reduce the potential for cuts include

- Worker education
- Safe work procedures
- Keeping sharp edges away from the body
- Use of tools correctly
- Choice of appropriate tool
- Safe disposal of all sharps, including broken glass.

Temperature Extremes

Administrative controls for cold environments include allowing an adjustment period, work-rest schedules with rest periods in a warm area, scheduling of work for warmer periods of the day, reducing periods of physical inactivity, such as sitting for long periods of time and occupational health programs to identify medical conditions that may pre-dispose workers to exposure.

Administrative controls used in hot environments include acclimatization, scheduling of work (to times of day when there is less heat), work-rest schedules, reducing the physical demands on the worker by lowering the pace or intensity of the work, altering the duration of work, rotating staff, providing water, using a buddy system to notice any signs of over-exposure, and worker education about the effects of heat and how to recognize symptoms of exposure.

Pressure

Compressed gas cylinders must be handled, maintained and stored carefully to prevent cylinders from falling or a gas release. Proper transportation of cylinders must also be considered whether it be by vehicle or within a work area by use of a hand cart or other means. A safe work procedure should be developed for the use, transport, storage and maintenance of compressed gas cylinders in the workplace. Some key compressed gas safe work practices are detailed below:

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What are basic safe practices when working with compressed gases?[6]

- Read the MSDSs and labels for all of the materials you work with.
- Know all of the hazards (fire/explosion, health, chemical reactivity, corrosivity, pressure) of the materials you work with.
- Know which of the materials you work with are compressed gases and check the label, not the cylinder colour, to identify the gas.
- Store compressed gas cylinders in cool, dry, well-ventilated areas, away from incompatible materials and ignition sources. Ensure that the storage temperature does not exceed 52°C (125°F).
- Store, handle and use compressed gas cylinders securely fastened in place in the upright position. Never roll, drag, or drop cylinders or permit them to strike each other.
- Move cylinders in handcarts or other devices designed for moving cylinders.
- Leave the cylinder valve protection cap in place until the cylinder is secured and ready for use.
- Discharge compressed gases safely using devices, such as pressure regulators, approved for the particular gas.
- Never force connections or use homemade adaptors.
- Ensure that equipment is compatible with cylinder pressure and contents.
- Carefully check all cylinder-to-equipment connections before use and periodically during use, to be sure they are tight, clean, in good condition and not leaking.
- Carefully open all valves, slowly, pointed away from you and others, using the proper tools.
- Close all valves when cylinders are not in use.
- Never tamper with safety devices in cylinders, valves or equipment.
- Do not allow flames to contact cylinders and do not strike an electric arc on cylinders.
- Always use cylinders in cool well-ventilated areas.
- Handle "empty" cylinders safely: leave a slight positive pressure in them, close cylinder valves, disassemble equipment properly, replace cylinder valve protection caps, mark cylinders "empty" and store them separately from full cylinders.
- Wear the proper personal protective equipment for each of the jobs you do.
- Know how to handle emergencies such as fires, leaks or personal injury.
- Follow the health and safety rules that apply to your job.

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[6] CCOHS; *OSH Answers – How Do I Work Safely with Compressed Gasses?;July 8, 2008;* http://www.ccohs.ca/oshanswers/prevention/comp_gas.html

Electrical Hazards

A major component of an electrical safety program is worker training.

Extension cords are used in many applications for temporarily supplying power. Considerations to follow when using extension cords include:

- Protect cords from damage; do not allow vehicles to drive over cords.
- Never keep an extension cord plugged in when it is not in use.
- Do not use a damaged extension cord.
- Extension cords and most appliances have polarized plugs (one blade wider than the other). These plugs are designed to prevent electric shock by properly aligning circuit conductors. Never file or cut the plug blades or grounding pin of an extension cord.
- Do not plug one extension cord into another. Use a single cord of sufficient length.

Hazard assessments should guide the development of work procedures to assess and control electrical hazards.

Motor Vehicle Collisions

Healthcare employers should consider a workplace driving safety program that targets driving safety in the workplace as well as outside working hours. Key components of a driving safety program include senior management commitment and employee involvement, written policies and procedures, driver qualifications, driver agreements, incident reporting and investigation, vehicle maintenance and inspection, driver training and communication and work scheduling.[7]

- **Senior Management Commitment and Employee Involvement** – Safe driving is a vital element of an effective occupational health and safety program and therefore warrants senior management support and commitment. Consider establishing a key senior manager as the leader of the safe driving program. Senior management is responsible to provide leadership, approve policies and allocate budget to create a safe driving culture. Encourage workers to participate in the safe driving program and to spread the safe driving information to family members and friends.
- **Written Policies and Procedures** – Develop a written policy expressing the organization's commitment to reducing the risk of workplace traffic collisions. Design a set of clear and comprehensive safe driving policies and procedures and communicate the

[7] United States Department of Labor - OSHA; *Steps to Workplace Driving Safety*; January 26, 2009; http://blog.nationalsafetycompliance.com/2009/01/steps-to-workplace-driving-safety-part.html

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policies to employees. Specific policy issues to consider include winter driving safety, driving in remote areas and working alone requirements. Communicate to workers that a violation of a safe driving policy is serious and will result in enforcement activities.

- **Confirm Driver Qualifications** – Check the driving records of all employees who drive for work purposes (using a company or personal vehicle). Ensure that no worker is assigned to drive on the job if he or she does not have a valid driver's license that is appropriate to the type of vehicle being driven. Obtain driver's abstracts for all employees who drive on behalf of the organization and confirm that they have a valid license and screen for employees with poor driving records. Driver's abstracts should be reviewed periodically to ensure that drivers maintain good driving records. Clearly define performance standards as it relates to demerit points and driving violations that a driver can have before losing the privilege of driving for work and define re-training requirements.
- **Driver Agreements** – Develop a written driving agreement to be signed by each employee who drives on behalf of the company. The agreement acknowledges that the driver is aware of the organization's safe driving policies and procedures, driver performance expectations, vehicle maintenance and inspection requirements and the reporting of vehicle incidents and traffic violations. Consider reviewing and signing the driving agreement on an annual basis as a strategy to keep safe driving in the minds of all drivers. Employers may consider requiring drivers to provide periodic documentation of vehicle insurance.
- **Reporting Incidents and Traffic Violations** – Educate employees to report all motor vehicle incidents as well as traffic violations. Full investigations should be completed on motor vehicle incidents in an effort to identify the immediate and root causes. The goal is for the organization to learn from motor vehicle incidents and develop strategies to prevent future losses.
- **Maintenance and Inspection** – Establish a preventative maintenance and inspection program that meets manufacturers' specifications and industry standards. The program should be formally documented and records from vehicle maintenance and inspection should be retained and readily available in the event of a serious vehicle incident. Workers who operate personal vehicles on behalf of the organization should be educated regarding the Alberta OHS Code S290.1 requirement that the worker ensure that the "vehicle is maintained in sound mechanical condition."
- **Driver Training and Communication** – Provide driving safety training to new and existing employees as a strategy to improve safe driving habits and driver attitudes. Provide training to any workers who operate specialized motor vehicles. Consider practical, performance based training for new employees who will drive on behalf of the organization. Teach workers strategies to recognize and manage driver fatigue and in-vehicle distractions. Emphasize the link between driver safety at work and driver safety at home. Lessons learned on the job can help to increase the awareness of workers to safe driving outside of work hours.
- **Work Scheduling** – Develop work schedules and driving routes that allow workers to obey all speed limits. Organizations should not require workers to drive irregular hours or work far beyond their normal working hours in an effort to minimize fatigue as a risk factor.

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The use of winter tires is recommended to improve safety during winter driving conditions. Workers should prepare for potential emergencies by having a winter driving emergency kit in their vehicles.

Personal Protective Equipment Controls

Trips, Slips and falls

The use of appropriate footwear by public health personnel is essential to prevent trips, slips and falls. Workers should be required to wear flat shoes with non-slip soles. (To prevent chemical exposure in the event of a spill, footwear should cover the entire foot and be of non-porous material.)

Cuts

Eye protection is important if there is any possibility that fragments of glass or other sharps may enter the eyes, and footwear must protect the wearer from accidental exposure to sharps. Gloves are usually required as PPE to protect workers from cuts. The selection of gloves depends on the nature of task. Cut-resistant gloves are available that are made from a variety of materials including Kevlar, Dyneema, HexArmor, stainless steel and wire mesh.

Temperature Extremes

For cold environments, PPE includes layers of clothing, mittens rather than gloves if possible, head and face covers, insulated footwear. All PPE should be kept dry. Water repellent clothing is important for workers who may be exposed to cold and wet conditions such as first responders and public health officers.

PPE for hot environments must take into account the work that is being done, the dexterity required, and the safety factors related to clothing and personal equipment. PPE may include protective clothing, clothing that exposes more skin for cooling (unless there are other safety concerns), and self-contained air conditioners or cooling packs or units.

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Psychological Hazards and Controls

Each public health division should systematically conduct hazard assessments for tasks performed by public health personnel and identify if and where the potential exists for psychological hazards. In this section, examples are provided of psychological hazards that may be encountered by public health personnel, and possible control measures will be suggested. This information will be useful for inclusion into hazard assessments. Please note, this is not designed to be an exhaustive treatment of the subject, but is rather an overview summarizing the some of the reported psychological hazards in healthcare settings.

Note:
The following chart provides basic information about control strategies for commonly occurring psychological hazards. The selection of controls should be based on a risk assessment of the tasks and environment. Worker tolerance to stressors varies considerably. Most controls listed here relate to organizational controls, with some mention of personal controls that may be useful in controlling risk. Worker education and good communication processes are critical administrative controls. All legislation related to the assessment of hazards, selection and use of controls should be followed.

Potential Psychological Hazards or Effects of Workplace Stressors	Summary of Major Control Strategies		
	Engineering	**Administrative**	**Personal**
Abuse by clients or members of the public	Alarm systems and panic buttons. Video surveillance.	Management policies and procedures related to no tolerance of violence or abuse. Worker education in violence awareness, avoidance and de-escalation procedures. Liaison and response protocols with local police. Working alone policies. Reporting procedures for incidents and near misses.	Ability to request support. Use of counselling services.
Abuse by co-workers	Alarm systems and panic buttons. Video surveillance.	Management policies and procedures related to no tolerance of violence or abuse. Worker education in violence awareness, avoidance and de-	Assertiveness training. Use of mediation and/or counselling services.

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		escalation procedures. Working alone policies. Reporting and investigation procedures for incidents and near misses.	
Hazards related to working alone • **Threat of violence** • **Medical emergencies when alone**	Communication devices. Vehicle design considerations. Panic alarms. Bright lighting. Surveillance cameras.	Scheduling to avoid having workers work alone. Worker training. Working alone policies.	
Stress related to critical incidents		Training to increase awareness of signs and symptoms of critical incident stress. Critical incident stress team to respond to incidents. Communication and call procedures to mobilize team. Defusings and debriefings as appropriate.	Development of support systems to assist in dealing with stress. Use of counselling services.
"Technostress" related to the introduction of new technology	Design of instruments or equipment with user-friendly features.	Selection procedures to ensure user-friendly technology choices. Provision of sufficient training for workers. Worker participation in selection and implementation of new technology. Provision of problem solving resources and support workers. Back-up plans in the event of failures. Change management strategy for introduction of new technology. Realistic expectations regarding use of communication technology. Limit use of technological monitoring of worker productivity. Setting and communication of priorities.	Self-education concerning new technologies. Time management strategies. Open communication about stress related to change. Healthy lifestyles. Setting realistic goals. Limiting the need to multi-task. Technology "time outs". E - vacations.
Substance abuse as a response to excessive workplace stressors		Worker involvement in substance abuse policy and procedures development. Worker education about substance abuse. Training workers and supervisors to recognize the signs of substance abuse. Procedures to limit individual access to narcotics. . Provision of counselling services and return to work plans.	Increase awareness of substance abuse signs and symptoms. Communication with counsellors. Report to family physician. Participate in treatment programs and return to work programs.

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Depression, anxiety, sleep disorders, other mental illness as a response to excessive workplace stressors		Worker education about the signs and symptoms of depression, anxiety, sleep disorders, other mental illness. Elimination of workplace risk factors for depression, anxiety, sleep disorders, other mental illness. Provision of support services and programs. Benefit plans provision. Effective return to work programs.	Programs to maintain or build resilience or coping skills. Development of support system. Communication with family physician.
Hazards related to impacts of aging on workers	Mechanical devices and power equipment for lifting / moving. Vehicle design – storing objects at appropriate heights, packing in smaller quantities or containers. Supportive, adjustable seating and workstations. Cell phones and pagers that incorporate vibration. Proper lighting.	Management policies and procedures that ensure no age discrimination. Proactive policies to accommodate aging workers. Training opportunities for aging workers. Education for all workers on intergenerational communication. Aging workers as trainers/mentors. Flexible work arrangement. Job redesign to accommodate aging workers.	Healthy lifestyle. Use of client and material handling equipment. Adequate sleep. Awareness of potential side effects of medication.
Hazards related to shiftwork, excessive workload and hours of work	Appropriate lighting levels. Lighting levels that are adjustable by workers. Appropriate thermal environment.	Management policies and procedures to address working hours and shift design. Worker involved in design of shift schedule. Limit hours of work and overtime. Shifts designed so workers get enough rest between shifts. Split shifts are avoided, if possible. Train workers and management in fatigue and shift work issues. Work shift schedules designed to minimize fatigue (e.g. maximum number of consecutive night shifts, forward rotation, etc.). Quality breaks are in place. Policies to encourage the reporting of concerns associated with fatigue. Thorough investigation of incidents and near misses with fatigue as a possible cause.	Appropriate sleep schedule and sleep environment. Strategies in place to promote sleep. Diet adjusted to accommodate shift schedule. Healthy lifestyle. Physical exercise. Safe plan for commute to work. Plan for family and friends. Use of stimulants and sedatives are minimized. Alertness strategies are utilized (e.g. bright lighting levels, regular short breaks, communication with co-workers, etc.).
Stress related to work-life conflict		Management policies and procedures that support work-life balance (e.g.	Time log used to track time. Work-life balance programs

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		voluntary reduced hours, voluntary part-time work, phased in retirement, telecommuting, job sharing, paid and unpaid leaves, dependent care initiatives, etc.). Work designed to address workload and work demands issues. Reliance on paid and unpaid overtime is reduced. Supportive management culture. Work-life balance policies are communicated to workers. The use and impact of work-life balance policies is measured.	are utilized. Work activities are isolated from home time. Time is effectively managed. Days off are protected. Appropriate sleep habits. Social support system is in place.
Exposure to nuisance or irritating noise levels that may induce stress	Noise reduction equipment. Well maintained vehicles. Sound absorber panels.	Purchasing decisions that take into account noise levels of equipment. Location of noisy equipment to more isolated areas.	
Exposure to poor indoor air quality that may induce stress	Proper ventilation system design. Good vehicle maintenance. Isolation/segregation of work processes that may create contaminants.	Selection of low-pollutant cleaning chemicals. Cleaning schedules. Infection prevention and controls standards. Communication to enable frank and timely discussion of IAQ issues and what is being done to resolve them.	

Notes about controls for psychological hazards

Potential psychological hazards and controls vary greatly in jobs, locations and organizations and are only briefly discussed here. Personal factors impact how stressors are viewed and addressed. A comprehensive discussion of causes and impacts of psychological stressors on workers and on the organization can be found in Best Practices for the Assessments and Control of Psychological Hazards – Vol. 5. Included in the discussion are the topics of environmental factors such as noise and indoor air quality and their impacts on personal health, as well as outcomes of workplace stress that may impact personal health such as substance abuse, depression, anxiety, sleep disorders and other mental illness, and age-related factors.

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Program elements for preventing or controlling violence and abuse towards workers in the workplace

Because the scope of abuse of workers is broad, with a wide range of potential internal and external perpetrators and a myriad of individual considerations, prevention of abuse of workers is multi-faceted. This list of prevention procedures and control techniques is not all-inclusive, but rather a sample of the complexities that should be considered in a program for public health personnel:

- ☐ Development, communication and enforcement of policies that indicate no tolerance for any form of violence, harassment, or abuse including bullying. Awareness sessions for all workers on abuse and violence in the workplace, reporting procedures and controls.
- ☐ Staff identification to reduce unauthorized access to areas – this includes a requirement of all workers to wear identification badges. It is suggested that information that is not necessary not be shown on the front to the badge to reduce risk to workers.
- ☐ Client guidelines and signage to emphasize that abuse will not be tolerated – this may include the preparation and dissemination of client information guidelines, in which client behaviour is discussed, the commitment to no tolerance for abuse against workers and the encouragement of mutual respect are covered.
- ☐ Working alone guidelines and communications protocols. Working alone guidelines are required by Alberta occupational health and safety legislation (OHS Code, Part 28), and must include a written hazard assessment as well as communication protocols for workers who must work alone.
- ☐ Alarm systems and emergency communication devices (panic buttons, etc.). Identification of workers or locations that should be provided with alarm systems and panic buttons should occur. Once any alarm systems are installed or provided, all workers should be trained on how to use them and how to respond to alarms.
- ☐ Identification and correction of high risk facility issues (e.g., isolated areas, parking lots, low lighting, no escape routes, etc.). There are many risk factors posed by the design of the facility. The public health division should identify risk factors and work to reduce the risk in the areas. A checklist would be useful for departments to help identify facility issues contributing to worker risk.
- ☐ Training programs that include non-violent crisis intervention and assault management techniques.

Working alone

Controls required

Employers must, for any worker working alone, provide an effective communication system consisting of

- radio communication,
- and land line or cellular telephone communication, or

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- some other effective means of electronic communication that includes regular contact by the employer or designate at intervals appropriate to the nature of the hazard associated with the worker's work.

If effective electronic communication is not practicable at the work site, the employer must ensure that

- the employer or designate visits the worker, or
- the worker contacts the employer or designate at intervals appropriate to the nature of the hazard associated with the worker's work.

Alberta OHS Code 2009, Part 28

Work-Life balance, including reduction of excessive workloads

An employer should strive to develop policies and programs that support work-life balance. The following is a list of general work-life balance policies and programs to consider:

- Flexible time arrangements including alternative work schedules, compressed work week, voluntary reduced hours / part-time work and phased in retirement
- Flexible work locations through the use of technology such as telecommuting and satellite offices
- Flexible job design through job redesign, job sharing
- Wellness programs
- Flexible benefits including paid and unpaid leaves for maternity, parental care giving, educational and sabbatical leaves
- Employer sponsored childcare and eldercare practice and referral services

A work-life conflict issue recognized in healthcare is often brought on by workload and work demands. Some strategies to reduce the impact of increased workloads and work demands include the following:

- Identify methods to reduce worker workloads. According to research, special attention is required for managers and professionals.
- Track the costs associated with understaffing and overwork (paid and unpaid overtime, increased turnover, employee assistance program use, increased absenteeism)
- Strive to reduce the amount of time workers spend in job-related travel.
- Reduce reliance on paid and unpaid overtime.
- Consider a "time in lieu" system to compensate for overtime.
- Develop norms regarding the use of technology (e.g. cell phones, PDA, laptops, email) outside of work time.

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- Allow workers to say “no” to overtime without repercussions.
- Provide a limited number of days of paid leave per year for caregiver responsibilities (childcare and eldercare) and personal problems.
- Measure the use of work-life practices (e.g. job sharing, compressed work week, etc.) and reward sections of the organization with high usage. Investigate sections where usage is low.
- Increase supportive management. Specifically, organizations should increase the extent to which managers are effective at planning the work to be done, make themselves available to answer worker questions, set clear expectations, listen to worker concerns and give recognition for a job well done.

Technostress (stress resulting from the introduction of new technologies)

The primary controls an organization employs to reduce the potential of technostress are administrative controls. While major engineering control opportunities exist in the design and development of technology to make it easier to use, an employer’s choice of technology is an administrative control.

Administrative controls an organization can use to reduce the risk of technostress include:

- Selection of technology that is designed to be easy for the user
- Worker participation in selection, trial and implementation of technology and the provision of feedback as to its use
- Sufficient worker training to ensure that workers feel confident and competent to use the technology
- Provision of problem-solving resources and support to workers
- Back-up plans in the event of technology failure
- Influential, credible supporter for the introduction of the new technology (executive support)
- Use of a change management strategy for organization-wide technology change
- Setting of realistic expectations for the use of communication technology
- Reduced use of technological monitoring of worker productivity
- Setting and communicating priorities to relieve stress in multi-tasking
- Updates of hazard assessments each time new technology is introduced.

Personal controls for reducing the risk of technostress include:

- Self-education concerning new technologies
- Open communication about stress related to change
- Time management

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- Setting priorities
- Healthy lifestyle including good nutrition, exercise and getting enough sleep
- Setting realistic goals
- Limit the need to multi-task
- Technology “time-outs” (avoiding being “plugged in” continually)
- Relaxation, meditation and taking vacations (especially e-vacations)

Shiftwork

The following guidelines will assist in reducing the psychological impacts of shift work.

Good Practice Guideline for Shift Work Schedule Design[8]

- Plan a workload that is appropriate to the length and timing of the shift.
- Strive to schedule a variety of tasks to be completed during the shift to allow workers some choice about the order they need to be done in.
- Avoid scheduling demanding, dangerous, safety-critical or monotonous tasks during the night shift, particularly during the early morning hours when alertness is at its lowest.
- Engage workers in the design and planning of shift schedules.
- Avoid scheduling workers on permanent night shifts.
- When possible, offer workers a choice between permanent and rotating shifts.
- Use a forward-rotating schedule for rotating shifts, when possible.
- Avoid early morning shift starts before 7 AM, if possible.
- Arrange shift start/end times to correspond to public transportation or consider providing transport for workers on particular shifts.
- Limit shifts to a maximum of 12 hours (including overtime) and consider the needs of vulnerable workers.
- Limit night shift to 8 hours for work that is demanding, dangerous, safety critical or monotonous.
- Avoid split shifts unless absolutely necessary.
- Encourage and promote the benefit of regular breaks away from the workstation.

[8] Adapted from Government of the U.K; Health and Safety Executive; Managing shift work HSG256; 2006; www.hse.gov.uk/pubns/priced/hsg256.pdf

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- Where possible, allow workers some discretion over the timing of breaks but discourage workers from saving up break time for the end of the workday.
- In general, limit consecutive working days to a maximum of 5-7 days.
- For long work shifts (>8 hours), for night shifts and for shifts with early morning starts, consider limiting consecutive shifts to 2-3 days.
- Design shift schedules to ensure adequate rest time between successive shifts.
- When switching from day to night shifts (or vice versa), allow workers a minimum of 2 nights' full sleep.
- Build regular free weekends into the shift schedule.

For a more detailed discussion of controls to prevent or reduce psychological hazards, please consult Best Practices for the Assessments and Control of Psychological Hazards – Vol. 5.

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APPENDIX 1 - OHS-related Competencies for Public Health Inspectors

The Canadian Institute of Public Health Inspectors (CIPHI) has established a continuing professional competency program (CPC) that specifies professional competencies of public health inspectors. The complete list of competencies can be found at http://www.ciphi.ca/files/documents/cpc/dsc.pdf

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APPENDIX 2 - Additional Resources

The following are useful references and links to relevant resource materials. For complete reference lists, please consult the Best Practice documents developed by Alberta Employment and Immigration available at http://www.employment.alberta.ca/SFW/6311.html

Agency for Toxic Substances and Disease Registry, Atlanta, Georgia, USA; Chemical Hazards Related to Clandestine Drug Laboratories (article) http://www.health.state.mn.us/divs/eh/meth/lab/jhughart.pdf

Alberta Employment and Immigration; No Unsafe Lift! Workbook; 2008 http://employment.alberta.ca/documents/WHS/WHS-PUB_nounsafelift_workbook.pdf

Alberta Government – Workplace Health and Safety Bulletin – Asbestos at the Work Site http://employment.alberta.ca/documents/WHS/WHS-PUB_ch019.pdf

Alberta Government – Workplace Health and Safety Bulletin – Isocyanates at the Work Site http://employment.alberta.ca/documents/WHS/WHS-PUB_ch005.pdf

Alberta Government – Workplace Health and Safety Bulletin – Lead at the Work Site http://employment.alberta.ca/documents/WHS/WHS-PUB_ch061.pdf

Alberta Government legislation related to chemicals in the workplace may be accessed through the Government website at http://employment.alberta.ca/SFW/307.html

Alberta Motor Association, *Mission Possible @ Work*; http://www.ama.ab.ca/driver-education/Mission-Possible-Traffic-Safety-at-Work

Alberta OHS Code 2009, Part 18 – Personal Protective Equipment

Alberta Workplace Health and Safety *Preventing Violence and Harassment at the Workplace*, Bulletin VAH001, 2006, retrieved from http://www.employment.alberta.ca/documents/WHS/WHS-PUB-VAH001.pdf

American Chemical Society – Chemical Storage Resources http://portal.acs.org/portal/acs/corg/content?_nfpb=true&_pageLabel=PP_ARTICLEMAIN&node_id=2231&content_id=WPCP_012310&use_sec=true&sec_url_var=region1&__uuid=dae6dbb6-9d03-4590-8995-5325374e8844

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American Journal of Public Health 'Biological and Chemical Terrorism Defense – A View from the Front Lines of "Public Health"; Fred Henretig, MD;, May 2001 http://www.ajph.org/cgi/reprint/91/5/718.pdf

BC Centre for Disease Control – A Guide for the Selection and Use of Disinfectants http://www.mtpinnacle.com/pdfs/disinfectant-selection-guidelines.pdf

Bilsker, D., Gilbert,M., Myette, T.L., and Stewart-Patterson, C. *Depression & Work Function: Bridging the gap between mental health care & the workplace;* Retrieved from www.comh.ca/publications/resources/dwf/Work_Depression.pdf

Canadian Centre for Occupational Health and Safety – Environmental Tobacco Smoke – General information and Health Effects http://www.ccohs.ca/oshanswers/psychosocial/ets_health.html

Canadian Centre for Occupational Health and Safety (CCOHS), *OHS Answers: Fatigue* July 2007; Retrieved from www.ccohs.ca/oshanswers/psychosocial/fatigue.html

Canadian Centre for Occupational Health and Safety (CCOHS), *OSH Answers – Safety Glasses and Face Protectors*; http://www.ccohs.ca/oshanswers/prevention/ppe/glasses.html

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APPENDIX 3 - Learning Objectives for this Module

1. Understand the need for and the procedure for conducting hazard assessments and risk evaluations.
2. Identify significant biological hazards that may impact public health personnel.
3. Identify significant chemical hazards that may impact public health personnel.
4. Identify significant physical hazards that may impact public health personnel.
5. Identify potential psychological hazards that may impact public health personnel.
6. Identify the hierarchy of controls that should be implemented to control hazards in the workplace.
7. Identify engineering controls and describe how they work.
8. Provide examples of administrative controls.
9. Describe the important considerations when selecting personal protective equipment.
10. For each type of hazards, identify possible engineering, administrative and personal protective equipment controls.

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APPENDIX 4 - Test Your Knowledge

1. In what way can public health personnel be exposed to biological hazards?
2. What is meant by the “hierarchy of controls”?
3. Give 3 examples of engineering controls.
4. Give 3 examples of administrative controls.
5. Give 3 examples of personal protective equipment.
6. What are the major physical hazards that public health personnel may be exposed to?
7. Name five components of a workplace driving program.
8. Name the five criteria for choosing the proper gloves to use.
9. Name the six criteria for selecting appropriate eye protection.
10. What administrative controls can be put in place to reduce the risk of exposure to hazardous chemicals?

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Test Your Knowledge - Answers

1. Public health personnel may be exposed to biological hazards through contact with patients, members of the public or through contaminated products or contaminated ventilation systems.
2. The hierarchy of controls refers to a preferred order of controls for implementation. The highest level is engineering controls, because these control the exposure at the source. The next level is administrative controls, which relies on worker compliance. The least effective and lowest level of control is personal protective equipment, because if the equipment fails the worker is likely to be exposed.
3. Fume hoods, biological safety cabinets, preventive maintenance of equipment, safety engineered medical devices, segregated areas, automated procedures, ergonomically designed work stations, machine guarding, etc.
4. Training, policies, safe work procedures, restricted access, appropriate staffing, purchasing diluted solutions, signage, purchasing standards, etc.
5. Protective eyewear, gloves, lab coats, respirators, etc.
6. Ergonomic, slips, trips, falls, temperature extreme, motor vehicle collisions
7. Senior management commitment and employee involvement, written policies and procedures, confirmation of driver qualifications, driver agreements, reporting of incidents and traffic violations, vehicle maintenance and inspection, driver training and communication, and work scheduling
8. Criteria for glove selection include:
    - The nature and concentration of the chemicals.
    - The amount of time the gloves will be exposed to the chemical.
    - Dexterity required performing the task.
    - Extent of protection needed (to wrist or higher).
    - Decontamination and disposal requirements.
9. Criteria for the selection of eye protection include:
    - Level of protection required.
    - Comfort of the wearer.
    - Secure fit that does not interfere with vision or movement.
    - Ease of cleaning and disinfection.
    - Durability.
    - Compatibility with prescription glasses and other PPE that must be worn at the same time (e.g. respirators).
10. Administrative controls may include safe work procedures including spill procedures with consideration to the specific product and manufacturer's instructions; waste handling procedures; education of workers in the nature of the hazard; availability of

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appropriate equipment and PPE; accommodation for workers with special needs (pregnant workers, persons with sensitivities or other health issues).

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