Strategies for the Prevention of Occupational Diseases

Occupational Safety and Health Branch
Labour Department

This booklet is prepared by
the Occupational Safety and Health Branch, Labour Department

This edition January 2009

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Introduction

Occupational hazards in various industries can affect employees' health and cause occupational diseases in severe cases. The most effective way to prevent occupational diseases is to eliminate or control the hazards at source. This booklet introduces a hierarchy of control measures to raise the awareness of employers and employees to the strategies for preventing occupational diseases. It is only by adopting appropriate and effective preventive measures that employees could be protected from contracting such diseases.

Occupational Diseases

The International Labour Organization defines occupational diseases as those having a specific or strong relationship with exposure to physical, chemical, biological or psychosocial factors at work, and these environmental factors are the predominant causes of such diseases. In recent years, silicosis, occupational deafness, tenosynovitis of the hand and forearm are the common occupational diseases in Hong Kong.

Common hazards causing occupational diseases can generally be grouped into the following categories:

1. Physical Hazards

Physical hazards commonly found in the work environment include temperature, humidity, air pressure, noise, vibration, lighting and radiation, etc.

2. Chemical Hazards

Different chemicals have their own properties. They can exist in the work environment in different forms, including liquid, gas, vapour, solid and air

particles (dusts, fumes), etc. Chemicals commonly used in the workplace include solvents, cleansing agents, acids and alkalis, etc.

3. Biological Hazards

Biological hazards commonly found in the work environment are micro-organisms including pathogenic bacteria, viruses and fungi, etc. They enter the human body through different channels such as by air, skin, or contact with mucous membrane, thus causing different occupational diseases. Common ones include Tuberculosis, *Streptococcus suis* infection and Leptospirosis, etc.

4. Ergonomic Hazards

Ergonomics refer to the interaction between human and the work environment and tools. Improper interaction can result in poor posture at work, resulting in musculoskeletal disorders and reduce work efficiency. Common ergonomic hazards at the workplace include incompatibility between the height of chairs and tables or the size of tools with the body-built of employees.

Prevention of Occupational Diseases - Principles and Measures

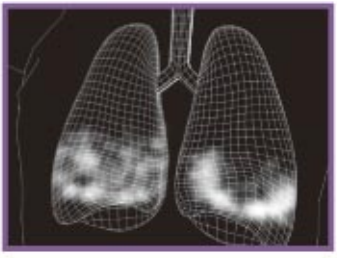
Identifying hazards at work is the first step to prevent occupational diseases. By using the grouping method described above for categorizing hazards, the hazards can be systematically identified for control. In addition, reviewing the adequacy and effectiveness of control measures already in place, formulating and adopting further appropriate measures, and stepping up monitoring are also important for the prevention of occupational diseases. The hierarchy of control measures introduced below can be adopted, as appropriate, for the control of different hazards in the work environment for the purpose of preventing occupational diseases.

(A) Elimination of hazards in the workplace

The ideal way to prevent occupational diseases is to eliminate the hazards in the work environment. It is thus appropriate not to adopt work processes that will generate hazards. Without hazards in the work environment, employees will not suffer from occupational diseases.

For example:

1. In compliance with relevant legislation, prohibiting asbestos spraying or the use of any type of asbestos insulation material for the purpose of thermal, acoustic or other insulation can prevent employees from contracting asbestos-related diseases such as asbestosis and mesothelioma through inhalation of asbestos during the work processes.



2. Avoiding hand-dug caisson work which exposes employees to exceptionally high concentration of silica dust can minimise employees' risk of contracting silicosis.

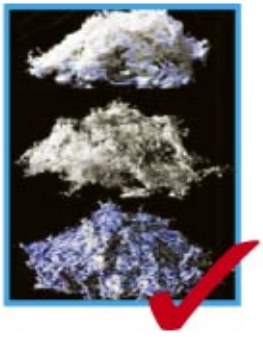
(B) Substitution by alternative materials, tools or machines

If it is not possible to avoid work processes with health hazards, use safer alternative materials, tools or machines as far as practicable to minimise adverse health effects on the employees.

For example:

1. Substituting fiberglass for asbestos prevent employees from contracting asbestos-related diseases.

Asbestos



Fiberglass

2. Using toluene instead of benzene as a solvent, employees will not contract leukaemia caused by benzene. Substituting water-soluble cleansing agents for organic solvents can reduce dermatitis among employees.

3. Replacing sand which contains a high level of free silica with metal shots in sand-blasting processes to prevent employees from contracting silicosis.

4. Substituting low-noise machines for noisy ones can reduce employees' risk of suffering occupational deafness.

5. Replacing manual can-openers with automatic ones can save employees from repetitive upper limb movements and forceful exertion, thus preventing them from having musculoskeletal disorders.

(C) Engineering control measures

If the hazards in the work environment cannot be completely eliminated or substituted by using safer alternative materials, tools or machines, other control measures should be used to reduce employees' exposure to such hazards. Controlling the hazards at source by engineering methods is an effective measure widely adopted. Engineering control measures include:

I. Enclosure

Enclosure of the hazardous work processes to reduce employees' exposure to the hazards, thus minimising the adverse health effects.

For example:

1. Enclosing the process of rock crushing in a quarry can prevent employees from contracting silicosis by the inhalation of silica dust.

2. Using enclosed machines for disinfecting endoscopes can prevent employees from developing occupational asthma due to inhalation of glutaraldehyde.

II. Isolation

Employees should be isolated from hazards or work processes which cause hazards. Automation or remote control of operation may be used where necessary to minimise employees' exposure to the hazards.

For example:

1. When removing materials or plants containing asbestos, isolating the removal area from other work areas to minimise the spread of asbestos through air can prevent employees from contracting asbestosis and mesothelioma.

2. Using insulating materials to isolate heat sources such as hot water pipes or steam pipes in kitchens or cabins to lower the ambient temperature of the workplace can help protect employees from heat stroke.

3. Providing noise barriers can lower the noise level in workplaces nearby, thus mitigating the risk of employees suffering from occupational deafness.

4. Isolating infectious patients (e.g. those with avian influenza) in appropriate isolation wards to control the spread of bacteria can protect health care workers from being infected.

III. Wet method

Hazards such as dusts or fibres in the air can be reduced by water spraying to lower the risk of inhaling these substances by employees.

For example:

1. Spraying water in construction sites when vehicles pass through to reduce the suspension of silica dust in air can protect employees from silicosis.

2. Using wet wiping method properly in construction and demolition works to suppress asbestos dust production can prevent workers from contracting asbestosis and mesothelioma.

IV. Good ventilation system

A good ventilation system not only brings fresh air into a workplace and provides a comfortable work environment, but also helps extract harmful substances from the environment to safeguard employees' health. Ventilation in the workplace can be effected by natural or mechanical means. Mechanical ventilation usually relies on mechanical equipment to draw air into or out of a workplace. If the substances are rather hazardous or their sources are more localised, supplementary local exhaust ventilation should be used to ensure that such substances are effectively eliminated or reduced to a reasonable level in the work environment.

For example:

1. The negative pressure ventilation system adopted in isolation wards for infectious patients can prevent the spread of pathogenic micro-organisms to infect health care workers and other patients outside the wards.

2. Installing local exhaust systems at appropriate locations in kitchens to extract hot air and steam outdoors can lower the temperature and humidity therein and help protect employees from heat stroke.

3. Using exhaust fans to extract toxic gases inside pipes and blowers to supply fresh air in confined space work such as underground pipes help prevent accidents caused by the inhalation of toxic gas or oxygen deficiency.

4. Placing the exhaust hood of a local exhaust system near the fume-producing source during welding processes can prevent employees from poisoning through breathing in hazardous fumes.

(D) Administrative measures

I. Formulation, provision and monitoring of safety management system and guidelines

Employers from different industries should formulate a safety management system and a set of guidelines having regard to the nature of work in their respective industries. They should clearly explain the contents of guidelines and details of the operating procedures to employees to ensure that the employees understand the proper safe operating procedures and their importance. Regular monitoring should also be carried out to ensure employees' strict implementation of the guidelines to safeguard their safety and health.

For example:

1. Formulating and implementing operating procedures for the transport, storage, use, disposal and spillage of chemicals reduce accidents arising from the handling of chemicals and prevent employees from injury or poisoning.
2. Laying down infection control guidelines and codes of practice and ensuring employees' compliance can reduce their risk of contracting infectious diseases such as hepatitis B, tuberculosis and SARS.

3. Formulating and implementing proper manual lifting procedures and team lifting guidelines can prevent workers from developing tenosynovitis of the hand or forearm because of performing such operations.

II. Provision of appropriate tools and mechanical aids

Provision of suitable tools and mechanical aids for employees can not only minimise their physical efforts at work but also enhance their productivity, thus achieving a win-win situation for both employers and employees.

For example:

1. Using a stable stool to reduce the distance of the goods from the body when handling goods at height can avoid overstretching the upper limbs and prevent musculoskeletal disorders.

2. Using tools such as hand pumps and pipettes to transfer chemicals can reduce direct skin contact with irritating chemicals to minimise the risk of dermatitis.

3. Using tools like mincers, mixers and can openers to reduce forceful and repetitive wrist and forearm movements of employees at work prevent them from developing tenosynovitis of the hand or forearm.

III. Regular repair and maintenance

Different tools, equipment, machines, ventilation systems and protective gears are frequently used in various workplaces. Regular repair and maintenance can ensure that these facilities function properly to safeguard the occupational health of employees.

For example:

1. Regular repair and maintenance of assisting devices such as trolleys and hand tools can reduce employees from using excessive efforts because of their malfunctioning and minimise their risk of musculoskeletal disorders.
2. Regular repair and maintenance of the fume cupboards and local exhaust systems in autopsy rooms can ensure their efficiency and effectiveness in avoiding leakage of harmful chemicals (e.g. formaldehyde used for preservation), thus preventing employees from getting diseases like occupational asthma.
3. Tightening loose parts and applying lubricants regularly ensure the best performance of machines to reduce noise caused by mechanical vibration or friction and help prevent occupational deafness among employees.

IV. Job rotation and appropriate rest breaks

Rotating employees to different work positions as far as practicable can reduce their prolonged contact with work hazards in a particular work position. Arranging appropriate rest breaks for employees to recuperate minimises their risk of suffering occupational diseases.

For example:

1. Rotating employees to work alternatively in noisy and quiet work environment can reduce their exposure to excessive noise and minimise the risk of hearing damage by noise.

2. Allowing employees who are required to work in a hot environment to take suitable rest breaks or rotating them to work in cool and shaded areas can prevent heat stroke.

3. Rotating workers engaged in physically demanding tasks (e.g. construction workers) or workers engaged in work involving repetitive movements of the upper limbs (e.g. cleansing workers) to other work positions, or providing rest breaks for them to do some relaxation and stretching exercises can reduce their risk of getting musculoskeletal disorders.

V. Provision of information and training

Providing to employees the necessary information and training helps them understand the hazards at work and the appropriate preventive measures to be adopted. If employees understand the importance of occupational safety and health, they will be more proactive in implementing such measures to prevent occupational diseases.

For example:

1. Employees working in noisy areas should know the adverse health effects of noise and the relevant preventive measures to help reduce their risk of getting occupational deafness.

2. Employers should provide employees with information on the chemicals used at workplaces, such as Material Safety Data Sheets (MSDS), so that the employees know the properties of the chemicals, effects on their health and the safety precautions required for preventing them from getting occupational diseases, e.g. dermatitis, occupational asthma and chemical poisoning, etc.

3. Employees working in elderly homes should be familiar with the infection control guidelines and universal precautions, and should receive proper training in the use of masks and other personal protective equipment to reduce the risk of occupational infections.

4. Teaching workers in kitchens and meat processing workers how to manage wounds properly and explaining to them possible infections arising from their course of work (e.g. *Streptococcus suis* infection), help prevent them from such occupational infections.

VI. Formulating contingency plan

Every organisation should formulate a contingency plan according to its operational needs and conduct drills regularly so that employees can properly react in a timely manner to minimise the impacts of the incidents in case of emergencies.

For example:

1. Formulating emergency evacuation plans for chemical leakage in factories, emergency rescue plans when gas monitoring in confined space indicates oxygen deficiency, emergency disposal and evacuation plans for leakage of radioactive substances in laboratories, etc. can help employees handle the accidents properly and reduce their risk of getting occupational diseases from contact with harmful substances.
2. In case of outbreak of SARS or tuberculosis in hostels, healthcare workers should follow the relevant contingency plan in handling the situation to avoid getting the infections.

(E) Personal protective equipment

Although controlling hazards at source is an ideal way to prevent occupational diseases, the use of appropriate personal protective equipment (PPE) will be the last resort if different control measures cannot eliminate or reduce the hazards to meet relevant standards. PPE should be used to complement other control measures since PPE alone is not sufficient for safeguarding the health of employees. In using PPE, one should pay attention to the correct way of wearing such equipment, regular checking of its effectiveness, cleanliness and hygiene as well as proper storage after use.

For example:

1. By wearing ear plugs or ear muffs, construction site workers can reduce the adverse effect of noise on their hearing while at work.

2. By wearing goggles or using face shields, welders can prevent keratoconjunctivitis caused by direct sight of ultraviolet rays.

3. By wearing gloves, cleansing workers can prevent direct contact of their hands with chemicals like bleaching solutions, multi-purpose disinfectants or toilet detergents, etc. for the prevention of occupational dermatitis.

4. Health care workers should wear surgical masks when attending to patients with respiratory infections to reduce the risk of such infectious diseases.

5. Workers in kitchens and meat processing workers should wear cut-proof gloves when cutting meat to avoid the increase in risk of *Streptococcus suis* infection because of hand injuries.

(F) Environmental monitoring

Environmental monitoring not only indicates the levels of hazards in the work environment but also reflects the effectiveness of existing control measures. If the level of hazards exceeds the relevant standards, then the health of employees working in or near such environment may be at risk. Therefore, regular environmental monitoring is an important step for preventing occupational diseases.

For example:

1. Before any work in a confined space, employers should appoint a "competent person" to conduct risk assessments and air monitoring to reduce or control the risk of such work to employees. Employers should conduct continuous air monitoring, if necessary, for early detection of the release of any harmful substances and their concentrations in air so that appropriate response can be taken to protect workers from gas poisoning.

2. Regular monitoring of the noise level at workplaces is an important part of a hearing conservation program. If the noise level is found to exceed the standard, both employers and employees should adopt corresponding measures to prevent occupational deafness.

3. Taking air samples regularly in firing ranges for lead analysis can help prevent employees from lead poisoning.

(G) Health surveillance

Environmental monitoring can measure the level of hazards at the workplace and indicate whether the health of employees will be at risk. However, health surveillance is important for early detection of any deviance in employees' health due to work, so that they can seek appropriate treatment as early as possible and take corresponding preventive measures at the workplace.

For example:

1. The law stipulates that employees engaged in mines, quarries or compressed air work should undergo pre-employment and periodic medical examinations and receive chest-X ray examination if necessary to prevent silicosis and compressed air illnesses, etc.

2. Employees exposed to ionising radiation at work (e.g. radiographers) should undergo pre-employment and periodic medical examinations and blood tests for early detection of health problems caused by ionising radiation, e.g. leukaemia, dermatitis, etc.

3. Employees may breathe in dusts containing cadmium during the production of cadmium batteries. Regular medical examinations can help assess the cadmium level in their blood and detect early signs and symptoms to prevent cadmium poisoning.

(H) Personal hygiene and vaccination

Personal hygiene is very important in the prevention of occupational diseases. Employees should follow relevant working guidelines, and refrain from eating, drinking or smoking at the workplace, and should wash their hands thoroughly after work and before eating to avoid chemicals, bacteria or other harmful substances from getting into the body through eating and drinking. Furthermore, abrasions or cut wounds should be managed immediately to reduce the risk of occupational infections. Vaccination can minimise employees' risks of getting infections, but not all infections can be prevented by immunisation.

For example:

1. To avoid lead dusts from getting into the body through eating and drinking, soldering material production employees should not eat, drink or smoke at the workplace. They should also wash their hands thoroughly after work and before eating and drinking.

2. Workers in kitchens and meat processing workers should manage abrasions or cut wounds immediately to reduce the risk of *Streptococcus suis* infection.

3. Health care workers should receive influenza vaccination annually to reduce the risk of influenza infection when taking care of patients.

(I) Healthy lifestyle

Employees should adopt a healthy lifestyle to maintain a strong physique to meet the needs of their daily work irrespective of the industry they belong to. A healthy lifestyle includes adequate rest and sleep, a balanced diet, regular exercise, a cheerful mind, and abstinence from alcohol and smoking, etc.

1. Adequate rest and sleep can relieve fatigue and allow the body to recuperate so that employees have adequate energy to deal with busy work.

2. A balanced diet can maintain an ideal body weight and prevent excessive stress on the back and joints due to overweight. It can also enhance body resistance to diseases and reduce the risk of occupational infections.

3. Regular exercises can promote blood circulation and strengthen the body of employees to prevent musculoskeletal disorders.

4. Using self-relaxation to relieve work stress and maintain a cheerful mind, and seeking assistance from colleagues or supervisors when there are problems at work.

5. Abstaining from smoking and alcohol, as smoking can increase the risk of occupational diseases such as Legionnaires' disease.

Conclusion

In general, early signs and symptoms of occupational diseases are not apparent. Employees may therefore neglect them and delay treatment. When the condition deteriorates, treatment will become more difficult and complete recovery remote, affecting employees' productivity and causing death in serious cases. Occupational diseases will not only bring distress to employees and their families, but will also affect employers as having employees with occupational diseases will lower staff productivity and morale and may adversely affect corporate image. Prevention is better than cure. All occupational diseases are preventable. Employers and employees should therefore work hand in hand by adopting the above hierarchy of control measures to prevent occupational diseases at source to safeguard the health of employees.

Occupational Health Clinics of the Labour Department

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Tel: 3543 5701

Occupational Health Education Service

The Labour Department provides free certificate courses and out-reaching occupational health talks for employers and employees. Please contact the nursing officer at 2852 4062 for details.

Enquiries

For enquiries on this booklet or advice on occupational health and hygiene, please contact the Labour Department's Occupational Safety and Health Branch through:

Telephone: 2852 4041

Fax: 2581 2049

Email: enquiry@labour.gov.hk

Information on the services offered by the Labour Department and on major labour legislation can also be found on our website http://www.labour.gov.hk.

Information on the services of the Occupational Safety and Health Council can be obtained through hotline 2739 9000.

Complaints

If you have any complaints about unsafe workplaces and practices, please call the Labour Department's occupational safety and health complaint hotline at 2542 2172. All complaints will be treated in the strictest confidence.