

Healthcare – Chemical Agents

MODULE OUTLINE (INTRODUCTION)

This module deals with chemical risks in the workplace. Click below for an overview of the module and to find out more about legal requirements in relation to chemical risks in the workplace.

OVERVIEW

This module explains:

- what chemical agent hazards are
- how exposure may arise
- what to consider when conducting a chemical agents risk assessment, and
- protective and preventative measures.

THE LAW

The Safety, Health and Welfare at Work (Chemical Agents) Regulations and the Safety, Health and Welfare at Work (Carcinogens) Regulations, require that employers:

- assess the risk to employees health and safety from any work activity likely to involve a risk of exposure to chemicals, carcinogens or mutagens, and
- take action to reduce risk.

TOPIC 1: CHEMICAL AGENT HAZARDS

This topic explains different chemical forms including dangerous chemicals and incompatible chemicals; it also outlines the route of exposure, how exposure to chemical agents arises, and the health effects of chemicals.

CHEMICAL AGENT HAZARDS

Exposure to potentially hazardous chemical substances is a common risk for healthcare workers.

Chemicals are encountered, for example; in the course of diagnostic and therapeutic procedures, in laboratory work, and in general housekeeping and maintenance.

CHEMICAL FORMS

Chemicals can exist in many forms:

- Solids: such as dust, fibres or powder, for example, asbestos in old buildings, nickel or chromium in medical instruments and resins used in dentistry.
- Liquids: for example, liquid disinfectants, cleaning solutions, alcohols or laboratory reagents and solvents.
- Gases, vapours, fumes or mists: for example, anesthetic gases, ethylene oxide, smoke plumes from laser surgery.

DANGEROUS CHEMICALS

Any chemical in either gas, liquid or solid form that has the potential to cause harm is called a hazardous or dangerous chemical.

Healthcare workers are potentially exposed to a number of dangerous chemicals in the workplace including:

- solvents like xylene
- disinfectants
- latex consumables
- cytotoxic drugs
- anaesthetic gases, and
- formaldehyde.

CHEMICAL AGENTS EXPOSURE

Exposure may arise in a variety of ways for example; employees can potentially be exposed to cytotoxic drugs due to splattering, spraying or aerosolisation when:

- withdrawing needles from drug vials
- transferring drugs from one container to another using syringes, needles or filter straws

- breaking ampoules open, or
- expelling air from drug filled syringes.

CHEMICAL HAZARDS

Hazardous chemicals may:

- cause health effects, for example a respiratory or skin sensitizer
- be a physical hazard, for example a flammable, explosive or oxidising chemical, and/or
- affect the environment if they are used, stored or disposed of incorrectly.

INCOMPATIBLE CHEMICAL HAZARDS

Additional hazards may also result if incompatible chemicals are mixed or stored together.

For example; oxidising and flammable chemicals should never be stored together as the oxidising chemical will provide extra oxygen in the event of the flammable chemical going on fire.

HEALTH EFFECTS OF CHEMICALS

Chemicals can cause many different types of harm ranging from mild skin irritation to cancer.

The effects of hazardous chemicals may be seen:

- immediately after contact (for example a chemical burn from an acid) or many years after the exposure (for example lung cancer following exposure to asbestos)
- following a single short exposure (for example, infrequent use of a chemical) or longer term exposures (for example, daily use of a chemical).

ROUTE OF EXPOSURE

There are four main routes by which people can be exposed to chemicals. These are ingestion, inhalation, absorption and Inoculation. Click below to find out more.

INHALATION

Examples: breathing in chemicals such as formaldehyde or ammonia, which are commonly found in cleaners and disinfectants.

ABSORPTION

Examples: chemicals entering into the eye or mucous membranes such as the nose and mouth, through the skin via open wounds or frequent skin contact with cleaning agents and disinfectants.

INGESTION

Examples: pesticides, cleaning and sanitizing solution or toxic metals such as mercury (used in thermometers) entering the body via contaminated food or hands.

This route of exposure may occur if there is poor personal hygiene practices or poor housekeeping.

INOCULATION

Examples: exposure to chemicals such as Antineoplastic (cancer) drugs, may occur during preparation, administration or disposal of the drug if a sharp object such as a needle punctures the skin.

CONCLUSION

This topic introduced you to the following:

- chemical forms
- definition of a dangerous chemical
- chemical agents exposure
- possible harmful effects, and
- routes of exposure.

TOPIC 2: CHEMICAL RISK ASSESSMENT

The aim of this topic is to explain chemical risk assessment and look in detail at the three steps involved. The steps are as follows:

- Step 1- Identify the hazard
- Step 2- Identify who is at risk of exposure and how
- Step 3- Control the risk using the hierarchy of control.

STEP 1- IDENTIFY THE HAZARD

- Identify and list the chemicals which you store or use. Include any dusts, mists, fumes or waste products which are generated as by-products of a process or work activity, for example, waste anaesthetic gases which may be found in an operating theatre.
- Record this information in a chemical inventory.

STEP 1: IDENTIFY THE HAZARD

Collect information about each chemical - what harm it can do and how it can happen.

Information on the hazards of your chemicals can be found on the label, the safety data sheet (SDS), supplier information and other sources such as surveys, healthcare journals or publications.

A chemical can have more than one hazard associated with it, so it is important to record all hazards.

STEP 1: IDENTIFY THE HAZARD

Chemicals should be supplied with a label attached to the container.

This label gives information on the chemical or product name, the chemical hazards and the precautions you should take into account to ensure safe use.

STEP 1: IDENTIFY THE HAZARD

If there are chemicals you cannot identify because the label is no longer attached or the chemical is stored in an unmarked container, mark these as “unknowns” on your list.

Make arrangements to have these chemicals safely removed from the workplace.

Never use chemicals if you are unsure what they are.

STEP 1: IDENTIFY THE HAZARD

Chemical manufacturers and suppliers are legally required to provide safety data sheets which give information on the chemicals' safety and health risks. Ensure that you have up to date sheets for all the chemicals in use.

Keep your SDSs in a clearly identified place where they can be easily accessed by your employees and if necessary the emergency services. A central database of SDSs may be helpful.

STEP 1: IDENTIFY THE HAZARD

Pharmaceutical products which are ready for use are not required by law to have SDSs so check product information sheets in such cases.

STEP 1: IDENTIFY THE HAZARD

Record what the chemical is used for and note how much of the chemical you have and where and how it is stored. This will help you locate the chemical easily and also avoid storing extra amounts.

Note also the type of container it is stored in such as a plastic or glass bottle and the condition of the container.

STEP 1: IDENTIFY THE HAZARD

Assess the exposure to the chemical; look at the type, intensity, length, frequency, route and occurrence of exposure including combined effects of any other chemicals.

Check if the substance has an Occupational Exposure Limit Value - OELV.

STEP 1: IDENTIFY THE HAZARD

Some hazardous chemicals such as acrylamide, formaldehyde and ethanol have OELVs which must not be exceeded. The SDS will list these levels or see the Health and Safety Authority's Code of Practice for a list of chemicals with OELVs.

Where OELVs exist, atmospheric monitoring measures may be required in order to obtain a quantitative estimate of exposure or to determine the effectiveness of control measures.

STEP 2: WHO'S AT RISK AND HOW?

When assessing exposure to the chemicals you have identified, consider the likelihood and severity of exposure. Click below for more information.

WHO USES THE CHEMICAL?

Is it everyone or a limited number of authorised people?

ARE VULNERABLE WORKERS EXPOSED?

For example asthmatics or others with pre-existing conditions such as dermatitis.

CAN NON-WORKERS BE EXPOSED?

Such as patients or visitors.

WHAT IS THE FREQUENCY AND DURATION OF EXPOSURE?

For example, is the chemical used for a few minutes or for a full shift?

HOW IS THE CHEMICAL USED AND HOW EXPOSURE ARISES?

For example chemical spray may result in inhalation or skin contact.

STEP 3: CONTROL THE RISK

Where a risk is identified the employer must reduce the risk to employees. The General Principles of Prevention which are modified for chemical agents should be followed.

1. Eliminate - Do you need to use the chemical at all?

2. Substitute - Replace the chemical with a less hazardous one or less hazardous form of chemical, for example use a pellet rather than powder form of the chemical.
3. Engineering controls - For example use local exhaust ventilation, scavenging systems or enclose the process.
4. Administrative controls - Change the work practices, minimise the number of employees using the chemicals, provide training in use of the chemicals, store chemicals correctly and put emergency procedures in place.
5. Use PPE - Use personal protective equipment (PPE) where necessary.

CONTROL MEASURES - PRACTICAL IMPLEMENTATION

Remember you may have to apply a number of control measures. For example, even with good engineering controls you may still need to examine whether administrative controls and PPE are also required.

CONCLUSION

This topic explained the three steps involved in a chemical agents risk assessment.

It emphasised that employers must consider what each hazard is and who is at risk of exposure.

Where a risk is identified the employer must reduce the risk to workers.

TOPIC 3: IMPLEMENTING CONTROL MEASURES

The aims of this topic are to outline the roles of protective and preventative measures such as:

- Instruction, Information and Training.
- Safe Storage.
- Personal Protective Equipment.
- Emergency Plans.
- Safe Disposal of Chemicals.
- Health Surveillance.
- Monitoring and Supervision.

INFORMATION AND TRAINING

Staff using chemicals should receive training in the hazards and risks associated with the chemicals they use. The training should cover how to use, handle, move and store the chemicals in a safe manner.

Staff should also know how to use equipment correctly, clean up any spills safely, how to report any chemical related incidents and what to do in an emergency.

SAFE STORAGE

Hazardous chemicals must be stored correctly. Only authorised users should be able to access the chemicals. When storing chemicals:

- follow the SDS instructions
- consider the compatibility of different chemicals. For example, iodine should not be stored with ammonia
- limit the quantities of chemicals stored
- ensure that the storage area is adequately ventilated so that there is no accumulation of gases, vapours or fumes, and
- keep chemicals known to be carcinogenic, mutagenic or toxic to reproduction under strict control.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

PPE is the last line of defence. The SDS gives advice on appropriate PPE to wear when using the chemical.

Where PPE is used, each person should ideally have their own equipment and be trained how to use it properly, store it and keep it in good condition.

EMERGENCY PLANS

- It is important that you and your employees know what to do in case of an accident, incident or emergency involving chemicals such as an accidental spill.

- Plan to avoid such events but also plan to minimise their effect should they occur. This may include your evacuation procedure and what to do in case of accidental exposure to the chemical.
- Ensure that you have a suitable spill kit in the event of an incident and that staff know how to use it.

SAFE DISPOSAL OF CHEMICALS

Refer to the SDS to find the correct disposal procedure for your chemicals.

If in doubt, contact the Environmental Protection Agency for further advice.

HEALTH SURVEILLANCE

Where exposure to a hazardous chemical can cause an identifiable disease or illness for example, skin or respiratory sensitizers, and there is a likelihood of illness occurring, then health surveillance should be carried out by an occupational healthcare professional.

MONITORING AND SUPERVISION

Routine checks, regular maintenance of equipment and appropriate supervision are necessary to ensure that controls are effective and correctly applied.

CONCLUSION

This topic outlined the roles of protective and preventative measures and how to implement these control measures in order to reduce/eliminate the risk of chemical hazards.

SUMMARY

Healthcare employees are frequently exposed to hazardous chemical agents during their work. If the exposure is not prevented or properly controlled; serious illness and even death can result.

In this module you learned about the basic concepts of chemical safety.

First, you learned about different chemical forms. Next, you learned about the route of exposure, how exposure to chemical agents arises, and the health effects of chemicals.

Finally, you learned about the steps involved in chemical risk assessment and the necessary measures to safeguard healthcare employees from the effects of hazardous chemicals.

LEARNING OBJECTIVES

The learning objectives of this module were:

- to understand how healthcare workers are exposed to chemicals
- to know how chemicals cause harm
- to learn how to carry out a chemical agents risk assessment, and
- to know how to store chemicals safely.