Hazardous Chemicals

1. Introduction ............................................................................. HC: 1
2. Purpose/Overall Goal ......................................................... HC: 1
3. Course Objectives ............................................................... HC: 1
4. Chemical Safety ................................................................. HC: 2
5. Physical and Health Hazards .............................................. HC: 3
6. Types of Chemical Exposure ............................................. HC: 4
7. Chemical Information ....................................................... HC: 5
8. Labels .................................................................................. HC: 6
9. Safety Data Sheets ............................................................ HC: 9
10. Dealing with Hazardous Spills .......................................... HC: 12
11. Conclusion .......................................................................... HC: 13
Hazardous Chemicals

INTRODUCTION

To protect and inform workers about potential hazards they may be exposed to, the United States Occupational Safety and Health Administration (OSHA) created certain standards. These standards state that:

- You have the right to know about chemical hazards in your workplace.
- Facilities are required to educate and train individuals who may work with hazardous substances.

OSHA also provides specific criteria for how health and physical standards are classified, and how chemicals are classified, based on international standards. Hazardous chemical labeling requirements are now consistent worldwide, to protect those who work with them.

PURPOSE/OVERALL GOAL

This module outlines what you as a healthcare worker need to know about working with hazardous chemicals. In particular, the focus is on how to read and understand the labels and Safety Data Sheets (SDS) that accompany every chemical in your facility.

The goal of this module is to keep you as safe as possible from accidental chemical exposure in your workplace.

COURSE OBJECTIVES

After completing this module, the learner should be able to:

1. Describe the chemical hazards that may be faced on the job
2. Describe how to protect him/herself as well as coworkers, patients, and visitors from these hazards
3. Demonstrate understanding of chemical labels and Safety Data Sheets
4. Explain safety procedures when working with chemicals
5. Understand what to do in the event of a hazardous spill

© Copyright Clinical Assessments by Prophecy, a Division of Advanced Practice Strategies
CHEMICAL SAFETY

In healthcare, chemical safety is everyone’s responsibility.

To ensure consistent safety information worldwide on hazardous chemical products, the United Nations adopted the Globally Harmonized System (GHS). This system defines and classifies the hazards of chemical products, and calls for consistent health and safety information on labels and safety data sheets.

The United States Occupational Safety and Health Administration (OSHA) requirements are in line with the GHS. The goal is to give workers easy-to-understand information to help avoid injuries and illnesses related to exposure to hazardous chemicals.

Information for every chemical is provided on a Safety Data Sheet, or SDS (formerly known as a Material Safety Data Sheet, or MSDS). To protect yourself, it is critical that you understand chemical labels and the SDS.

Healthcare workers MUST:
1. Know what chemical hazards they may face on the job
2. Know how to protect themselves, coworkers, patients, and visitors from these hazards
3. Read and understand labels and Safety Data Sheets, and follow instructions and warnings
4. Follow safety procedures on the job

Facilities MUST implement a written hazard communication program including:
1. Listing hazardous chemicals in the workplace
2. Labeling on-site chemical containers
3. Making chemical information available to healthcare workers in the form of labels and SDS

Chemical manufacturers MUST:
• Determine the physical and chemical hazards of their products and the possible health effects
• Label chemical containers
• Provide SDS that details information about hazardous chemicals
PHYSICAL AND HEALTH HAZARDS

Hazardous chemicals can create two types of hazards: physical hazards and health hazards.

Physical hazards usually result from improper use or storage of hazardous chemicals. Physical hazards are posed by chemicals that are:
- Flammable (catch fire easily)
- Explosive (causes a sudden release of pressure, gas, and heat)
- Reactive (burns, explodes, or releases toxic vapor if exposed to other chemicals, heat, air, or water)

Health hazards are posed by chemicals that, upon exposure, can affect body organs or systems including:
- Lungs
- Eyes
- Kidneys
- Skin
- Mucous membranes
- Blood-producing system
- Reproductive system

Signs and symptoms of chemical exposure include:
- Skin rashes
- Headache
- Eye irritation
- Dizziness
- Nausea
- Difficulty breathing or wheezing

Existing medical conditions can also be aggravated by exposure to hazardous chemicals. Effects can be acute and appear right after the exposure, such as a rash, burn, or wheezing. Effects can also be chronic or long-term and may take years to develop, such as cancer, birth defects, or sterility.
TYPES OF CHEMICAL EXPOSURE

There are four different ways a chemical could enter your body. These types of exposures include:

1. **Inhalation.** Inhaling hazardous chemicals could cause:
   - Dizziness
   - Headaches
   - Nausea
   - Vomiting
   - Throat and/or lung damage

2. **Absorption.** Skin and eye contact could cause:
   - Burns
   - Allergies
   - Vision problems
   - Blindness
   
   In addition, cuts and other skin injuries may allow chemicals to pass into your bloodstream.

3. **Ingestion.** Swallowing hazardous chemicals when you eat, drink, or smoke in areas where chemicals are located could damage your internal organs.

4. **Injection.** An accidental puncture with a needle, scalpel, or any sharp object can allow toxins to enter your bloodstream directly and circulate throughout your body.
CHEMICAL INFORMATION

Before you use a chemical, you must know this important information about it:
1. Proper use
2. Precautions
3. Treatment if accidentally exposed to it

This information has been researched by the chemical manufacturers and can be found on container labels and Safety Data Sheets (SDS).

It is the manufacturer’s responsibility to research the product and the chemicals it contains, provide a SDS for the product, and provide a warning label.

Common chemical hazards in a healthcare facility may include:
- Acids and bases
- Natural rubber latex (proteins)
- Resins and adhesives
- Soaps and detergents
- Solvents
- Cadmium/lead
- Ethylene oxide
- Formaldehyde
- Glutaraldehyde
- Mercury
- Phenol
- Xylene
LABELS

Chemical manufacturers must label every container of hazardous chemicals. The format will differ from company to company, but the labels must contain similar types of information.

- All chemical containers **MUST** be labeled.
- If you pour a chemical from a larger container into a smaller one, the smaller container **MUST** still be labeled.
- If the chemical is a disinfectant, the date it was poured or mixed and the contact time **MUST** also be included on the label. The contact time is the time the chemical must remain on the surface for effective cleaning and disinfecting.

Some key points regarding labels:

- The labels will help you know how to properly store the hazardous chemicals.
- The information on the label works together with information contained on the Safety Data Sheet (SDS). For example, the precautionary statements will be the same on the label and on the SDS.
- The information on the labels can also help you or emergency personnel to quickly find information on first aid if needed.

The following six items are what you should expect to see on labels:

1. **Product Identifier.** This is how the hazardous chemicals are identified and includes the chemical name and code/batch number.
   - The manufacturer, importer or distributor can decide the appropriate product identifier.
   - However, the same product identifier that is used must be both on the label and in Section 1 of the SDS for Identification.

2. **Signal Word.** This is used to indicate the relative level of severity of hazard. It also alerts you to a potential hazard on the label. Only two signal words are used:
   - “Danger” is used for the more severe hazards
   - “Warning” is used for the less severe hazards
3. **Pictogram.** When chemicals have multiple hazards, different pictograms are used to identify the various hazards. The healthcare worker should expect to see the appropriate pictogram for the corresponding hazard class.
   - The pictogram that must be included on the labels must be in the shape of a square set at a point.
   - It must include a black hazard symbol on a white background with a red frame that must be wide enough to be clearly visible.
4. **Hazard Statement.** This should include the nature of the hazard(s) of a chemical, including the degree of the hazard, where appropriate. One example of this is: “Causes damage to kidneys through prolonged or repeated exposure when absorbed through the skin.”
   - **ALL** of the applicable hazard statements must appear on the label.
   - Hazard statements may be combined where appropriate to reduce redundancies and improve readability.
   - All chemical users should always see the same statement for the same hazards, no matter what the chemical is or who produces it.

5. **Precautionary Statement(s).** This phrase describes recommended measures that should be taken to minimize or prevent adverse effects resulting from exposure to a hazardous chemical or improper storage or handling. In cases where there are similar precautionary statements, the one providing the most protective information will be included on the label.

6. **Name, Address & Phone Number of Chemical Manufacturer, Distributor, or Importer.** This information should always be displayed on each label.
SAFETY DATA SHEETS (SDS)

The Safety Data Sheet (SDS), formerly called MSDS, is a basic hazard communication tool that provides details on:
1. Chemical and physical dangers
2. Safety procedures
3. Emergency response techniques

There are 16 sections to the SDS. As a healthcare worker, you will find information on exposure limits, engineering controls, and personal protective equipment in Section 8.

The SDA gives you all of the information you need to work safely with chemicals. Check with your supervisor for the location of your facility’s SDS.

Here is the information provided in each section of the 16 SDS sections:

<table>
<thead>
<tr>
<th>SECTION</th>
<th>TOPIC</th>
<th>DESCRIPTION</th>
</tr>
</thead>
</table>
| 1       | Identification                       | ✓ Common name, product, manufacturer/ importer/ responsible party name, address, and telephone number  
                      | ✓ Recommended use of the chemical (for example, flame retardant) and restrictions on use (for example, recommendations given by supplier) |
| 2       | Hazard(s) identification             | ✓ Hazardous classification (such as “flammable liquid”)                     
                      | ✓ Signal Word                                                               
                      | ✓ Hazard Statement(s)                                                       
                      | ✓ Pictograms                                                                
                      | ✓ Precautionary Statement(s)                                                
                      | ✓ Description of any hazards not otherwise classified                      
                      | ✓ For a mixture that contains an ingredient with unknown toxicity, percentage of how much of the mixture consists of ingredient(s) with unknown toxicity |
| 3       | Composition/ information on ingredients | For substances:                                                             
                      | ✓ Chemical name                                                             
                      | ✓ Common name and synonyms                                                 
                      | ✓ Chemical abstracts                                                        
                      | ✓ Impurities/stabilizing additives                                          
                      | For mixtures:                                                               
                      | ✓ Same information as required for substances                              
<pre><code>                  | ✓ Chemical name and concentration (such as exact percentage) of all ingredients classified as a health hazard |
</code></pre>
<table>
<thead>
<tr>
<th>SECTION</th>
<th>TOPIC</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>First-aid measures</td>
<td>✓ Necessary first-aid instructions by relevant routes of exposure (such as what to do in the event of inhalation, skin and eye contact, ingestion)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ Description of the most important symptoms or effects, and any symptoms that are acute or delayed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ Recommendations for immediate medical care and special treatment needed, when necessary</td>
</tr>
<tr>
<td>5</td>
<td>Firefighting measures</td>
<td>✓ Recommendations of suitable extinguishing equipment, and information about extinguishing equipment that is not appropriate for a particular situation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ Advice on specific hazards that develop from the chemical during the hazardous combustion products created when the chemical burns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ Recommendations on special protective equipment or precautions for firefighters</td>
</tr>
<tr>
<td>6</td>
<td>Accidental release measures</td>
<td>✓ Use of personal precautions (such as removal of ignition sources or providing sufficient ventilation) and protective equipment to prevent the contamination of skin, eyes, and clothing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ Emergency procedures, including instructions for evacuations, consulting experts when needed, and appropriate protective clothing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ Methods and materials used for containment (such as covering drains and capping procedures)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ Cleanup procedures (such as appropriate techniques for neutralization, decontamination, cleaning/vacuuming, adsorbent materials; and/or equipment required for containment/cleanup)</td>
</tr>
<tr>
<td>7</td>
<td>Handling and storage</td>
<td>✓ Precautions for safe handling, including recommendations for handling incompatible chemicals, minimizing the release of the chemical into the environment, and providing advice on general hygiene practices (such as stating that eating or drinking in work areas is prohibited)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ Recommendations on the conditions of safe storage and incompatibilities, as well as specific storage requirements (such as ventilation requirements)</td>
</tr>
<tr>
<td>8</td>
<td>Exposure controls/personal protection</td>
<td>✓ Exposure limits as used or recommended by agency (OSHA, etc.), chemical manufacturer, importer, or employer, where available</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ Appropriate engineering controls</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓ Personal protective measures to prevent illness or injury from exposure to chemicals, such as personal protective equipment (PPE)</td>
</tr>
<tr>
<td>SECTION</td>
<td>TOPIC</td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td>---------</td>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td>9</td>
<td>Physical and chemical properties</td>
<td>✓ Minimum required information (as applicable/available) consists of: Appearance (physical state, color, etc.), Odor, Odor threshold, pH, Melting point/freezing point, Initial boiling point/range, Flash Point, Evaporation rate, Flammability (solid, gas), Upper/lower flammability/explosive limits, Vapor pressure/density, Relative density, Solubility(ies), Partition coefficient (n-octanol/water), Auto-ignition temperature, Decomposition temperature, and Viscosity</td>
</tr>
<tr>
<td>10</td>
<td>Stability and reactivity</td>
<td>✓ Reactivity: Description of the specific test data such as class or family of the chemicals ✓ Chemical Stability: Indication of whether the chemical is stable or unstable</td>
</tr>
<tr>
<td>11</td>
<td>Toxicological information</td>
<td>✓ Information on the likely routes of exposure (such as inhalation, skin, eye contact) ✓ Description of delayed, immediate, or chronic effects from short-term and long-term exposure ✓ Numerical measures of toxicity ✓ Description of symptoms ✓ Indication of whether the chemical is listed in the National Toxicology Program (NTP) Report on Carcinogens, or has been found to be a potential carcinogen by International Agency for Research on Cancer (IARC) Monographs or by OSHA</td>
</tr>
<tr>
<td>12</td>
<td>Ecological information (non-mandatory)</td>
<td>✓ This section provides information to evaluate the environmental impact of the chemical</td>
</tr>
<tr>
<td>13</td>
<td>Disposal considerations (non-mandatory)</td>
<td>✓ This section provides guidance on proper disposal practices, recycling, or reclamation of the chemical(s) or its container, and safe handling practices (refer to Section 8 of the SDS for information on Exposure Controls/Personal Protection)</td>
</tr>
<tr>
<td>14</td>
<td>Transport information (non-mandatory)</td>
<td>✓ This section provides guidance on classification information for shipping and transporting of hazardous chemical(s) by road, air, rail, or sea</td>
</tr>
<tr>
<td>15</td>
<td>Regulatory information (non-mandatory)</td>
<td>✓ This section identifies the safety, health, and environmental regulations specific for the product that is not indicated anywhere else on the SDS</td>
</tr>
<tr>
<td>16</td>
<td>Other information</td>
<td>✓ This section indicates when the SDS was prepared or when the last known revision was made</td>
</tr>
</tbody>
</table>

© Copyright Clinical Assessments by Prophecy, a Division of Advanced Practice Strategies
DEALING WITH HAZARDOUS SPILLS

Your facility will have specific clean-up policies for various types of hazardous spills. Please consult with your supervisor in the event you encounter a hazardous spill in an area in which you are working.

In general, you should respond to a hazardous spill by:

- Protecting your safety and the safety of others
- Isolating the scene and denying entry to it
- Notifying the individual or department responsible for cleaning up hazardous spills
CONCLUSION

Hazardous chemical communication is a valuable way to ensure everyone benefits from the same safety warnings. But it can protect you only if you:

1. Read labels and SDS
2. Know where to find information about the chemicals you work with
3. Follow warnings and instructions
4. Use and store chemicals safely
5. Use the correct protective clothing and equipment when handling hazardous substances
6. Learn emergency procedures in the event of a spill or exposure
7. Practice sensible, safe work habits

REFERENCES: