

Hazard and Risk

OSH Answers

What is a hazard?

- The meaning of the word hazard can be confusing. Often dictionaries do not give specific definitions or combine it with the term "risk". For example, one dictionary defines hazard as "a danger or risk" which helps explain why many people use the terms interchangeably.
- There are many definitions for hazard but the more common definition when talking about workplace health and safety is:
- A **hazard** is any source of potential damage, harm or adverse health effects on something or someone under certain conditions at work.

- Basically, a hazard can cause harm or adverse effects (to individuals as health effects or to organizations as property or equipment losses).
- Sometimes a hazard is referred to as being the actual harm or the health effect it caused rather than the hazard. For example, the disease tuberculosis (肺结核TB) might be called a hazard by some but in general the TB-causing bacteria would be considered the "hazard" or "hazardous biological agent".

What are examples of a hazard?

- Workplace hazards can come from a wide range of sources. General examples include any substance, material, process, practice, etc that has the ability to cause harm or adverse health effect to a person under certain conditions. See Table 1.

Table 1
Examples of Hazards and Their Effects

Workplace Hazard	Example of Hazard	Example of Harm Caused
Thing	Knife	Cut
Substance	Benzene	Leukemia/白血病
Material	Asbestos石棉	Mesothelioma间皮瘤
Source of Energy	Electricity	Shock, electrocution
Condition	Wet floor	Slips, falls
Process	Welding定位焊接	Metal fume fever
Practice	Hard rock mining	Silicosis硅肺病

- As shown in Table 1, workplace hazards also include practices or conditions that release uncontrolled energy like:
- an object that could fall from a height (potential or gravitational energy),
- a run-away chemical reaction (chemical energy),
- the release of compressed gas or steam (pressure; high temperature),
- Entanglement/纠缠 of hair or clothing in rotating equipment (kinetic energy), or
- contact with electrodes of a battery or capacitor (electrical energy).

What is risk?

- Risk is the chance or probability that a person will be harmed or experience an adverse health effect if exposed to a hazard. It may also apply to situations with property or equipment loss.
- For example: The risk of developing cancer from smoking cigarettes could be expressed as “cigarette smokers are 12 times (for example) more likely to die of lung cancer than non-smokers”. Another way of reporting risk is “a certain number ,”Y“, of smokers per 100,000 smokers will likely develop lung cancer” (depending on their age and how many years they have been smoking). These risks are expressed as a probability or likelihood of developing a disease or getting injured, whereas hazards refer to the possible consequences (e.g., lung cancer, emphysema/肺气肿 and heart disease from cigarette smoking).

Factors that influence the degree of risk include:

- how much a person is exposed to a hazardous thing or condition,
- how the person is exposed (e.g., breathing in a vapour, skin contact), and
- how severe are the effects under the conditions of exposure.

What is an adverse health effect?

- A general definition of adverse health effect is "any change in body function or the structures of cells that can lead to disease or health problems".
- Adverse health effects include:
 - bodily injury,
 - disease, decrease in life span,
 - change in the way the body functions, grows, or develops,
 - effects on a developing fetus (teratogenic effects致畸效应, fetotoxic effects),
 - effects on children, grandchildren, etc. (inheritable genetic effects)
 - change in mental condition resulting from stress, traumatic外伤的 experiences, exposure to solvents, and so on, and
 - effects on the ability to accommodate additional stress.

Will exposure to hazards in the workplace always cause injury, illness or other adverse health effects?

- **Not necessarily. To answer this question, you need to know:**
- **what hazards are present,**
- **how a person is exposed (route of exposure, as well as how often and how much exposure occurred),**
- **what kind of effect could result from the specific exposure a person experienced,**
- **the risk (or likelihood) that exposure to a hazardous thing or condition would cause an injury, or disease or some incidence causing damage, and how severe would the damage, injury or harm (adverse health effect) be from the exposure.**

- The effects can be acute, meaning that the injury or harm can occur or be felt as soon as a person comes in contact with the hazardous agent (e.g., a splash of acid in a person's eyes). Some responses to may be chronic (delayed). For example, exposure to poison ivy/毒梅 may cause red swelling on the skin two to six hours after contact with the plant. On the other hand, longer delays are possible: mesothelioma间皮瘤, a kind of cancer in the lining in the lung cavity, can develop over 20 years or more after exposure to asbestos石棉.
- Once the hazard is removed or eliminated, the effects may be reversible or irreversible. For example, a hazard may cause an injury that can heal/治愈 completely (reversible) or result in an untreatable disease (irreversible).

What types of hazards are there?

- A common way to classify hazards is by category:
- **biological** - bacteria, viruses, insects, plants, birds, animals, and humans, etc.,
- **chemical** - depends on the physical, chemical and toxic properties of the chemical.
- **Ergonomic/人类环境改造学的** - repetitive movements, improper set up of workstation, etc.,
- **physical** - radiation, magnetic fields, pressure extremes (high pressure or vacuum), noise, etc,
- **Psychosocial/社会心理的** - stress, violence, etc.,
- **safety** - slipping/tripping hazards, inappropriate machine guarding, equipment malfunctions or breakdowns

- Please use OSH Answers to find information about specific hazards and their control. If you are unable to find the information you are looking for, please consider using our subscription products, or contacting our free Inquiries Service for more assistance.