

# PRINCIPLES OF ACCIDENT PREVENTION IN INTERNATIONAL PRACTICE

*У статті представлено ефективний метод попередження нещасних випадків вживаний у міжнародній практиці. Для попередження нещасних випадків і забезпечення не шкідливих та безпечних умов на робочому місці запропоновано метод тріступеневого контролю ризику. Запропонований метод ґрунтується на концепції, що саме робоче місце повинно підлягати вдосконаленню та модифікації, щоб бути сприятливим для людини, а не навпаки.*

*Paper introduces applying effective techniques for accident prevention in international practice. Three basic steps should be taken to ensure a safe and healthy workplace and prevent accidents. They are based on the concept that the workplace should be modified to suit people, not vice versa.*

## Introduction

An accident can be defined as an unplanned event or happening. That is, an accident is something unexpected, not predictable, foreseen or intended. An extension of this theme is that an accident is an outcome of an event that is not desired. Accidents do not just “happen” they are caused. An unsafe act and / or unsafe condition cause the accident event; resulting in interruption to work activities, damage to property or injury to a person.

Every accident has one or more identifiable causes. The employer is responsible for ensuring a safe system of work is in place and therefore must take action to prevent accidents from occurring or recurring.

For some, this concept still causes difficulty. The term “accident” suggests that an event occurred itself, with some degree of chance and it implies no blame or responsibility. Some people associate or equate an accident with injury or damage, when on many occasions accidents do not result in injury or damage. These events are often termed “near misses” [1].

Determining where, why and how accidents occur is fundamental to understanding the causation and implementing preventive measures. Once the circumstances and causes have been identified, effective measures can be taken to prevent similar occurrences.

An employee who is injured is likely to suffer financial loss and either disfigurement, disability, pain or in extreme cases death. The effects of an injury may not always be temporary and can have

devastating long-term consequences on an individual’s personal life, social and other activities. There may also be a significant impact on the injured person’s family and friends.

The employer should be concerned with accident prevention because the direct and indirect costs associated with accidents can endanger a company’s competitiveness. For instance, financial losses due to increased insurance premiums, lost production or disruption to production schedules, damage to equipment and plant, loss of time for other employees (eg, supervisors) during the accident investigation, training of replacement employees and the possibility of fines and adverse publicity are all issues to consider.

Whilst it is possible to insure against some of the expenses associated with injury, ill health and damage to property, the hidden uninsurable costs could well exceed the insurable costs.

In the increasingly competitive market place, it is becoming common for clients to request companies to provide safety records as part of tender analysis processes or pre-qualification. Additionally in some cases, once the successful companies have been selected, on going occupational safety and health performance evaluations are conducted on behalf of the principal contractor.

A number of beliefs are crucial to the success of the accident prevention process. According to the British Health and Safety Executive’s Publication “Successful Health and Safety Management”, these beliefs include the following principles:

People are our most important asset.

The majority of accidents and incidents are not caused by “careless workers”, but failures in control (either within the organization or within the particular job), which are the responsibility of management.

The preservation of human and physical resources is an important means of minimizing costs.

Safety and health is a management responsibility of equal importance to production and quality.

Control of safety and health is achieved through co-operative effort at all levels in the organization. Effective safety and health management is not “common sense” but based on a common understanding of risks and how to control them brought about through good management.

Competence in managing safety and health is an essential part of professional management.

All accidents, ill health and incidents are preventable.

Safety and health; and quality, are two sides of the same coin.

### **1. Techniques for Accident Prevention**

All employers, employees and self employed persons have a duty of care towards their own, and others’ safety and health at their workplace.

Compliance with legislative requirements may assist by providing either performance based or prescriptive criteria to achieve required results. Various legislative requirements may impact on activities within workplaces to ensure that workers are able to work in a safe environment.

Under general duty of care legislation, employers have a duty to ensure, as far as practicable, that employees are not exposed to hazards at the workplace. Under regulations and in accordance with codes of practice, employers also have an obligation to identify workplace hazards, to assess the associated risks and to make the necessary changes to minimize the risks. These three basic steps [2, 3] should be taken to ensure a safe and healthy workplace and prevent accidents. They are based on the concept that the workplace should be modified to suit people, not vice versa. The three steps are:

Identifying the Hazard – involves recognizing things which may cause injury or harm to the health of a person, for instance, flammable material, ignition sources or unguarded machinery.

Assessing the Risk – involves looking at the possibility of injury or harm occurring to a person if exposed to a hazard.

Controlling the Risk – by introducing measures to eliminate or reduce the risk of a person being exposed to a hazard.

It is important to regularly review the steps, especially if there are changes in the work environment, new technology is introduced, or standards are changed.

Occupational Safety and Health legislation promotes cooperation and consultation between the employer and employees within the workplace to achieve a safe and healthy work environment. Employers should consult with safety and health representatives, if any, and employees during these steps. Involvement of elected safety and health representa-

tives can provide an opportunity for problems to be resolved using knowledge within the immediate work area.

### **2. Hazard Identification**

A hazard in relation to a person is defined as “anything that may result in injury to a person or harm to the health of a person”.

There are a number of ways of identifying potential sources of injury or disease. Selection of the appropriate procedure will depend on the type of work processes and hazards involved. Procedures may range from a simple checklist for a specific piece of equipment or substance, to a more open-ended appraisal of a group of related work processes. Systematic inspections and audits can be used to detect changes away from the designed or designated conditions. Such programs can be scheduled on time, fault or random regimes. Importantly the results should be utilized and form part of an on-going base of data for the workplace. A combination of methods may provide the most effective results. Methods of identifying workplace hazards include [4]:

- developing a hazard checklist;
- conducting walk-through surveys and inspections;
- reviewing information from designers or manufacturers;
- analyzing unsafe incident, accident and injury data;
- analyzing work processes;
- consulting with employees;
- examining and considering material safety data sheets and product labels; and
- seeking advice from specialist practitioners and representatives.

Some hazards are inherent in the work process, such as mechanical hazards, noise, or the toxic properties of substances. Other hazards result from equipment or machine failures and misuse, control or power system failures, chemical spills, and structural failures.

Hazards may be grouped into three categories - physical, mental and biological. Within each category, there are further hazard groups or types. It is useful to consider these hazard types (see below) when identifying work related hazards to ensure that a wide range of potential hazards is considered. The most common hazards in terms of bodily injury or disease are those which result in:

- strain or overuse injuries and disease to back, shoulder, wrist etc;
- cut and abrasion injuries to the eyes, hands, fingers, feet and head;
- impact and crush injuries to the head, feet and fingers;
- burns (by heat, light or chemicals) to the eyes, feet, and skin;
- noise induced hearing loss; and
- toxic effects (short or long term) to respiratory system or skin, resulting in poisoning, cancers or dermatitis.

Table 1

**Types of hazard**

<b>Types of hazard include:</b>	<b>Specific examples:</b>
Gravity	falling objects, falls of people
Kinetic energy	projectiles, penetrating objects
Mechanical energy	caught between, struck by, struck against
Hazardous substances	skin contact, inhalation
Thermal energy	spills and splashes of hot matter
Extremes of temperature	effects of heat or cold
Radiation	ultraviolet, arc flashes, microwaves, lasers
Noise	hearing damage
Electrical	shock, burns
Vibration	to hands
Biological	micro-organisms
Stress	unrealistic workload and expectations

The conclusion of hazard identification should result in a list of hazard sources, the particular form in which that hazard occurs, the areas of the workplace or work process where it occurs, and the persons exposed to that hazard.

**3. Assessing the Risks**

Risk, in relation to any injury and harm, is defined as “the probability of that injury or harm occurring.”

Risk assessment should result in a list of any potential injury or harm and the likelihood of these occurring, arising from the hazards identified in the first step. In general, these should be stated from the most to the least serious, for example, from death by crushing to abrasion. The potential for fatal injury should be considered for each hazard type identified.

In assessing risks, consideration should be given to the state of knowledge about the frequency of injury or disease, the duration of exposure to injury or disease sources and the likely severity of the outcomes. Knowledge gained from similar workplaces or similar processes may be relevant to this risk assessment. Items to be considered include:

- Frequency of injury – how often is the hazard likely to result in an injury or disease?
- Duration of exposure – how long is the employee exposed to the hazard?
- Outcome – what are the consequences or potential severity of injury?

Assessing these three factors will indicate the probability or likelihood of injury or harm to workers involved in a particular work process. It also indicates the likely severity of this harm. Incomplete data or incomplete information regarding hazards of a work process may complicate the task. Risk assessment requires good judgment and awareness of the potential risks of a work process. Any person undertaking the risk assessment must have knowledge and experience of the work process.

An assessment of the risk will help determine the consequences (potential injury or disease) and assist to identify methods to reduce the risk. Risk assessment should include:

- assessing the adequacy of training or knowledge required to work safely;
- looking at the way the jobs are performed;
- looking at the way work is organised;
- determining the size and layout of the workplace;
- assessing the number and movement of all people on the site;
- determining the type of operation to be performed;
- determining the type of machinery and plant to be used;
- examining procedures for an emergency (eg: accident, fire and rescue); and
- looking at the storage and handling of all materials and substances.

In some cases it may be necessary to break down the activity or process into a series of parts and assess each part separately.

Risk assessment should provide information regarding which employees face an injury or disease risk, how often, and the potential severity of that injury or disease risk.

**4. Reducing the Risk and Preferred Order or Hierarchy of Controls**

The final step is to determine the control measures that need to be taken. In some instances, a combination of control measures may be appropriate. Control measures should be designed [5]:

- to eliminate or reduce the risks of a hazardous work process and to minimise the effects of injury or disease;
- to reduce the risk of exposure to a hazardous substance.

Controls involve implementing measures that reduce the hazard and risk in the workplace. The control of occupational injury and disease risks should preferably be dealt with in a preferred order or hierarchy. The control measures range from the most effective to the least effective. The hierarchy or preferred order of control is [1,5]:

Elimination – removing the hazard or hazardous work practice from the workplace. This is the most effective control measure;

- Substitution – substituting or replacing a hazard or hazardous work practice with a less hazardous one;
- Isolation – isolating or separating the hazard or hazardous work practice from people not involved in the work or the general work areas, for example, by marking off hazardous areas, installing screens or barriers;
- Engineering Control – if the hazard cannot be eliminated, substituted or isolated, an engineering control is the next preferred measure. This may include modifications to tools or equipment, providing guarding to machinery or equipment;
- Administrative Control – includes introducing work practices that reduce the risk. This could

include limiting the amount of time a person is exposed to a particular hazard;

- Personal Protective Equipment – should be considered only when other control measures are not practicable or to increase protection.

Control measures are not mutually exclusive. That is, there may be circumstances where more than one control measure should be used to reduce exposure to hazards.

The higher level controls generally eliminate, reduce or minimize risk in a more reliable manner than personal protective equipment which is at the bottom of the priority schedule.

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