

# Exposure in a work environment

**Exposure means the exposure of an organism to environmental factors** (for example noise, vibrations, dust, radiation) or agents that affect human health. For measurable occupational exposures, the objectively determined (measured) value of the workload, the occupational hygiene factors and the length of time the person is exposed to the workload, shall be taken into account.

## Risk assessment

Risk assessment is the process of **qualitatively** and **quantitatively** determining the occupational risk to the health and safety of the worker. Various methods and procedures are used to estimate the potential for harm to a person's health. As human health is involved, the term *health risk assessment* is also used.

The assessment is preceded by an "information inventory" with the employer. The sources of information are the results of previous **workplace inspections** (inspection protocols or records), **official and non-official documents** (e.g. approval protocols, instructions for use of machinery and equipment, safety data sheets, declaration of hazardous work, reported occupational diseases and occupational accidents). Other sources include the results of **objective measurements** of concentrations and intensities of factors in working conditions, the identification of the type and type of **biological agent** endangering health, occupational surveys and the number of workers by **age** and **sex** assigned to them, and **occupational health characteristics** based on the results of monitoring the health status of workers.

The risk assessment document should **describe** the workplace and occupation in detail, **identify** the hazards (sources of risk), **state the principles** of the risk assessment used in the specific situation, and only then assess the employer's risks and propose their control – an effective prevention programme.

The key to assessing the risks to workers' health is to evaluate exposures and burdens to workplace factors, taking into account the working conditions. In any case, it is not possible to be satisfied with simply assessing the severity of the risk by estimating the probability of its occurrence in situations where it has already been objectified by measurement. The risk assessment document must be regularly updated to capture any changes that threaten workers' health.

The evaluation steps are: hazard identification, dose-response evaluation, exposure assessment and risk characterisation.

## Determination of hazard

It involves the **collection** and **evaluation** of data on the possible types of health damage that may be induced by the substance (factor) and the exposure conditions under which such damage occurs. For this purpose, data obtained from epidemiological studies, experiments on volunteers, analyses of emergency situations, experiments on laboratory animals, isolated organs, tissues, isolated cells and cell systems, as well as analyses of relationships between the structure of substances and their biological effects, are used. All data are critically evaluated to determine whether the substance of interest has adverse effects on humans or the environment. The greater the consistency of the data obtained by the test methods used, the greater the confidence in such a prediction.

## Evaluation of the dose-response relationship

Characterize quantitative relationships between **dose** and **magnitude of adverse effect** (damage, disease). It requires two basic types of extrapolations: interspecies (experimental animal-human) extrapolation and extrapolation to the low-dose region. The aim is to obtain baseline parameters for risk quantification, and there are two basic types of effects - threshold and non-threshold.

## Exposure evaluation

In risk assessment, exposure represents a 'supply' of a hazardous factor that gives rise to risk but may not be fully utilised. Exposure assessment is probably the most difficult and crucial step in risk assessment. It describes the sources, routes, magnitude, frequency and duration of exposure of a given population to the agent of interest. The exposure assessment, like the two previous steps of the risk assessment, is always burdened with uncertainties. These uncertainties arise both from uncertainties in the description of the underlying physical, chemical and biological phenomena and from uncertainties in the acquisition of input data.

## Characterisation of risk

It involves the integration (synthesis) of the data obtained in the previous steps and leads to a determination of the probability with which any of the possible health harms will occur. As this integration is based on all the assumptions made in the three previous steps, it is important for the risk assessment to discuss the level of uncertainty inherent in the final estimates.

# Links

## Related articles

- Hygiene of a working environment

## References

- TUČEK, Milan – CIKRT, Miroslav. *Pracovní lékařství pro praxi : Příručka s doporučením a standardy*. 1. edition. Praha : Grada, 348. ISBN 80-247-0927-9.