



Risk Assessment

Module 1



Health & Safety
Essentials

Registered charity number 207890

Risk assessment in the laboratory

After studying this module you will be able to understand the need to conduct risk assessments, how this applies to all laboratory activities, and the principles underlying the process of assessing risk.

Objective: to protect the health and safety of people, the risks arising from work-related exposures to hazards need to be assessed BEFORE any work is started. Controls (precautions) need to be put in place and monitored to make sure they are actually used, maintained and are suitable and sufficient. This means considering ALL types of hazards, not just those arising from the use of chemicals

There have been a number of serious and fatal injuries in laboratories whilst working with chemicals, biological agents and with machinery. These incidents have occurred in laboratories all over the world, including universities in the UK. Here are some examples of such incidents:

- 2011: a university science student was fatally injured when her hair got caught in a lathe in a chemical laboratory.
- 2010: a serious injury occurred in a chemistry laboratory when a high-energy metal compound suddenly detonated.
- 2009: a fatality occurred in a university chemical laboratory three weeks after sustaining third degree burns when a t-butyl-lithium that was being worked with, ignited.
- 2006: an explosion occurred in a university fatally injuring one person and seriously injuring another. The blast was heard over two kilometres away. The cause of the explosion was unknown, but thought to be linked with an ethylene leak.

The list of incidents are numerous and include many examples related to fires, from spillages and heat sources and explosions, exposure to toxic chemicals from spillage or inadequate ventilation, nitrogen asphyxiation, electric shock and chemical burns.

In some of these instances, serious injury and fatality could possibly have been reduced or prevented by conducting a 'suitable and sufficient'¹ risk assessment before the experimental work started, in order to identify adequate control measures.

What is risk assessment?

A 'risk assessment'² is an important step in protecting yourself, those that work for you and others who may be affected by your work activities from risks to their health and safety. It is a careful examination of what, in your work, could cause harm to people, so that you can weigh up whether you have enough precautions in place, and if you need to do more to prevent harm.

A structured and systematic approach helps you focus on the risks that really matter - the ones that have the real potential to cause harm. For example, it makes sense to ensure that spillages of chemicals are cleaned up promptly so that no one else can be exposed or can slip and injure themselves.



In the UK, it is a requirement under the 'Health and Safety at Work etc. Act 1974'³ to ensure 'so far as is reasonably practicable'⁴ the health and safety of employees and others at work or from work activities. How you go about this is further specified in the 'Management of Health and Safety at Work Regulations 1999'⁵ under regulation 3 as a requirement to complete risk assessments. Here employers are required to identify hazards and to undertake the management and control of risks to both persons at work and others who may be affected by work activities. In safety legislation the concept of risk assessment first appeared in 1980 in regulations for the control of lead at work. This theme was developed in subsequent regulations and is now a well established principle and a key issue on which control measures are based. The most relevant regulations in the laboratory context which specify the need to assess risks are:

- 'Control of Substances Hazardous to Health Regulations 2002 (COSHH)'⁶
- 'The Regulatory Reform (Fire Safety) Order 2005'⁷
- 'Manual Handling Operations Regulations 1992'⁸ (as amended)
- 'The Control of Noise at Work Regulations 2005'⁹
- 'Personal Protective Equipment at Work Regulations 1992'¹⁰
- 'Dangerous Substances and Explosive Atmospheres Regulations 2002'¹¹
- 'The Health & Safety (Display Screen Equipment) Regulations 1992'¹²

Where a specific assessment has already been undertaken there is no need to repeat it as long as conditions remain the same and it is not due for review. It is important however, to identify ALL relevant risks when general risk assessments are done so that comprehensive records are kept and that special areas are not overlooked.

The law does not expect you to eliminate all risk, but you are required to protect people 'so far as is reasonably practicable'⁴.

In this module we will discuss the need for risk assessment as a general requirement and provide a simple format for compiling such assessments. There is no need to complicate the process, as many of the risks may be well known and the necessary control measures may be already in place.

The risk assessment associated with chemical hazards and hazardous substances that cause harm to health are covered in more detail in the Royal Society of Chemistry's resource: '*Health & Safety Essentials: Control of Substances Hazardous to Health*'.

You MUST make a 'suitable and sufficient'¹ assessment of the risk to the health and safety of the individuals created by the work, and the steps that need to be taken to control them arising from the hazards you encounter.

Everyone associated with the activity has a role to play in assessing risk in a laboratory but those in supervisory positions must be familiar with Risk Assessment and actively involved in implementing the control measures, even if they are not actually performing experimental work.

You can ask people to help you with your risk assessment. Those who have the knowledge, expertise and competence can assist you in identifying all the hazards, associated risks and appropriate control measures. The risk assessment should be signed by both the person completing it and a person of authority (line manager or supervisor) who is responsible for its review and for ensuring that it is suitable and sufficient.

Before proceeding do you understand the difference between HAZARD and RISK?

Hazard – is the potential for something to cause harm.

i.e. hazardous substances (chemicals), electricity, work equipment/machinery, trip hazards such as trailing leads. (In relation to a substance, it means the intrinsic property of that substance which has the potential to cause harm (injury or damage) to the health of a person).

The level or severity of harm is considered together with likelihood of exposure when undertaking a risk assessment.



Both likelihood and severity must be considered before the risk can be adequately assessed and suitable controls defined.

Risk is the likelihood (probability) that the hazard will cause actual harm in the circumstances.

The best way of expressing this is through the following relationship:

A risk assessment is simply a careful examination of what, in your work, could cause harm to people's health, so that you can weigh up whether you have taken enough precautions or should do more to reduce the risk.

Risk Management is about taking the practical steps to protect people from real harm, so you should think about the most significant risks first. The greater the risk then the more reliable and robust the control measures should be.

Sensible risk management is about:

- Ensuring that workers and the public are properly protected
- Enabling innovation and learning; not stifling them
- Ensuring that those who create risks manage them responsibly
- Enabling individuals to understand that as well as the right to protection, they also have responsibilities

Sensible risk management is not about:

- Creating a totally risk free society
- Generating useless paperwork mountains
- Scaring people by exaggerating or publicising trivial risks
- Reducing protection of people from risks that cause real harm and suffering

The risk assessment process:

Risk assessment is a structured and systematic examination of the premises, processes (e.g. chemical reactions, distillations, extractions) and work activities to identify what could cause harm to people to enable decisions to be made as to whether sufficient precautions have already been taken and therefore whether further controls are needed.

Risk assessment is a subjective process based on experience, opinions, observations and guidance from many sources: it is not a 'perfect science'. The key is to develop a proportionate response to the risk that requires control; neither overly burdensome nor too inadequate to achieve the desired control. Risk assessment can be seen as a logical way of asking questions, which will produce enough information for sensible conclusions to be drawn.

The questions to be asked in the assessment process are:

- What are the hazards?
- What are the sorts of circumstances that are realistically expected ('reasonably foreseeable' 13) to occur which are capable of leading to injury or ill health?
- When are the circumstances likely to arise?
- Who are the people who might be at risk?
- Are some of the people likely to be at particular risk (e.g. pregnant workers, young workers, workers with disabilities and lone workers)?
- What is the severity of the outcome likely to be in terms of injury or ill- health to those at risk?
- What are the nature and the extent of the risk(s)?
- What are the existing precautions and are they appropriate and adequate?
- Are we fully complying with the law?
- If not what action is required to control the risks



The modules within this resource will go into the details of risk assessments and the suggested steps to be taken.

Risk Assessments are not "one-off" and for all time. They must also be reviewed:

- At regular intervals or when changes occur that may invalidate the original assessment
- If there is reason to suspect that it is no longer valid,
- There has been significant change to the work, personnel or circumstances to which the assessment relates,
- If monitoring shows it is necessary
- After an accident, incident or new information comes to light.
- Take account of vulnerable individuals e.g. consider pregnancy, disabilities/illnesses such as epilepsy and those inexperienced in the working environment

NB The assessments should ideally be signed (not a legal requirement but good practice) by those individuals who are completing the task, area supervision, and any other persons that are affected by the activity.

