NATIONAL INSTITUTE FOR OCCUPATIONAL HEALTH

NATIONAL HEALTH LABORATORY SERVICE

WHAT ARE HAZARDOUS BIOLOGICAL AGENTS?

Hazardous biological agents (HBAs) can be defined as "any microorganism, cell of plant, animal or human origin, cell culture, human endoparasite, including those that have been genetically modified, which may cause infection, allergy, inflammation, toxic reaction, malignancy or otherwise create a hazard to human health". HBAs are classified into 4 groups according to their hazard level.

LEGISLATION

In South Africa, the Occupational Safety and Health Act (Act No. 83 of 1993) and the promulgation of the Regulations for Hazadous Biological Agents (R 1248) in 2001 played an enormous role in making employers and workers aware of the risk of exposure to HBAs.

The regulations apply to every employer / self-employed person in a workplace where:

- HBAs are deliberately produced, processed, used, handled, stored or transported.
- An incident may occur which may lead to exposure of workers to HBAs belonging to Groups 2, 3 and 4 while on duty.

ASSESSING THE RISKS

Identify which sources of infection are present in your workplace. When you have identified the source(s) of infection, you need to consider how likely it is that infection will result - think about:

- how often the task is carried out;
- how many employees are exposed; and
- how much infectious material is handled.

Find out how your employees might come into contact with infectious microorganisms at work
Determine if conditions that could allow infectious micro-organisms to grow in your workplace
If you determine that there is a risk, then you need to decide whether existing controls are sufficient
or you need to do more.

Characteristics	Examples	
Group 1		
Unlikely to cause human infection	• Yeast • E coli K 10	
Group 2		
Can cause human infection May be a hazard to workers Unlikely to spread to community Effective prophylaxis and / or treatment available	• L pneumophila • N meningitides • Influenza A & B	
Group 3		
Can cause severe human infection Serious health hazards to workers May spread to community Effective prophylaxis and / or treatment available	• M tuberculosis • B anthracis • HIV	
Group 4		
Causes severe human infection Serious health hazard to workers High risk of spreading to community No effective prophylaxis and / or treatment available	• Congo fever • Ebola	

HAZARDOUS BIOLOGICAL AGENTS

CHAIN OF INFECTION

The process of infection can be represented as a chain therefore, when identifying the hazard, all the links in the chain should be considered to assist in breaking it to control the risk.

Link in the chain		Examples
AGENT	Plants	Lower plants, higher plants
	Microorganisms	Bacteria, viruses and fungi
	Animals	Invertebrates
		Vertebrates
		Arthropods
SOURCE	Occupational settings	Agriculture, agricultural products, animal care, laboratories, mining, health care workers, pharmaceutical industry, sewage & waste disposal
ESCAPE	Primary	Immediate physical barrier
	Secondary	Engineering controls (usually physical barrier)
	Tertiary	Facility design, airflow, effluent control, operational methods
	Biological	Genetic modification
TRANSMISSION	Contact	Direct (touching contaminated surface)
		Indirect (touching previously contaminated surface)
	Droplet	Coughing, sneezing, suctioning, talking
	Airborne	Droplet nuclei that remain suspended in air for a long time
	Common vehicle	Food, water, devices, equipment
	Vector-borne	Fleas, mosquitoes, flies, bats
ENTRY	Inhalation	Airborne agents and those contained in droplets
	Ingestion	Eating contaminated food
	Fecal-oral route	Drinking water from contaminated sources
	Cutaneous inoculation	Through cuts in the skin
	Direct contact	Working in laboratories or with patients
HOST	First line of defense	Skin
	Second line of defense	Immune system

CONTROLLING THE RISK

You should consider, if you can:

- changing the way you work so the job/task/equipment that exposes your employees to a source of infection isn't needed any more; or
- modifying your work to cut out any hazardous by-products or waste.

If you can't prevent exposure, you need to adequately control it. This means controlling exposure, ie the risk of infection, to a level that won't harm people's health. However, you need to remember that, unlike some chemicals, there are no exposure limits for microorganisms. And your control measures need to take into account the fact that:

- microorganisms can grow and multiply; and
- infection could be caused by exposure to only a few micro-organisms.

There are two main approaches that you should use for the control of infection:

- for work with people or animals, the basic control principles of good occupational hygiene should be applied in all situ-actions.
- the principles of good environmental hygiene and design to stop or limit the growth of the microorganisms in the workplace.

These measures should be applied in all workplaces. This applies especially whenever contamination is suspected in the workplace, but also on a routine basis to keep the equipment you use and the workplace clean.

POSTAL ADDRESS: NIOH, P.O. Box 4788, Johannesburg 2000, South Africa
PHYSICAL ADDRESS: NIOH, 25 Hospital Street, Constitution Hill, Johannesburg, South Africa
TEL: 011 712 6475 FAX: 011 712 6426
EMAIL: tanusha.singh@nioh.nhls.c.za WEB:http://www.nioh.ac.za