

OCCUPATIONAL HEALTH

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. Biological Hazards

(Biohazards)

Biological hazards

What is biological hazard?

Biological hazards refer to organisms or organic matters produced by these organisms that are harmful to human health.

These include parasites, viruses, bacteria, fungi and protein.

- **Biological hazards can be broadly defined as Any risk that comes from the biosphere, including plants, animals, and humans.**

- ❑ **Common biological hazards derived from the environment include mold & fungi, harmful plants, stinging(biting) insects, and animal and bird droppings**

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harmful effects 



❑ Occupational Biohazards (biohazards)

❑ defines as :

“infectious agents or hazardous biological materials that exert harmful effects on workers' health, **either**

- **directly** through infection or
- **indirectly** through damage to the working environment, and it can also include medical **waste** or **samples** of a **microorganism**, virus, or **toxin** from a biological source.”

❑ **Biological hazards** (biohazards) **present the** Occupational Health and Safety (OHS) professional with **complex challenges**.

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- ▶ Many and varied biohazards may result from workplace exposure to **organisms, or substances produced by organisms**, that **threaten human** health.
 - ▶ Although workers in health and community care, and **agricultural and fishing occupations** **are** **at particular risk** of exposure to hazardous biological agents,
 - ▶ All workplaces **harbour the potential** (possible) **for various** forms of biohazard exposure, **including**
 - ▶ **person-to-person** transmission of infectious disease.
 - ▶ **Studies on biological** hazards in the workplace **are lacking**;
however,
 - ▶ **A report by Safe Work Australia** notes that
 - ▶ **19 % of** surveyed workers reported exposure to biolog. hazards.
 - ▶ Of those workers, **three quarters(3/4)** reported that they were **exposed to human body fluid** of some kind.
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[Cont. .. A report by Safe Work Australia .](#)

❑ According to the report, there were **two industries** that were, **unsurprisingly, affected more** than any other:

- (1) Health and community services and
- (2) Agriculture, forestry, and fishing.

❑ In general, there are Three Major of routes of entry for these micro-organisms into human body, through the

- ❖ Respiratory system,
- ❖ Contact with **body fluids** of the infected or
- ❖ Contact with **contaminated objects**.

❑ The harmful effects to human health are mainly of Three Types.

1. Infections,
2. Allergy and
3. Poisoning.

Is this Worker at Risk?



The short answer to this question is that just

❖ about **Every Worker is at Risk** of coming into contact with some kind of biological hazard, whether that be human blood, organic matter, or airborne pathogens.

❑ **However**, there are some industries and workers that are routinely exposed to these risks. **These include:**

1. Workers **exposed** to bodily fluids, including healthcare workers, personal service workers, & dental professionals

2. Workers **in contact** with **live animals**, including breeders, animal scientists, poultry handlers, farm workers, and laboratory animal workers

3. Workers **in contact** with animal products, including butchers, farmers, meat packers, and freight_(cargo) handlers



Cont. ..some industries and workers that are routinely exposed to these risks.



4. Workers **exposed** to ticks, fleas, and mites, including forestry workers, groundskeepers, landscapers, highway maintenance personnel, and pest control workers

5. Workers **exposed** to human or animal waste, including child care workers, laboratory workers, sewer workers, and animal handlers

6. Workers **exposed** to dust-containing pathogens (e.g. rodents, bird roosts, soil in endemic areas), including building cleaners, construction workers, granary workers, heating and air conditioning workers, gardeners, roofers, demolition workers, and farm workers

❖ **Classification of Biological hazards into; six categories:**

❖ This method of classifying occupational infections is commonly used because it provides a means to link diseases and occupations

1. **Contact with infected living animals;** *Brucellosis, influenza, leptospirosis; Q fever, plague, rabies*
2. **Contact with contaminated animal products;** *Anthrax, brucellosis, plague, haemorrhagic fever, leptospirosis, Q fever.*
3. **Tick, flea, or mite bite;** *Murine typhus, plague, Scrub typhus*
4. **Contact with human or animal waste;** *HAV, Leptospirosis, schistosomiasis,*
5. **Contact with infected patient or blood;** *AIDS, haemorrhagic fever, HBV, HCV, diphtheria, meningococcus.* And
6. **Raising dust containing pathogens;** *leptospirosis*

Preventive and Control Measures

□ **Elimination** of the source of contamination is
□ fundamental to the prevention and control of biological hazards

❖ **Identifying and Managing Biological Hazards**



Identifying and Managing Biological Hazards

- Employers and safety professionals **must take time to identify potential biological hazards** and develop a **plan to manage** them.

- When conducting a **hazard assessment**, **consider** the following questions:
 1. Are employees **working around people** who may have an illness or **communicable disease** ?
 2. Is there the potential for employees to be **exposed to blood and other bodily fluids**?
 3. Are employees **working with** or in proximity to **animals or insects**?
 4. Is the workplace **clear of mold and fungi**?
 5. Are employees working around **hazardous materials like sewage**?

Cont. ..Identifying and Managing Biological Hazards

6. Does the workplace have "sharp" materials that must be cleaned regularly and safely disposed of?

7. If there are biological hazards in the workplace, do employees have the right protective gear (equipment) to remain safe?

❑ What to do once the biological hazards have been identified:

❖ Once we identified biological hazards in the workplace it is important to eliminate as many as possible as well as reduce their risk to employees.

❖ By implementing controls in the workplace,

❖ the risk of biological hazards can be greatly reduced and in some cases, eliminated (discarded) completely.

❑ Two types of controls that can be used to address biological hazards are; **administrative** and **engineering controls**.

❑ **Elimination** of the source of contamination is fundamental to the **prevention and control** of biological hazards

If the biological hazards identified cannot be eliminated,

Employers ➔

- **must take steps to reduce** risk of exposure to an **acceptable level**
- and **provide** appropriate **personal protective equipment (PPE)** to workers

A.Engineering Controls

B.Administrative Controls

C.Personal Protective Equipment



A. Engineering Controls

- A. Engineering Controls
- B. Administrative Controls
- C. Personal Protective Equipment

□ Engineering Controls:

- ❖ Should be the **first line of defence** for protecting workers against biological hazards.
- ❖ **Engineering controls**, work to reduce the risk of exposure through physical means.
- ❖ While **appropriate controls** will vary **depending** on the **specific hazards** present in the workplace,

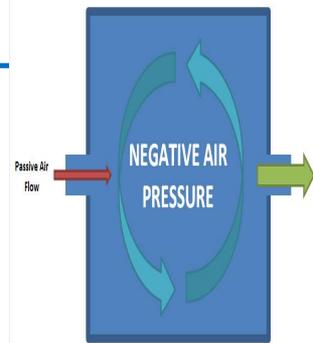
□ following are **examples** of effective options:

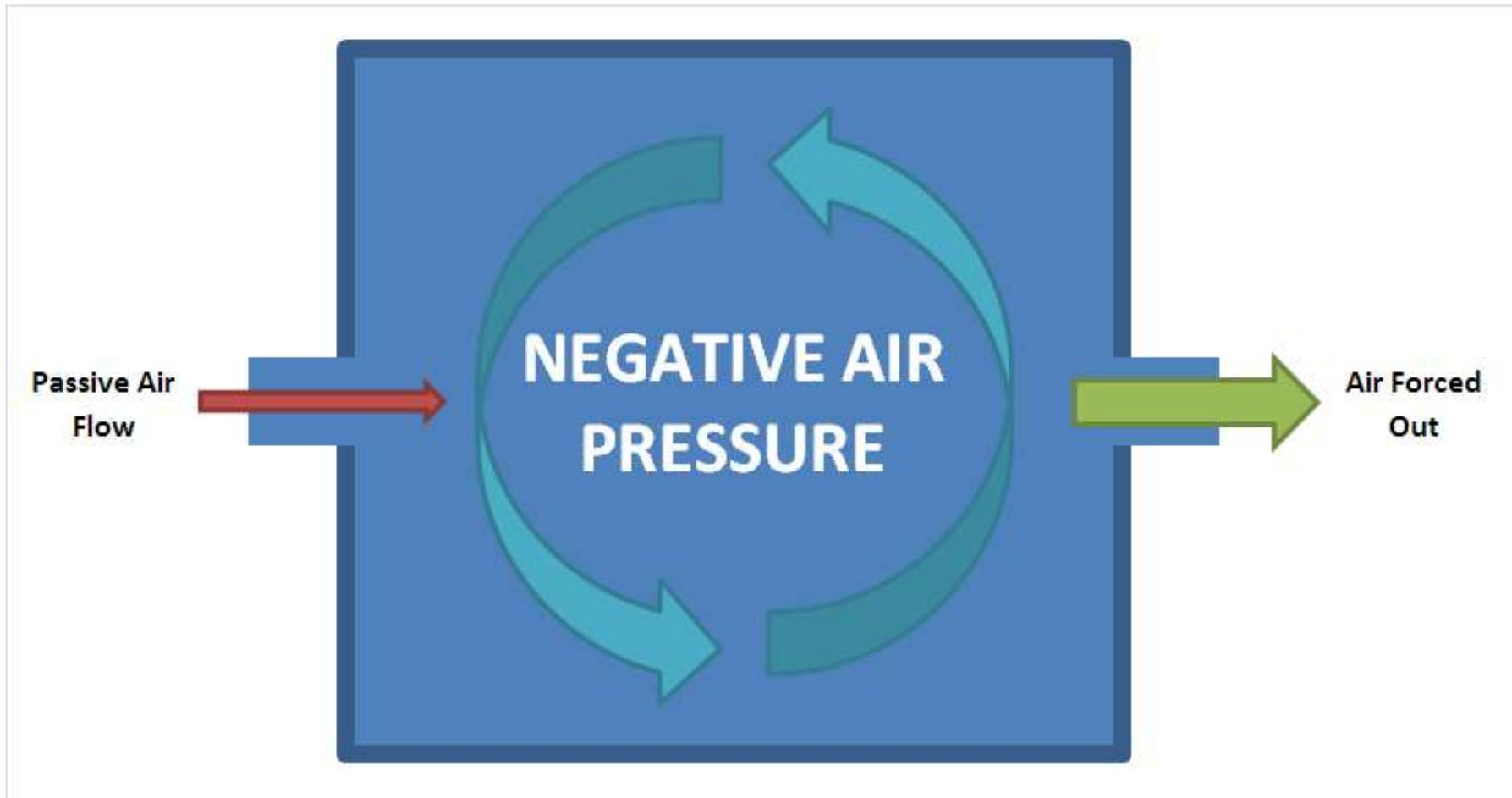
1. Containment (keeping under control) **laboratories**
2. **Microbiological safety cabinets**
3. **Proper ventilation**
4. **Partial isolation** of the contamination source,

Installation of **negative** pressure 

- ✓ Installation of **negative** pressure and **separate ventilation** and air conditioning system
- ✓ Use of **Ultraviolet** lamps can help contain the spread of contaminants
- ✓ Regular **cleaning** of the workplace,
- ✓ Pest prevention/extermination,
- ✓ Requiring that **safety equipment** be used
- ✓ Proper **storage**,
- ✓ Proper **transport**, and
- ✓ Proper **disposal**

of biologically **hazardous** materials and items that may **pose a biological risk.**





The internal air is forced out so that a negative air pressure is created pulling air passively into the system from other inlets.

B. Administrative Controls

- A. Engineering Controls
- B. Administrative Controls**
- C. Personal Protective Equipment

- ❖ are the second line of defence.
- ❖ One of the key methods of risk control in this category is;
- ❖ safe operating procedures.
- ❖ Employers must detail procedures and processes that should be followed in order to protect workers from biological hazard risks, including things such as where and where it is necessary for workers
- to wear gloves. (For a primer on safety gloves,
- Examples of other effective ways to use administrative



Examples of other effective ways to use administrative controls to manage biological hazards include:

A Comprehensive employee

1. **education and training**
2. Adequate **supervision**
3. **limiting** exposure to potential biological safety hazards
4. **Monitoring** exposure
5. **immunizations** providing immunization programs
6. **Generous sick leave policies** (*to discourage sick employees from coming to work*)
7. Clear **emergency procedures**

❑ Once administrative and engineering controls have been implemented

❖ it is important to REVISE all the safety strategy

➤ at least once a year and

➤ every time the workplace conditions change.

❖ For some workplaces, the changing of the seasons can affect these controls so

❖ it is important to Regularly Monitor The Biological Conditions that the employees are exposed to

C. Personal Protective Equipment

- ❖ Personal protective equipment (PPE) is the last line of defence against hazards, though it plays a critical role.
- ❖ If the contact with biological hazards cannot be prevented, the employees must use personal protective equipment and adhere strictly to the practice of personal hygiene.
- ❖ Examples of PPE to guard against biological hazards in the workplace include:
 1. Laboratory coats protective clothing
 2. Non-permeable gloves
 3. Eye protection eye shields
 4. Masks or respiratory protection face shields & shoe covers



Common protective equipment includes

:Respiratory protection

Using the appropriate **respiratory protective equipment** is important for the securing an adequate protection from biological hazards.

□ Surgical masks

Surgical mask generally consists of three layers of non-woven غير المنسوجة fabrics.

❖ It provides a **barrier** protection against **large** respiratory droplets;

❖ **N95** or higher level respirators

This type of **N95** ,respirator **filters out particulates** and **liquid droplets in small particle size**, therefore providing protection from inhaling aerosols and microorganisms that are airborne.





Protective clothing

includes protective coverall (with attached hood), gown, apron, head and shoe covers;

- ❖ Protective clothing should be **waterproof or impermeable** to liquids to **protect the body** *from contamination by blood, droplets or other body fluids* and **prevent these contaminants from getting into the body through open wounds or contaminating the worker's own clothing, thus reducing the chance of spreading of pathogen and cross-infection**
- ❖ Protective clothing is **disposable** in most cases though some can be **reused after sterilization**;
- ❖ Protective clothing **should fit the wearer** and
- ❖ **should not hamper**(obstruct) movement;
- Protective clothing should be **checked before use**
- ✓ and **replaced if damaged**;



- ❖ **Biologically contaminated** protective clothing should be
 - **disposed of** in specially designed rubbish bag marked
 - **with "biological hazard"** warning and label.

Seal the bag and place it in designated location for special disposal

Safety goggles/glasses and face shields



- ❖ can **protect the eyes** from contacting pathogen-carrying blood, droplets or other body fluids, *which may then enter the body through the mucosa*
- ❖ *hen enter the body through the mucosa*
- ❖ Both face shields and goggles/glasses should be
 - ❖ **cleaned with liquid soap** regularly.
 - ❖ If contaminated by blood, they should **be soaked in 1:49 diluted liquid bleach** and then rinsed with clean water.
- ❖ **Place them in plastic bags** after wiping dry and store them in a cabinet;
- ❖ **Check them regularly.**
- ❖ **Replace them** if out of shape, cracked, scratched or fogged



□ Gloves

- ❖ **Protect** *the hands* from contacting **blood, droplets, body fluids** and **other body tissue** of the infected, or pathogen-contaminated objects and
- ❖ **Can avoid infection** when touching the eyes, mouth or nose afterwards.
- ❖ also **protect open wounds** from contamination by pathogen;
- ❖ Most gloves are **disposable after** use;



□ Shoe covers prevent pathogens **from being carried outside** the workplace;

- Shoe covers are usually **disposable** after use;
- **Boot covers offer** further protection.

*Cover the boots with the **trousers of protective** clothing to **prevent contaminants from getting into the boots**;*

- **Shoe covers** should be **water resistant** and **skid proof**



- ❖ To ensure their protectiveness
- ❖ All personal protective equipment requires
 - correct selection and use, as well as
 - proper maintenance and storage.
- ❖ Re-useable protective equipment should be
 - cleaned and sterilized thoroughly before they are used again.
- ❖ Damaged items should be replaced immediately.

When using the complete set of protective equipment, medical personnel should follow strictly hospital guidelines on infection control.

❑ Other general **frontline workers** such as **cleaning staff** should follow order in putting on protective equipment.

❑ Sterilization

Sterilization is the process using

- **ultra heat** or **high pressure** to eliminate bacteria, or
- using **biocide** to eliminate microorganisms, including spores

❑ A complete sterilization process **should include**

- ✓ disinfecting the **contaminated premises** (building) and
- ✓ **thorough cleaning** of any **residual toxic** substances, to ensure that employees would not be harmed through exposure in the risk area

❑ There are many kinds of **sterilizing and antiseptic agents**,

❖ Effective sterilization depends on

- strain and **amount** of microorganisms, **properties** of the organisms
- the **level of organic material** present,
- i. the **duration**,
- ii. **temperature** and
- v. **concentration** of the sterilizing agent



❑ Sterilization must be carried out by following strictly safety guidelines and taking personal protection to safeguard the health and safety of employees.

❖ Personal hygiene

➤ Washing hands with liquid soap is the simplest and most basic method to avoid infection.

However, it is often neglected.

✓ Wash hands before and after work.

✓ Also wash hands immediately before and after wearing protective clothing, uniforms or gloves to reduce the possibility of infection

✓ Hands must be washed thoroughly after taking off any personal protective equipment



Hazard Control Plan

❖ Employers should have a **written plan** to

➤ Identify
➤ control, and
➤ manage

the biological hazards present in their workplaces.

❖ The plan should **be easily accessible** to employees

❖ and **outline**; what the **hazards** are,

❖ the **procedures** and **processes** that should be

❖ **used to control** or manage them, and

❖ the **training** employees require.

□ It should also clearly **articulate emergency**
procedures in case of exposure.

○ As with other health and safety plans,

□ biological hazard control plans **should be reviewed**

□ and **updated** regularly – at **least once per year**.



Preventive and control measures

- ❖ **Elimination of the source** of contamination is fundamental to the prevention and control of biological hazards.
- ❖ **Engineering controls** such as improvement of ventilation, **partial isolation** of the contamination source, **installation of negative pressure** and **separate ventilation** and **air conditioning system** (e.g. in medical wards for infectious diseases) and the use of **ultraviolet lamps** can help contain the spread of contaminants.
- ❖ If the contact with biological hazards cannot be prevented, the employees must use **personal protective equipment** and adhere strictly to the **practice of personal hygiene**.
The personal protective equipment includes masks, gloves, protective clothing, eye shields, face shields and shoe covers.

Thank You!



