



Primary Containment & Other Biological Hazard

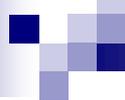
2018

Biological hazard Prevention and Control

- The first and the best strategy is to control and contain the hazard at the source

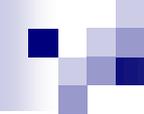
Step in Biological Hazard Prevention & control

1. Substitute hazardous material with non-hazardous material
2. Design facility (engineering control), use containment equipment (primary containment), or design process to remove the hazard or enclose the hazard to prevent exposure in normal operations



Biological Hazard Prevention and Control cont....

3. Where complete enclosure it not feasible, establish barriers or local ventilation to reduce exposure to the hazard in normal operations (PPE)
4. Work environment and the job itself should be designed to eliminate hazards or reduce exposure to hazards



Primary Barrier

■ Primary Containment Equipment

- Primary containment contain the agent at the source
- Biological Safety Cabinet, Fume Hood, Glove Box, Animal Housing, Centrifuge

■ Personal Protective equipment (PPE)

- PPE (Gloves, laboratory clothing, respirator etc..)
- PPE do not contain the hazard but protect the person from exposure the hazard

Secondary containment / Barrier

■ Engineering control

- Structure surrounding the primary barrier
 - Room, facilities...
- Basic Laboratory
- Containment Laboratory

■ Tertiary containment / Barrier

- Area beyond the containment laboratory
 - Fence, corridor, building etc.
 - Significant and only high risk work

Hierarchy of Controls

TERTIARY CONTAINMENT

Area beyond the containment laboratory
Fence, corridor, building

SECONDARY CONTAINMENT

Laboratory, Facilities, containment laboratory
Engineering control

PRIMARY CONTAINMENT

BSC, Fume hood,
Centrifuge cups, room etc

PPE

1^o Barrier
Gloves, Gown,
work practices etc

Personal Protective Equipment

- To protect the wearer from hazards, e.g. chemicals, dust, noise, infectious agents
- To prevent contamination of wearer and the product
- Minimize risk of exposure to aerosols, splashes and accidental inoculation



PPE- Laboratory Clothing



BSL-1 & 2
Front fastened lab coats
allowed

BSL-3
Wrap around gowns with
tight cuffs



BSL-4
Positive pressure suits



PPE-Footwear

- Open-shoes and sandals not acceptable for work with infectious materials including BSL-1
- Use shoes with good non-slip soles
- Shoe covers add protection
- Rubber boots with good soles required if area is wet



PPE-Gloves

- **Vinyl gloves**- Sensitive touch. Excellent gloves for handling chemicals and specimens during fixation and embedding



- **Nitrile gloves**- made from a synthetic latex. For users who are extremely allergic to the protein found in natural latex.



- **Latex gloves** (powdered or powdered free)- Provides sensitive touch



Choose the right size for a good feel and grip

Removing Gloves Safety

You can get contaminated while removing gloves!



1. Grab the first glove on the outer surface at the wrist



2. Pull the glove back onto itself so that when it is completely removed it will be inside out



3. Remove the other glove by slipping your bare fingers inside the glove, and pulling it off so that it is also inside out when completely removed

Wash your hand after removing gloves!!!

The wrong way using gloves can spread contaminant



Eyes and Face protection

- Goggles, safety glasses to protect the eyes
- Full face shield to protect facial skin protect eyes from splashes



Respirators

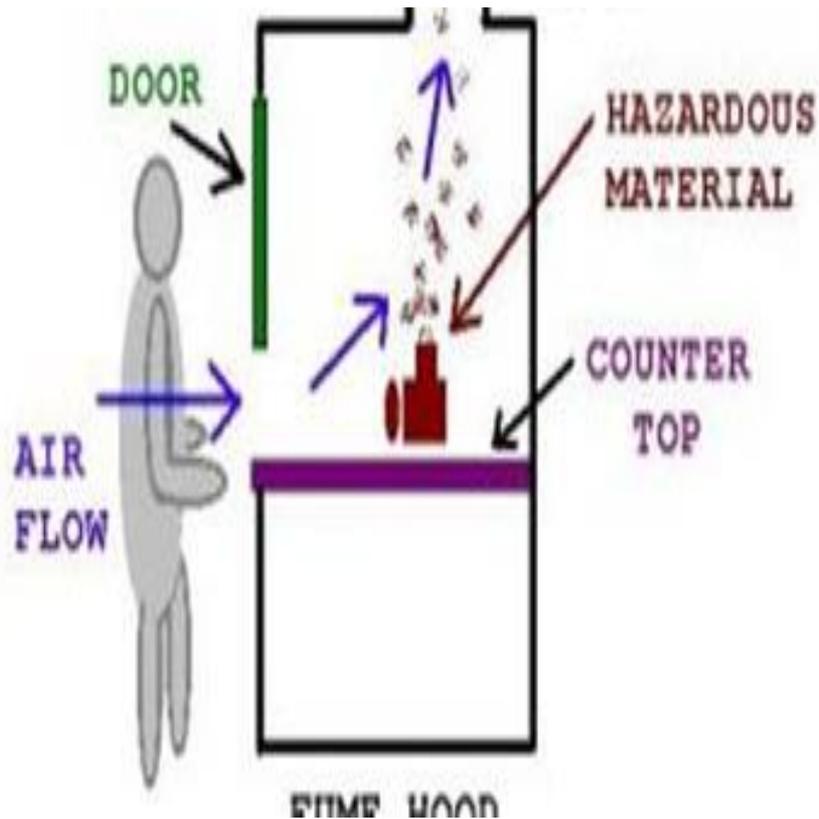
- Air Purifying and reduces aerosol inhalation
 - Must have a proper fit lest for N-95 mask
 - Powered –PAPR
- Air supplying
 - Air supplied from safe area
 - Supplied Air Respirator (SAR)
 - Air line and + pressure
 - Self Contained Breathing Apparatus
 - Consider for use in BSL-3 lab animal facilities (rabbit, etc)



Primary Containment & Ventilation Equipment

	Personnel	Product	Environment
Chemical Fume Hood	X		
Laminar Flow Clean Bench		X	
Class I BSCs	X		X
Class II BSCs	X	X	X
Class III BSCs	X	X	X
Isolators	X	X	X

Chemical Fume Hood

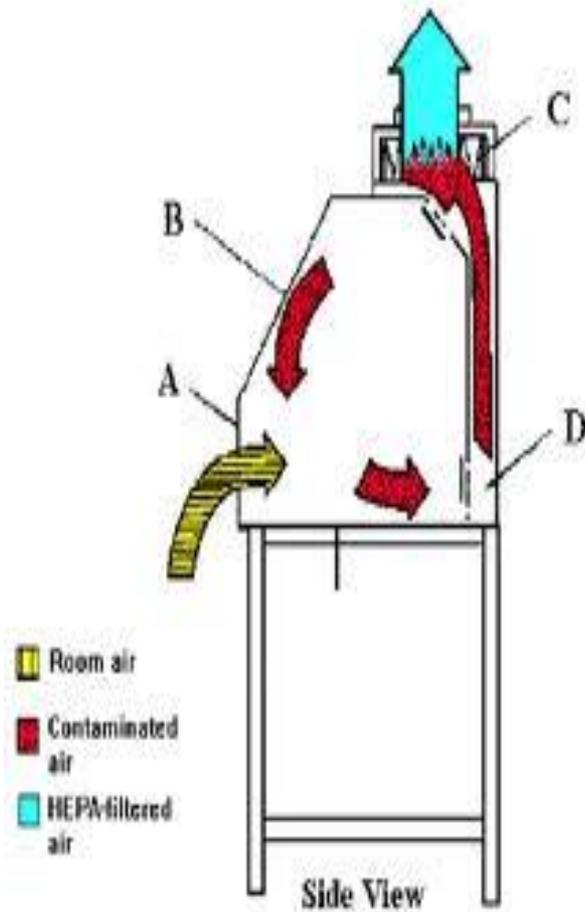


Laminar Flow Clean Bench



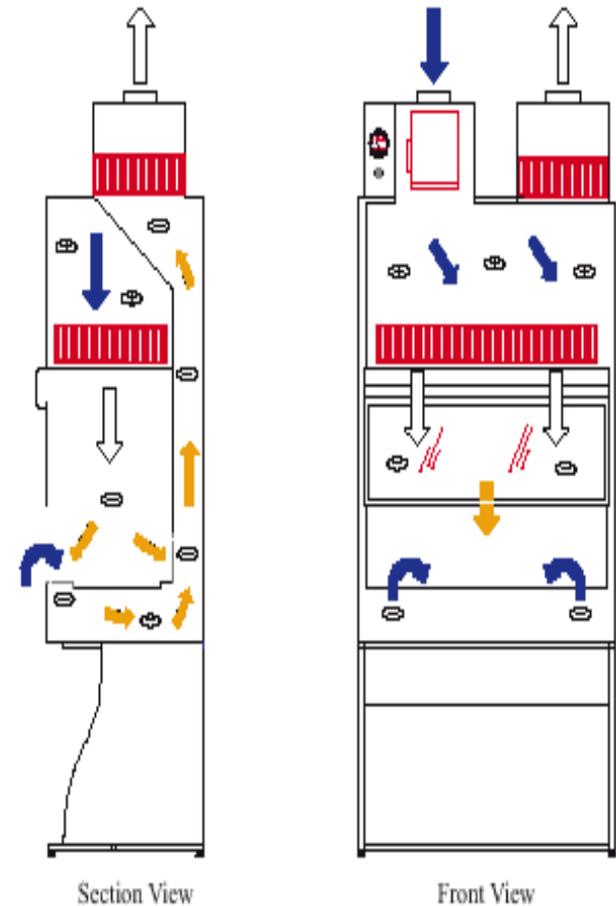
Class I BSCs

Class II BSCs

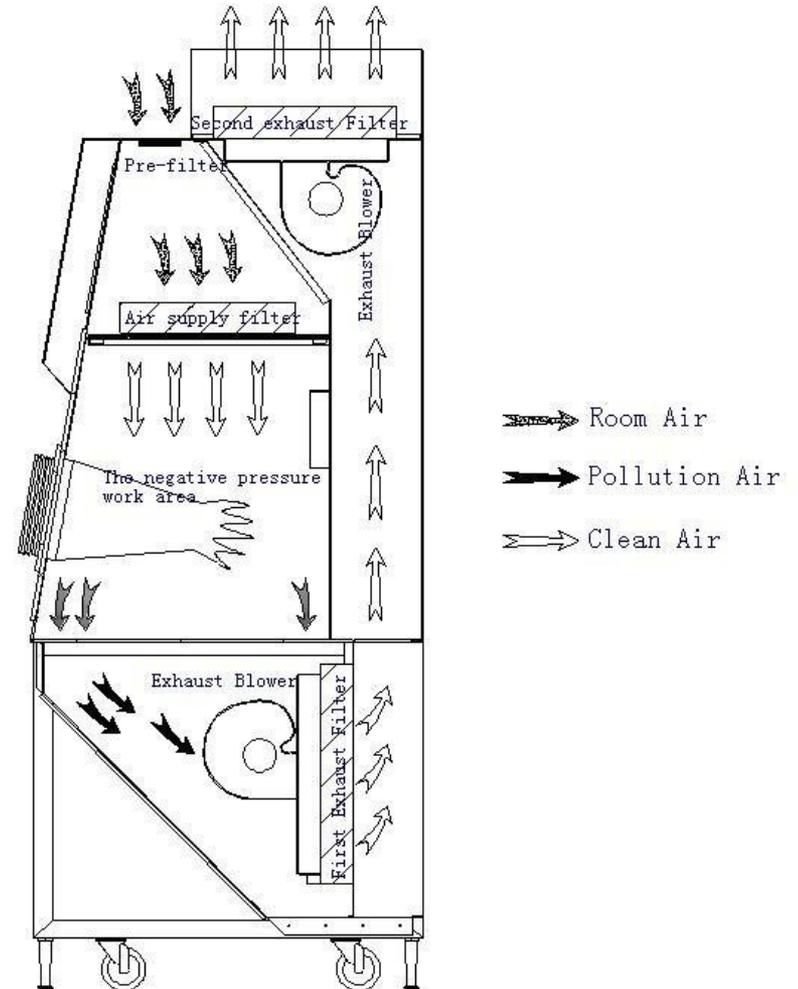


- Room air
- Contaminated air
- HEPA-filtered air

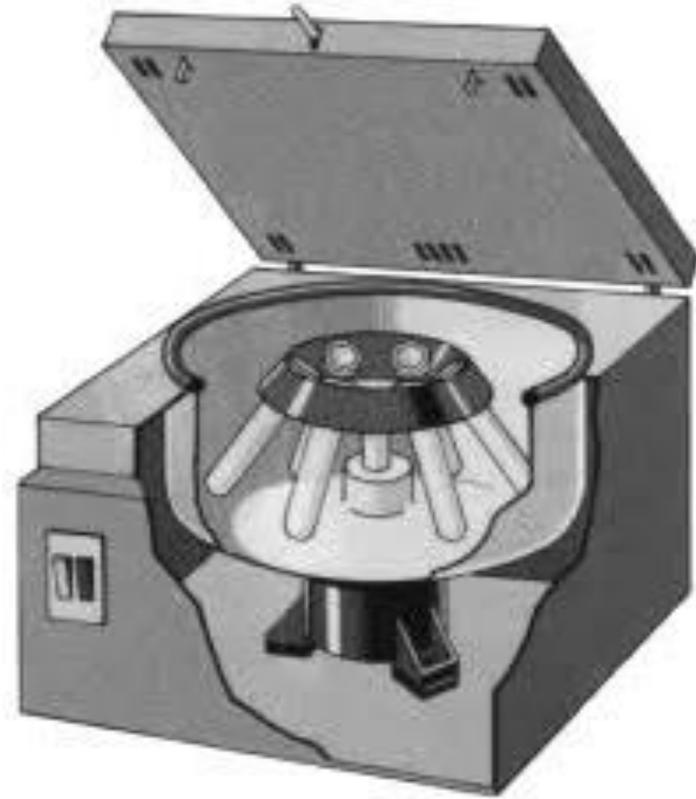
- HEPA filter
- Room Air
- Potentially contaminated air
- HEPA Filtered air
- Positive pressure
- Negative pressure



Class III BSCs & Isolators



Primary containment & Centrifuge



Factor to consider when using centrifuge

- Risk group agent?
- Route of transmission of agent?
- Volume to be centrifuged?
- Where will the tubes be filled?
- How will the rotor be loaded / unloaded from the centrifuge?
- Emergency response what happens if a tube breaks in centrifuge?



Procedures for Safety use of the centrifuge

- Always use safety cups and rotors
- Load/unload rotor in BSC
- Don't overfill tubes
- Clean and maintain gaskets and O rings
- Decontaminate centrifuge and buckets if leakage occurs
- If tube breaks in cycle wait minutes for aerosols to clear before opening



Use the right centrifuge tubes, rotors, rotor cover, o-ring etc..

Check for visible crack



Accident can happen



Other Hazards in Biological Laboratory

2018

Fire Hazard



Managing fire safety

- Develop fire safety policy
- Define role and responsibilities
- Develop and implement fire safety guidelines
- Training and refresher course (theory and practical)
- Encourage external fire safety qualifications and certifications



Managing fire safety

- Evacuation procedures
- Fire safety signage and notice
- Regular maintenance of fire fighting equipment
- Regular audit and inspection
- Good housekeeping to prevent obstruction



Electrical Hazard

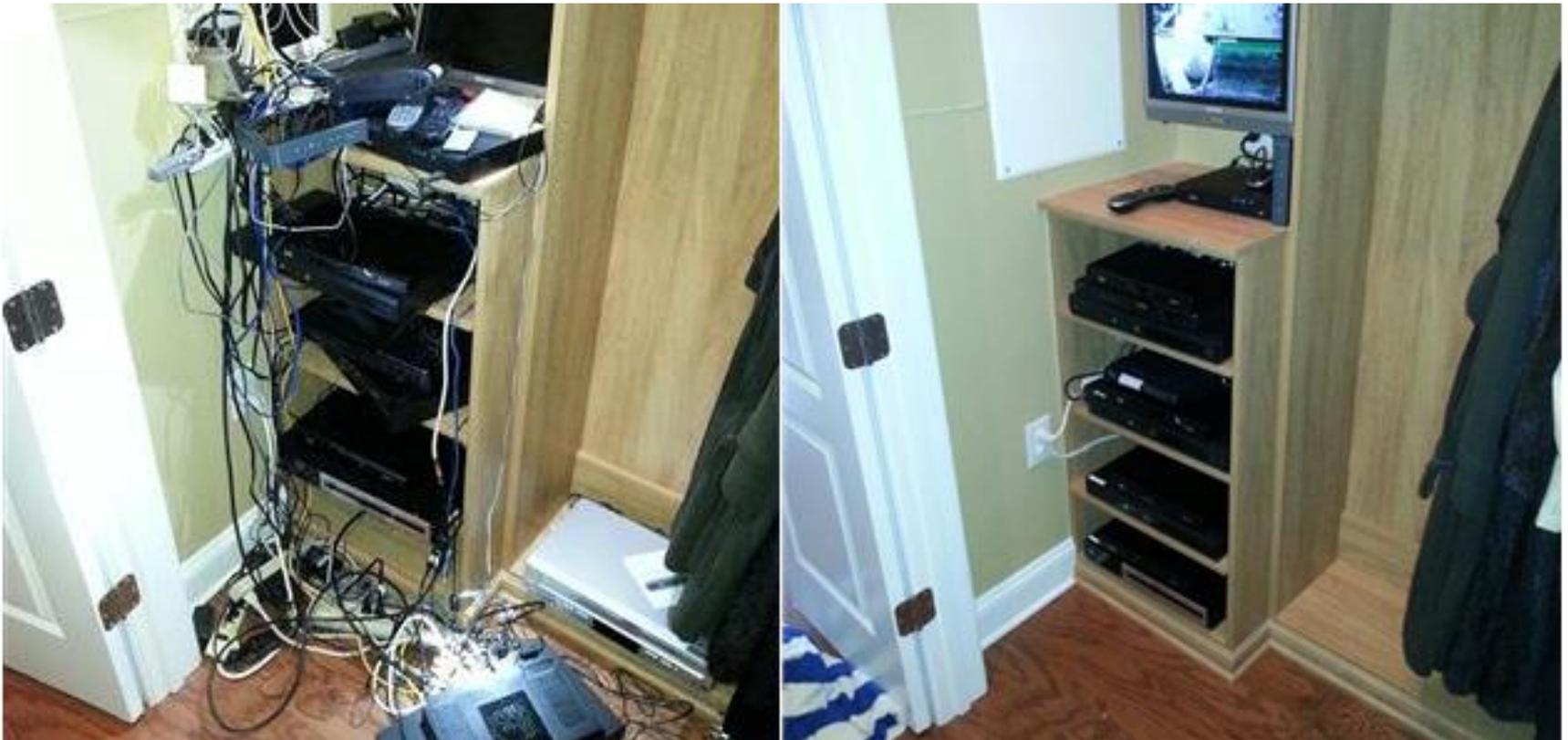


General Principles

- Faulty electrical appliance is one of the leading causes of fire in workplaces
- Each electrical point has maximum capacity for loading
- Check the equipment before use
- Understand the functions of the equipment
- Do not overload the electrical circuits



Good housekeeping Matters.....



Chemical Hazard

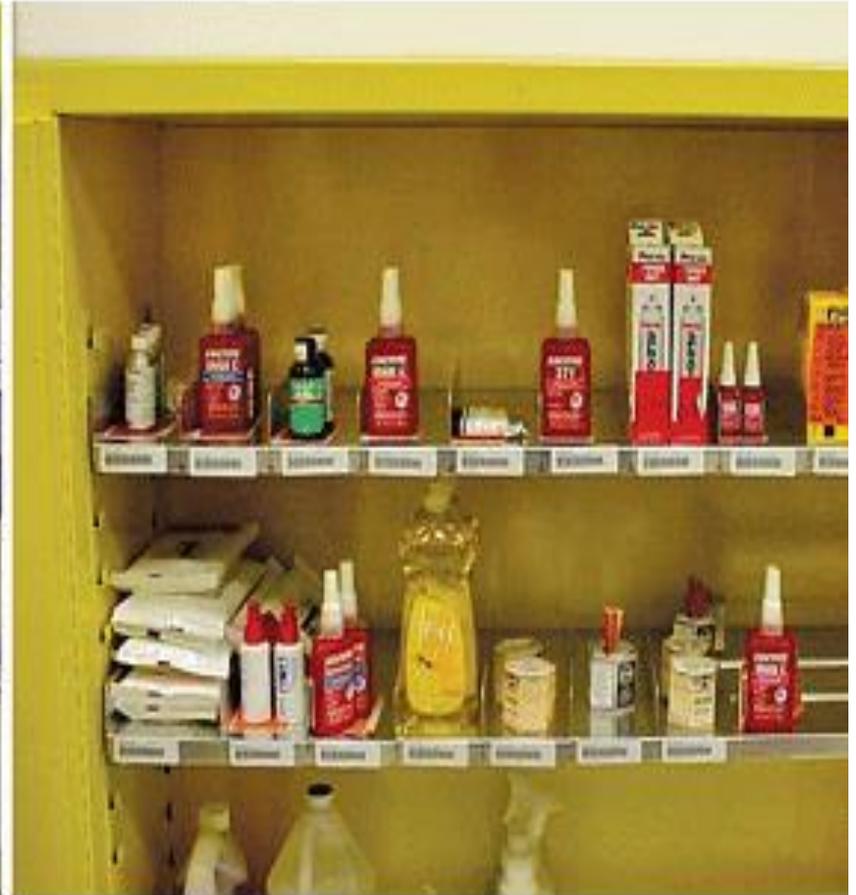
- Flammability
- Explosives
- Corrosively
- Reactivity



Good housekeeping Matters.....



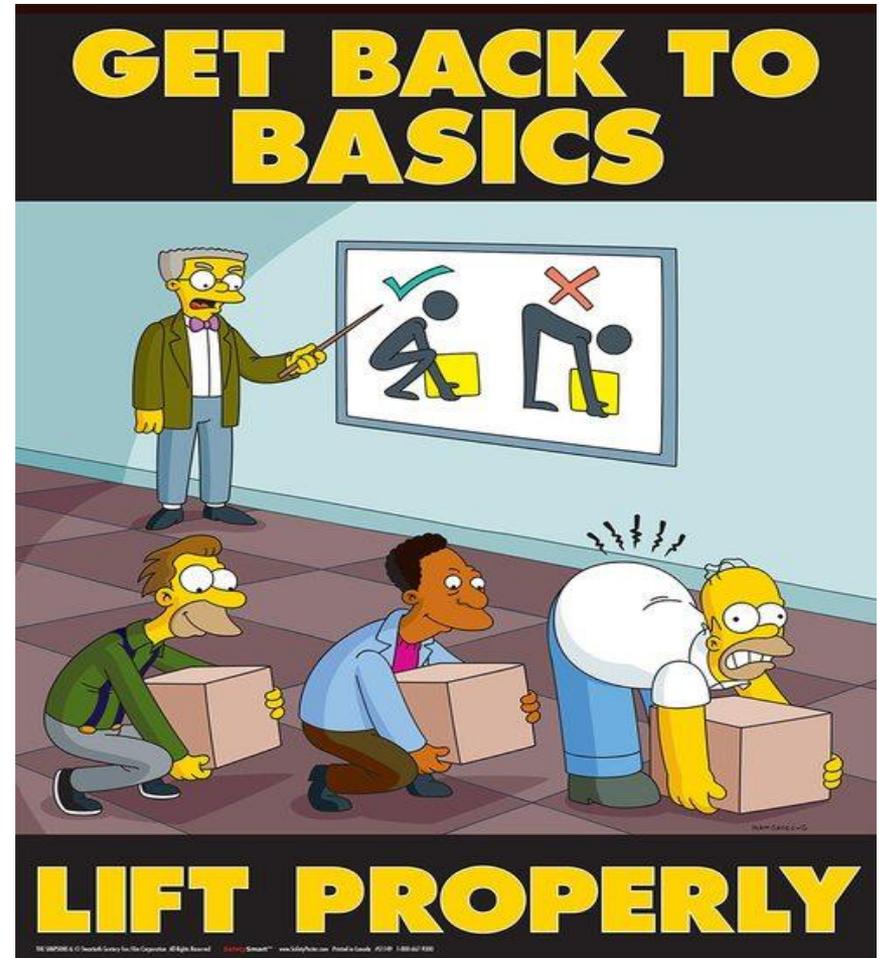
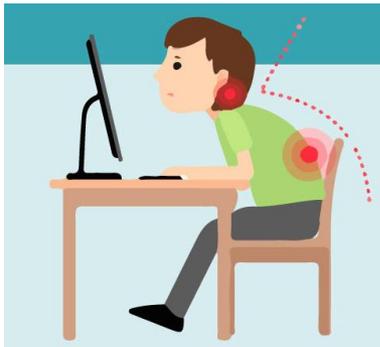
Before



After

Physical Hazards

- Lifting
- Slips
- Noise





**Thank you for your
attention**