Laboratory Safety Audits – Improving Safety Practices and Occupational Safety

Dr. Juhee Chandra

Safety in Medical Laboratories

- For lab staff
- For patients
- Attendants
- Visitors

Risk To Technicians & other Fellow Workers

Biosafety

Chemical Safety

Electrical Safety

Mechanical Safety

Fire Safety

Lab safety audit is important for

- Risk identification
- Regulatory compliance
- Improving safety culture
- Resource optimisation

Risk identification

It helps to identify potential hazards which may lead to injuries ,accidents and severe fatalities

Preparing for the audit

- Identify the safety team
- Review previous audit reports
- Prepare a checklist
- Communicate with the lab staff

Laboratory Safety Training

Are all lab personnel, students, and working visitors trained on experiments and/or procedures that are being performed in the laboratory?

Because only then risk can be assessed and mitigated

General safety

- Are any food and drinks present in the lab
- Do all aisles within the laboratory space(s) have sufficient width of 36” for passing?
- Any any doors or corridors obstructed
- Are stickers/signs posted to reflect the appropriate hazards on all laboratory equipment?

Emergency Procedures

1.Are laboratory personnel aware that they are to report all needle sticks and cuts

2. Are laboratory personnel aware of the Emergency Preparedness Guide, which includes the chemical spill procedures?

Laboratory Emergency Equipment

- Safety Showers
- Eyewash Stations
- PPE
- Fire alarm pull station, fire extinguisher and exit stair tower
- Emergency gather point
- Presence of MSDS fact sheet
- Chemical spill kit

Chemical Safety

Have all individuals working in the lab been educated about the chemical hazards present within the lab space(s)?

Has a risk hazard assessment been conducted for all chemicals, substances and processes that pose a physical risk and/or health hazard?

Are Safety Data Sheets (SDS) readily accessible to lab personnel for ALL chemicals/substances present in the lab space(s)?

Are chemicals, including chemical waste, properly labeled and stored by hazardous class and compatibility?

5. Are flammable chemicals, including chemical waste, being stored in an approved storage room or flammable liquids cabinet?

6. Are all chemical waste containers closed, labeled appropriately, and stored in secondary containment?

7. Is the lab properly disposing of chemical waste ?

Biosafety

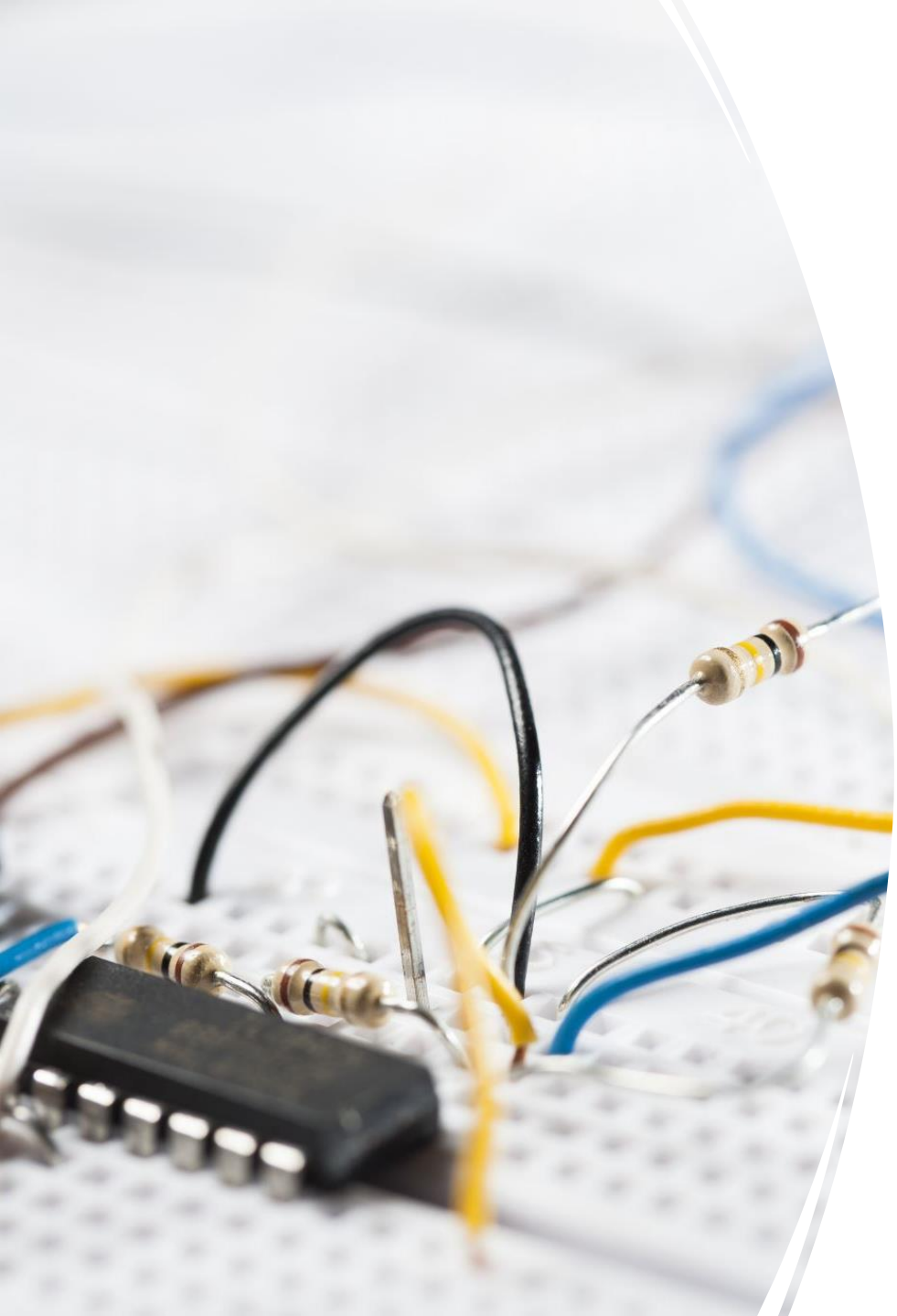
- Biohazard symbol should be used on all container/equipment containing biohazardous material
- Laboratories should ensure proper preservation and security of specimens
- Destruction/disposal of hazardous material should be authorized, supervised and handled according to standard procedures

Biosafety

Four levels of biosafety laboratories (BSL) - 1, 2, 3 and 4, have been designed for handling biohazardous material

Usually higher level of biosafety is required while carrying out procedures using higher risk group organisms

However, certain procedures which generate high concentration of a low risk organism, may also necessitate the use of higher level of biosafety eg. generation of aerosols



Electrical safety

- Laboratories are full of complex equipment. If it is improperly maintained or worn out, this equipment can pose a safety hazard
- Although some hazards, such as frayed electrical wires and damaged plugs, are not unique to laboratories, they are serious hazards
- Equipment that uses higher voltage or current presents a particular hazard. Most are aware that water and electricity don't mix.

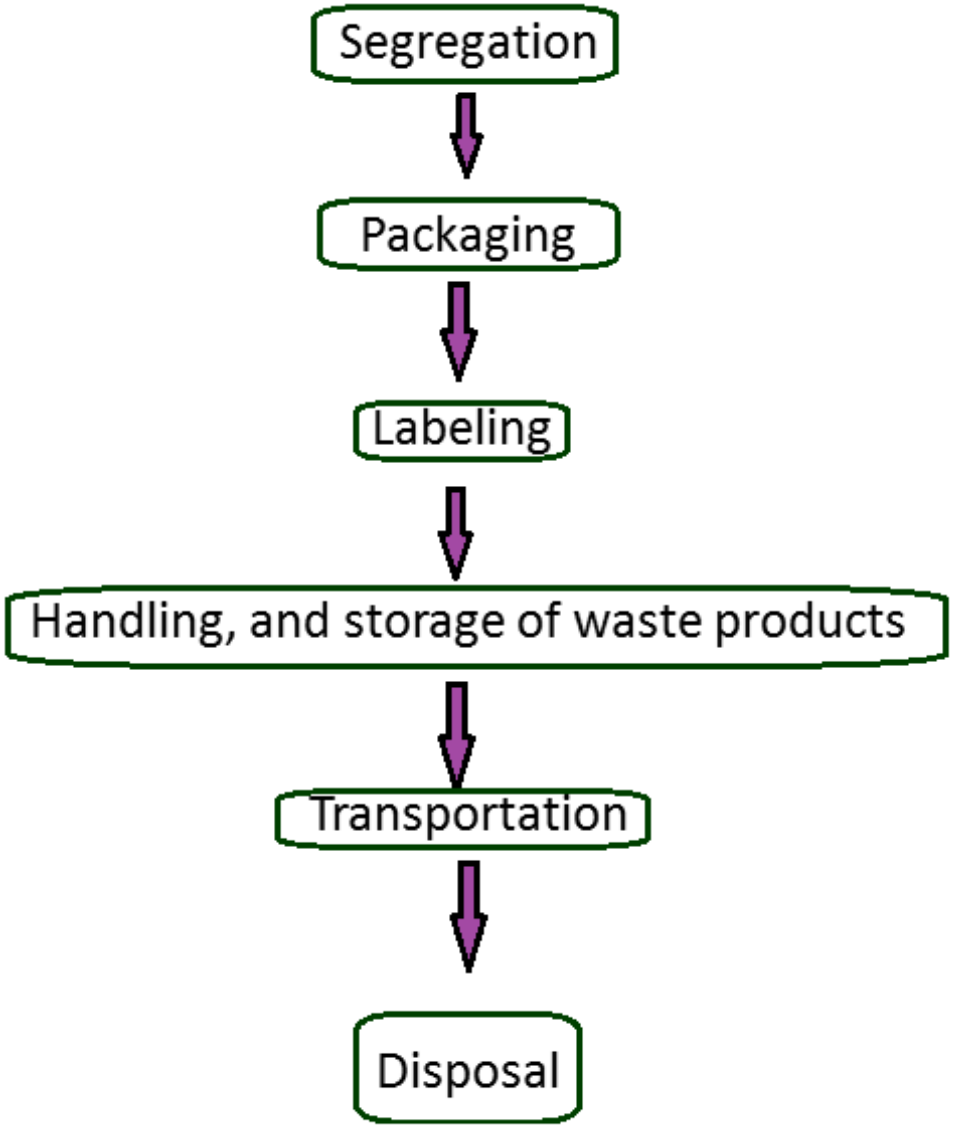
Mechanical safety

- No one should operate any equipment in lab unless trained and authorized to do so by the laboratory director
- Mechanical hazards are also present in laboratories. Rotating equipment, in particular, can entangle clothing, hair or hands
- If a centrifuge is not properly cared for, the rotor can fracture and the fragments become lethal projectiles

Fire safety

- Laboratory personnel should be thoroughly trained in managing fire, and non-fire emergencies such as large spillage, gas leakage etc
- Adequate fire extinguishers should be readily available in the laboratory and periodically checked
- Employees should familiarize themselves with the location of safety devices (i.e., fire extinguishers, pull alarms, safety showers, fire blankets, etc.) before an accident occurs.

BIOMEDICAL WASTE MANAGEMENT PROCESSES



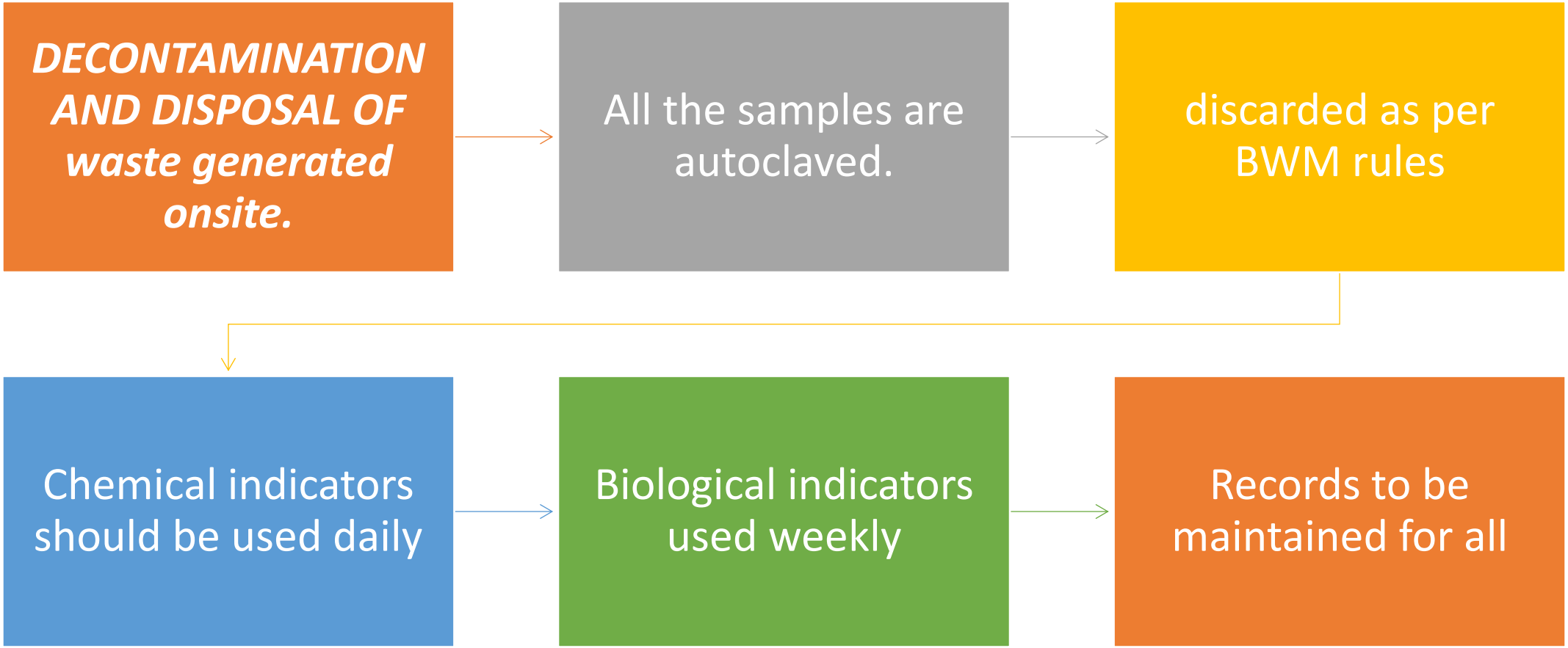
Roles & Responsibilities of Safety Officer includes following but not limited to

- Daily inspection of waste segregation and reporting
- Supervising the maintenance of registers
- Ensure availability of equipment like needle cutters, autoclaves and sterilizers, waste, carrying trolleys, personnel protective gears (masks, apron, gloves etc.) and other materials like bleaching solution or hypochlorite solution

CLEANING & DISINFECTION OF WORK AREA

Counter tops, work surfaces, laboratory equipment, etc. must be cleaned with disinfectant 1% Sodium hypochlorite solution (freshly prepared) before and after each testing of working bench.

PROCEDURE FOR DECONTAMINATION AND DISPOSAL OF BMW



Safety audit checklist

A. ***General Work Environment***	**Y**	**N**	**NA**	***Comments***
1. Work areas illuminated				
2. Storage of combustible materials minimized				
3. Waste removed properly or not				
4. All the aisles and passageways kept closed				
5. Heavy items are stored in lower shelves				
6. Materials to pick up the items placed in heights available				
7. Exits				
Signs displayed				
Paths free from obstruction				
Alternate exits available				
Fire doors not blocked				
Doors not locked				
8. Pits / floor openings covered and guarded				

B.	Emergency Planning
1.	Fire extinguishers mounted near doorway
2.	Fire extinguishers unobstructed
3.	Fire extinguishers gas replaced
4.	Fire extinguishers tamper indicator in place
5.	Eyewash and emergency showers available
6.	Fire alarms available
7.	Emergency lights functional
8.	Fire extinguishers inspected
9.	Eye wash stations/emergency showers inspected
10.	Spill control plan and spill kits available

C.	*Required information / posters*
1.	Emergency action plan available
2.	Material safety data sheets readily available
3.	Chemical hygiene plan available
4.	Respiratory protection procedure available
5.	Documentation of personal protective equipment
6.	Hazard assessment and training
7.	Emergency contact numbers- correct
8.	Emergency evacuation routes posted

D.	*Personal Protective Equipment*
1.	**Eye and face protection available where necessary**
	Goggles and face shields for corrosives
	Glasses in case of possibility of spill
2.	Areas where eye protection required is posted
3.	Open toed shoes not allowed
4.	Appropriate respirator used wherever necessary

E.	*Electrical hazards*	Y	N	NA	*Comments*
1.	Electrical cords in position				
2.	Cover plates for outlets and switches				
3.	Equipment accessible panels available				
4.	No exposed electrical cords				
5.	Multiplug adapters have overload protection				
6.	Appropriate earthing in place				

F.	CHEMICAL STORAGE
1.	Shelves adequate for chemicals stored
2.	Refrigerators for chemical storage labeled as no food
3.	Refrigerators for food are labeled as food only
4.	Chemical storage areas properly labelled
5.	No volatile chemical storage in unventilated room
6.	Containers clearly labelled with chemical names
7.	Containers kept closed except during use
8.	Containers compatible with chemicals stored
9.	Heavy containers stored in lower shelves
10.	Corrosives not stored above eye level
11.	Storage quantities adequate – not in excess
12.	Materials expired are disposed as per manufacturer’s instructions
13.	Before leaving instructions are posted and available

G.	*Flammable liquids*
1.	Used in well ventilated areas
2.	Flammables separated from strong oxidizers
3.	Class A,B,C or B,C fire extinguishers are available
4.	Flammable liquid not stored near ignition sources

H.	Compressed gases	Y	N	NA	*Comments*
1.	Used in well ventilated areas				
2.	Minimize storage quantities				
3.	Regulators compatible with gas cylinders				
4.	Cylinder carts used for transport				
5.	Protective valve caps in place				
6.	Empty or unused gas cylinders are promptly returned back to the supplier				

I.	*Cryogenics*
1.	Personal protective equipment used to avoid skin contact
2.	Chemicals used in areas with good ventilation
3.	Containers vented or pressure relief devices provided

J.	*Waste disposal*
1.	Containers kept closed except during transfer
2.	Containers color coded accordingly
3.	Separate containers available for broken glass
4.	All containers are compatible with waste
5.	Storage allowed as per limits defined

K. Ventilation

1. Corrosive materials used in areas of good ventilation
2. Chemical storage limited to good ventilated rooms
3. Other local exhaust devices inspected regularly

L. Pressure / Vacuum systems

1.	System components properly designed
2.	Pressure release devices provided and inspected
3.	Corrosion prevention considered
4.	Standard operating procedures available
5.	Inspection/maintenance procedures in place
6.	Failure analysis and hazard control documented
7.	Operators trained and authorized

M. Security

1.	Doors to the lab operate, lock and close properly
2.	Windows operate, lock and close properly
3.	Alarm systems are functioning properly
4.	Keys and access cards are kept in secure areas out of sight

N.	*Training*
1.	Laboratory safety training provided to all staff
2.	Emergency action plans available to all staff
3.	Laboratory security training provided to all staff
4.	Laboratory orientation training provided to all staff
5.	All trainings documented

O.	AWARENESS
1.	What to do in emergency including evacuation plan
2.	How to clean blood/chemical spills
3.	Location/contents of Chemical Hygiene Plan
4.	Safety Officer familiar
5.	MSDS – Location, use and other safety information
6.	Personal protective equipment to be used – when/where
7.	Handling chemical waste
8.	Most hazardous materials used and precautions taken
9.	Carcinogenic,highly toxic chemicals used
10.	Where and how to use emergency equipment-eye wash,emergency showers,fire extinguishers
11.	Handling unfamiliar visitors of lab
12.	Aware of laboratory safety policy
13.	Anyone in lab is conducting unauthorized research activity
14.	Report suspicious or unusual conditions and security incidents to public safety

Thank you for your time and attention