

SAFETY IN MEDICAL LABORATORY

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FROM:

DFK HAEMATOLOGY

OUTLINE

- SAFETY DEFINED
- A TYPICAL SCENARIO ON SAFETY
- PLACE OF SAFETY IN QMS
- LABORATORY DESIGN
- LABORATORY SAFETY MEASURES

SAFETY DEFINED

- **S** = Security of self, patients and co-workers from hazards
- **A** = Activities without accident
- **F** = Facility specially designed for optimal protection/safety
- **E** = Expert handling in case of safety issues
- **T** = Trained, training and retraining personnel on handling safety issues
- **Y** = Yield of quality without compromise of safety

Scenario

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- ❖ **Federal Teaching Hospital is one of the HIV/AIDS and SARSCOV-02 diagnosis and treatment centres.**
- ❖ **There is a global epidemic of SARSCOV-2 and Nigeria was not exempted. The Federal Ministry of Health named our laboratories as the reference laboratories for processing all samples.**
- ❖ **What safety practices would you adopt in your laboratory?**

WHY LABORATORY SAFETY?

- It is one of the 12 key essentials of quality management system and the other eleven revolves round it.
- Possibility of laboratory accidents (physical, chemical, biological, electrical , allergic and fire etc accidents)
- Possibility of irreparable damage
- Loss of hospital property
- Loss of life

WHY LABORATORY SAFETY?

- **EXPOSURE: MLS/MLT can be directly affected on exposure to**
- **Chemical hazards** (improper handling of toxic, corrosive, inflammable, explosive chemicals)
- **Biological hazards** (risks of contracting blood-borne infections)
- **Physical hazards** (noise, poor posture, exposure to explosive or inflammable lab. reagents)
- **Safety hazards** (failure to disconnect unused laboratory equipment after work, improper handling of hot sterilized items, shock, electrocutions et cetera)
- **Allergy hazards** (most common is latex allergy)

Secondary effects of a laboratory accident

- loss of staff confidence
- loss of reputation
- loss of patients
- increased costs → litigation, insurance



Negligence of laboratory safety is costly!





IS RESPONSIBLE FOR QUALITY AND SAFETY



MANY HANDS MAKE BRIGHT WORK

Collaboration at the Crick

**All diagnostic
and health care
laboratories
must be designed
and organized for
Biosafety level 2
or above**



Laboratory design

- **Path followed by the sample:**
 - Reception and registration of patients
 - Phlebotomy unit: Sampling
 - Dispatch between different laboratories
 - Analysis of samples
- **Post-analytical documentation**
- **Release of Results to the reception**
- **Dispatch from laboratory to requesting physician**

Reception/Sample Registration



Ideal Situation

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An Ideal Phlebotomy Unit



An Ideal Reception/Sample Registration Unit

LABORATORY SAFETY

MEASURES:

THE MLS/MLT'S PART

Safety during Analysis

- **No unauthorized persons**
- **No friends**
- **No children**
- **No animals**

Please
CLOSE

the DOOR

With proper label of OUT OF
BOUND to UNAUTHORISED
PERSONS



Safety During Analytical Phase: MLS/MLT'S Part (Staying safe means)

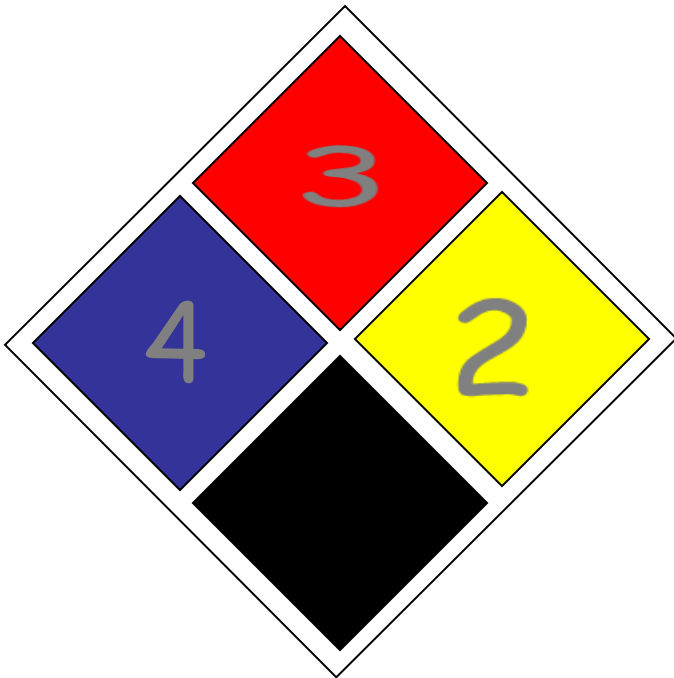
- Use your PPE
- Clean your workbench
- Wear close-toe, close-heel shoes, and earing aid (where there is noise)
- Pack your hairs properly
- Observe general safety precautions
- Read safety manuals, SOPs and material safety data sheets (MSDS)
- Remember emergency procedures
- Enroll for training for update

Safety During Analytical Phase: MLS/MLT'S Part (Staying safe means)

- Recognize health hazards indicated on chemical labels (corrosive, toxic, hepatotoxin, nephrotoxin, neurotoxin, highly toxic, reproductive hazard, carcinogenic et cetera)
- Know the precautionary measures to take while handling them.
- Know the common signal words on reagent/chemical labels (Danger, warning, caution)

Color and Number Coded Label Systems

NFPA-type label



Colors represent kind of hazard

- Red = fire
- Yellow = instability
- Blue = health
- black = specific hazard & personal protection

Numbers show degree of hazard

- 0 = Minimal
- 1 = Slight
- 2 = Moderate
- 3 = Serious
- 4 = Severe

Material Safety Data Sheets (MSDS)

Provides more **detailed information** about a chemical, including

- **Composition**, information on ingredients
- **Hazards** identification
- **First aid** measures
- **Accidental Release** measures
- **Handling** and **Storage**
- Exposure controls, **personal protection**
- **Stability** and **reactivity**
- **Toxicological** information



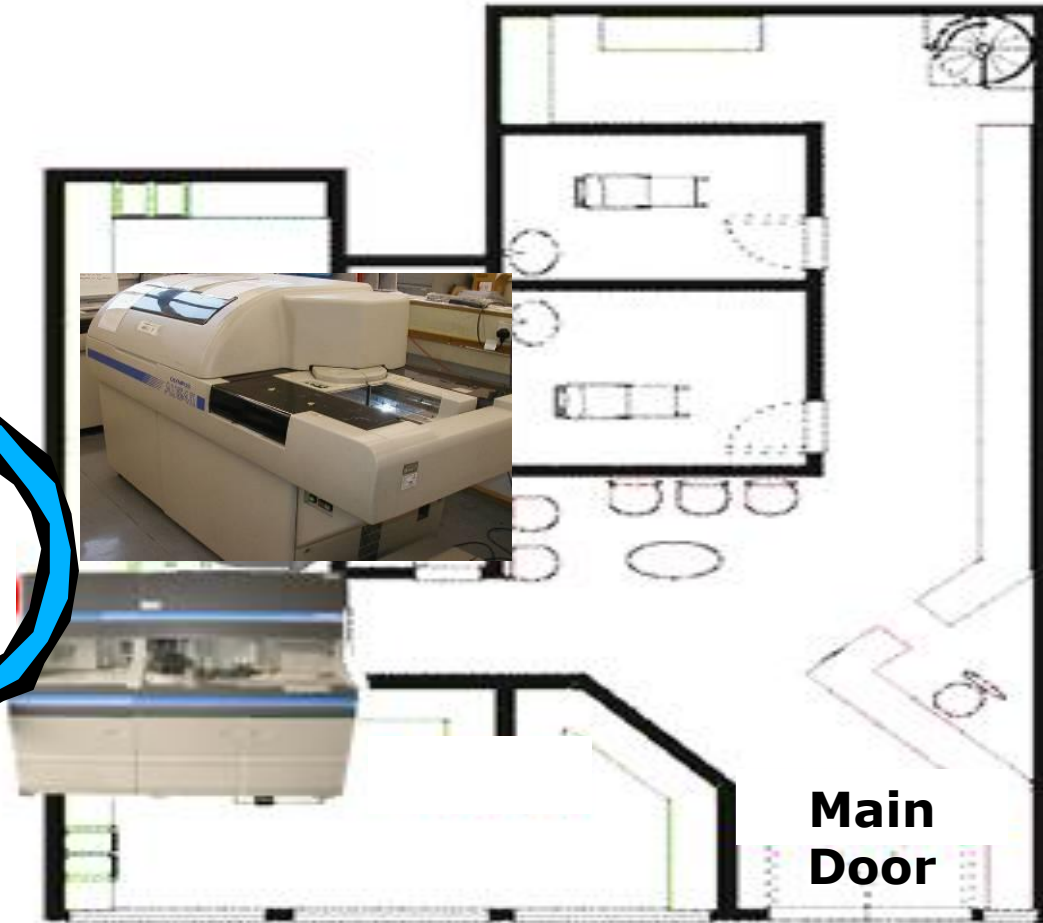
DEDICATED STORE 1

Dedicated Store 2: What do you think is right/wrong?



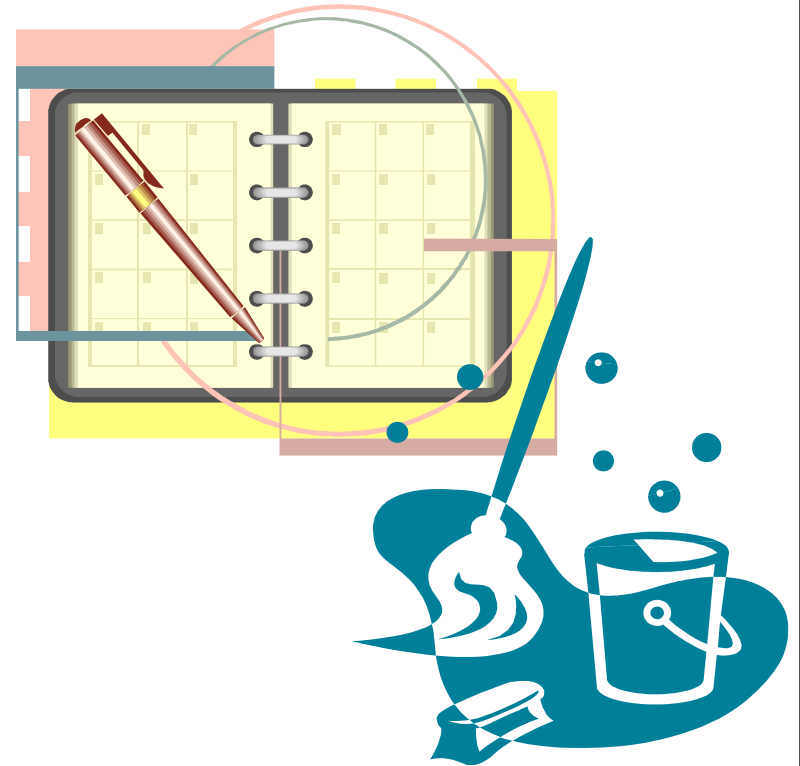
Doors and large equipment

Blood clotting



Scheduled Cleaning

- **daily**
 - bench tops
 - floors
- **weekly**
 - ceiling and walls
- **other**
 - refrigerators
 - freezers
 - storage areas
- **record date and cleaning staff**



Proper Safety Management

- Responsible: Safety Officer
- Safety Manual: laboratory-specific
- Standard Operating Procedures
- Material Safety Data Sheets
- Trained personnel
 - potential risks
 - safety procedures
- Waste Management

General Safety Equipment



shower

eye washer



fire safety



PPE



Waste Disposal

Standard Safety Practices

DO NOTS-



Standard Safety Practices

DOs-



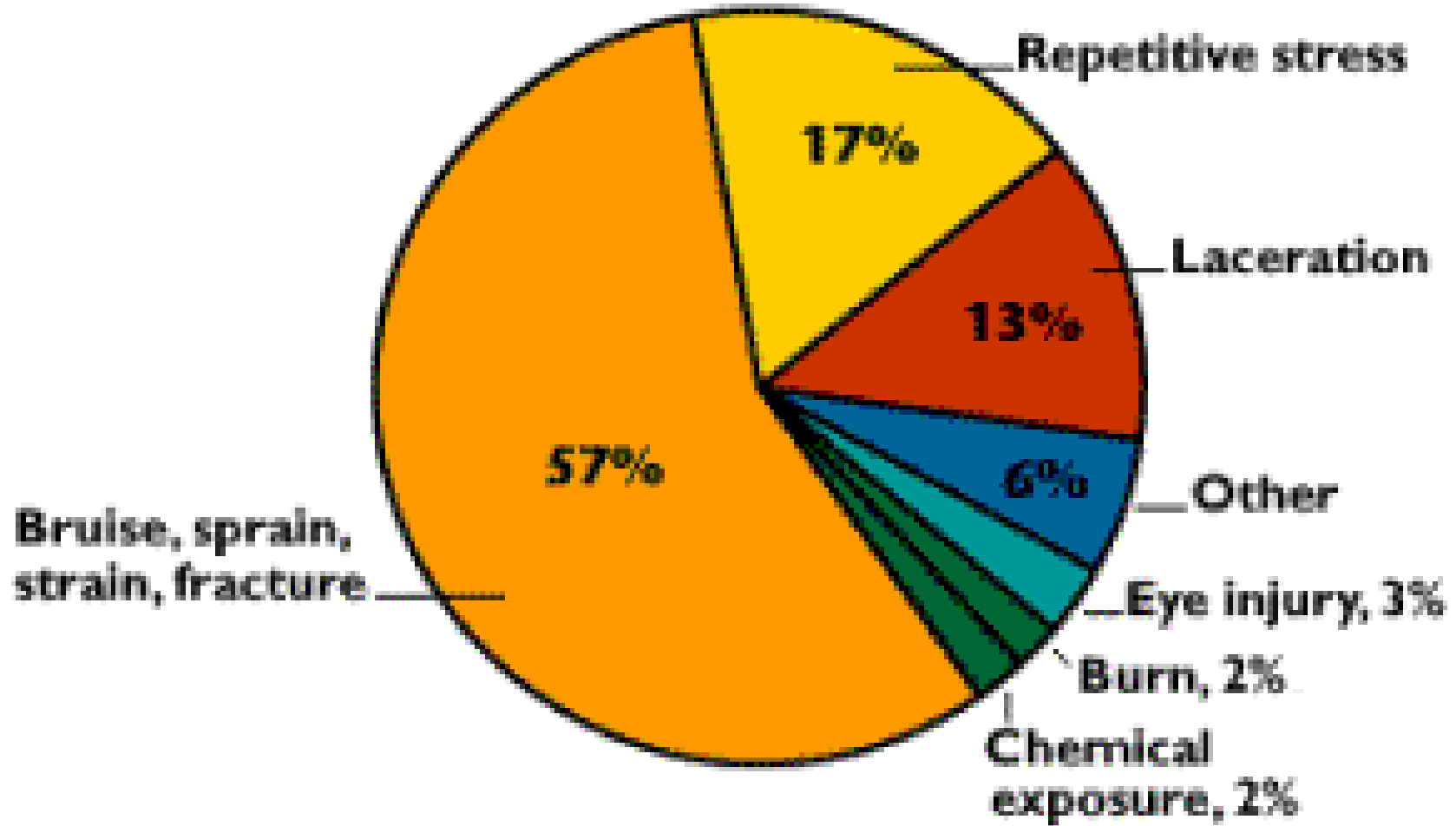
Safety Signs



Figure 2. ISO 3864 safety sign formats (clockwise from top left): warning sign, prohibition sign, mandatory action sign, and safety information sign.

I Why perform a risk assessment?





Laboratory Support Injuries



**needles,
syringes**

**broken
glass,
sharps**

**Accidents,
injuries**

**Bites,
scratches
animal or
ectoparasites**

**Aspiration
through
pipettes**

**Spills,
sprays**



Physical Hazards: Can you see anything wrong here?



Needles, Broken Glass, and Sharps: What is right/wrong here?



Do you see anything wrong?



Do NOT reuse disposable injection equipment

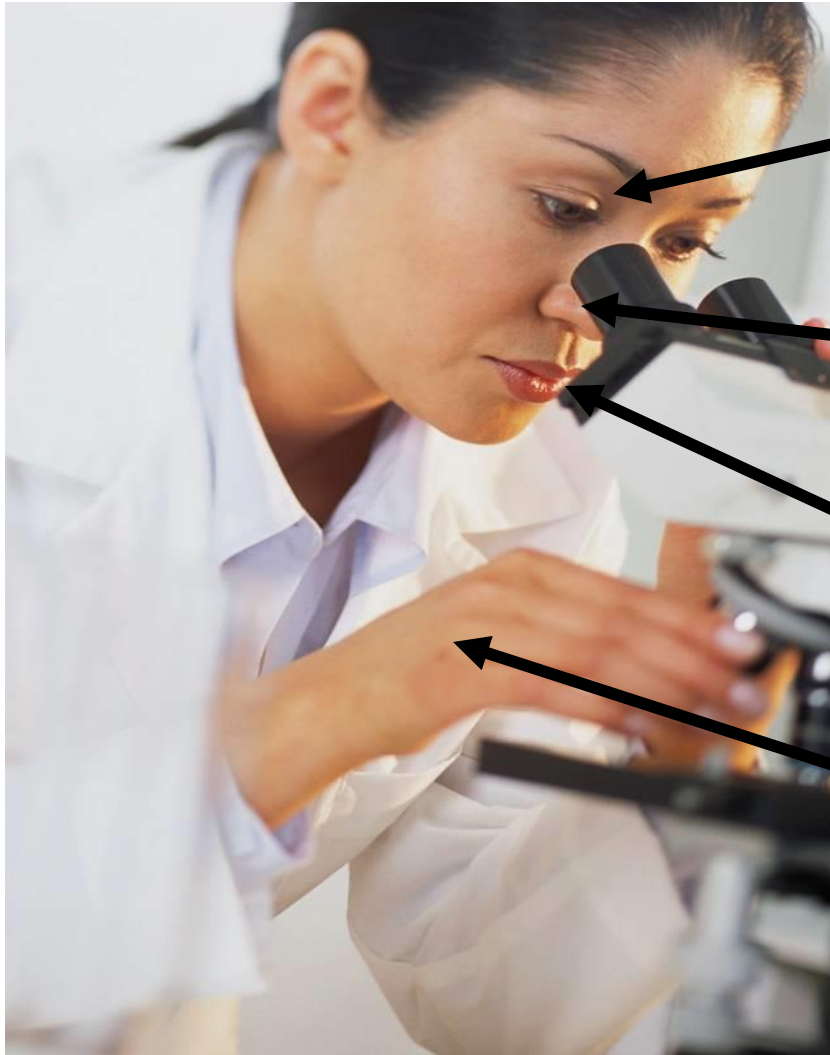


Biological Hazards

Aerosols and droplets are the main sources of contamination



Contamination Routes



Ocular invasion

Inhalation

Ingestion

Skin penetration

Chemical Spills

- anything beyond a **minor** spill and requiring help from outside of the laboratory group constitutes a **major** spill



Minor spill



Major spill





Laboratory Fire Safety : Learn how to operate a portable fire extinguisher.⁴⁰

EMERGENCY PROCEDURES

- ❖ If exposed to hazards, get medical attention immediately.
- ❖ Report to laboratory supervisor
- ❖ Fire: call 911, activate building fire alarm; safely use fire extinguisher on small fire.
- ❖ Hazardous Chemical spill (over 1 pint): evacuate the room; close door; call 911; consider evacuation of building

Conclusion

- **When designing a laboratory or organizing workflow, ensure that patients and patient samples do not have common pathways**
- **Safety is dependent on:**
 - a responsible supervisor
 - a safety manual and SOPs
 - trained personnel
 - assessment of risks
 - laboratory design

Key Message

Neglecting laboratory safety is costly.

It jeopardizes the lives and health of employees and patients, and jeopardizes laboratory reputation, equipment, and facilities.

Useful and helpful websites regarding safety:

http://www.luc.edu/environmentalservices/safety_information.shtml

<http://www.ilpi.com/safety/>

<http://www.chem.uky.edu/resources/stockroom/waste.html>

<http://www.uttyler.edu/safety/labwastemanual.pdf>

<http://www.cdc.gov/niosh/npg/>

<http://avogadro.chem.iastate.edu/MSDS/>

END OF SLIDE

THANK

YOU

FOR

LISTENING