Patient safety and biohazard safety
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Learning objectives

- Definitions
- Quality care
- Patient safety goals
- Biohazards
- Biosafety issues
- Management of biomedical waste
Complex Environment
errors are bound to happen
Our aim

Quality Care

Patient Safety
Quality care

- Quality care
  - Safe
  - Effective
  - Patient Centred
  - Timely Efficient
  - Equitable
IOM elements of “Quality”

- **Safe**: avoiding injuries to patients from the care that is intended to help them
- **Timely**: reducing waits and sometimes harmful delays for both those who receive and those who give care
- **Effective**: providing services based on scientific knowledge to all who could benefit and refraining from providing services to those not likely to benefit (avoiding underuse and overuse)
- **Efficient**: avoiding waste, in particular waste of equipment, supplies, ideas, and energy
- **Equitable**: providing care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location, and socioeconomic status
- **Patient-Centered**: providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions

“STEEEP” Framework outlined by the Institute of Medicine (“IOM”)
patient safety is the bedrock of quality care

Institute of Medicine: Quality Care
Safety Definition

- **Patient Safety**
  - Prevention of harm to the patient
  - Freedom from accidental and preventable injuries produced by medical care
Safety definition

- *Freedom from accidental injury*
  - from the patient's perspective, the primary safety goal is to prevent accidental injuries
    - Safe environment = low risk of accidents
      - reduce defects in the process or departures from the way things should have been done
      - establish operational systems and processes that increase the reliability of patient care.
Patient Safety Goals

The Joint Commission - NPSGs

- Improve the accuracy of patient identification
  - 2 patient identifiers
  - Eliminate transfusion related errors

- Improve effectiveness of communication among caregivers

- Improve the safety of using medications
  - LABELS
Patient Safety Goals

- Reduce the harm associated with clinical alarm systems
- Reduce the risk associated with risk of health care associated infections
- Reduce the harm resulting from falls
- Prevent health care associated pressure ulcers
Patient Safety Goals

- Organization identifies safety risks inherent in its patient population
  - Suicide
  - Home oxygen therapy

- Universal protocol for preventing Wrong site/wrong procedure/wrong person surgery
  - Pre procedure verification process
  - Mark the site
  - Time out before procedure
Team STEPPS

- Team Strategies and Tools to Enhance Performance and Patient Safety
- An evidence-based communication toolkit to improve team performance across the health care delivery system.

- Team Competency Outcomes
  - Knowledge – how to understand being on the “same page”
  - Attitudes – the importance of “team” orientation
  - Performance – improve safety and outcomes in your daily practice
TeamSTEPPS

Key Benefits

- Improve patient outcomes
- Actively promote teamwork
- communication
- Create tools so as to communicate effectively

Legend

Skills
Outcomes

Knowledge
Shared mental model

Attitudes
Mutual trust, Team Orientation

Patient Care Team

Performance
Adaptability, Accuracy, Productivity, Efficiency, Safety

Leadership
Articulate clear goals through briefs, huddles & debriefs

Communication
Speak clearly using SBAR, read back, handoff, call out

Situation monitoring
Ensure all team members are on same page

Mutual Support
Ask for and offer task assistance, CUS
Biohazard safety
Definitions

- **Biohazard**
  An infectious agent or hazardous biological material that presents a risk or potential risk to the health of humans, animals or the environment.

- **Bio safety**
  The containment principles, technologies and practices that are implemented to prevent the exposure to pathogens and toxins, or their accidental release.
biosafety

- The use of animal or human blood and body fluids in the college and University is fundamental to its activities.

- Our aim
  - To make you safe
  - Awareness about safety in handling biological materials
  - Work safely with biological materials
  - Reducing their spread in the environment
Biohazard Symbol
Biohazardous Materials

- Infectious organisms (e.g. Viruses, Bacteria, Fungi, Chlamydiae/Rickettsiae, Prions)
- Biologically active agents (toxins, allergens, venoms)
- Recombinant DNA and stem cells
Routes of transmission

- Human and animal materials are well known to contain specific infectious biohazards.
- Exposure to a biohazardous agent may occur while handling chemicals, animals, tissues, body fluids or diagnostic specimens through:
  - puncture wounds
  - the respiratory tract
  - gastro-intestinal system
  - skin or mucous membranes
Biosafety Issues

- *Laboratory Safety*
- *Bloodborne pathogens (BBP)*
- *Biological waste disposal*
- Recombinant DNA (rDNA)
- Infectious substance and diagnostic specimen shipping
Biosafety Issues

- Respiratory Protection
- Bioterrorism and Select agents
- Mold and indoor air quality
- Occupational safety and health in the use of research animals
- Biohazards used in animal models
Principles of Biosafety

Biosafety Levels 1-4 (BSL)
- Increasing levels of employee and environmental protection
- Guidelines for working safely in research & medical laboratory facilities
Laboratory Safety
Laboratory acquired infections (LAI)
Blood borne pathogens (BBP)
Blood borne pathogens (bbp)

- The bloodborne pathogens that pose the most serious health risks
  - Hepatitis B virus (HBV)
  - Hepatitis C virus (HCV)
  - Human Immunodeficiency Virus (HIV)

- Hepatitis B vaccination is recommended for all health care workers

- No FDA approved vaccine exists to prevent HCV or HIV infection
Human materials/Tissues considered Highly Infectious

- Blood
- Semen
- Vaginal secretions
- C S F
- Synovial fluids
- Amniotic fluid
- All other body fluids
Not Infectious unless contaminated with Blood or Body fluids.

- Feces,
- Nasal secretions,
- Sputum,
- Sweat,
- Tears,
- Urine / Vomitus,
- Saliva unless blood stained.
Route of Exposure

- Sharps
  - Lancets
  - Broken Glass
  - Needles

- Spillage of blood / body fluids
  - A common health hazard in the working environment.
  - Never wipe the spillage with working wet mop
  - Always cover the spills with paper and pour 1 %Hypochlorite or Bleaching powder to decontaminate the spills with HIV/HBV virus
Work practices that increase the risk of a sharps injury

- Recapping needles
- Transferring a body fluid between containers
- Opening blood tubes
- Failing to dispose of used sharps properly in a puncture-proof sharps container
Risk Assessment

- There are varying levels of risk for the transmission of blood-borne pathogens which must be taken into consideration:

- High risk:
  - Large-bore hollow needle
  - Deep puncture wound
  - Needle from patient’s artery or vein
  - Cuts with sharp instruments – especially when blood is visible
Risk Assessment

- **Medium risk:**
  - Splashes of blood or other body fluids onto mucous membranes
  - Bite
  - Contact of blood onto broken skin
  - Prolonged contact of blood with intact skin

- **Low risk:**
  - Contact with urine or faeces.
Protect yourself

- Assume all blood and body fluids to be infectious
- Always use safe work practices, required PPE, and safety devices
- Do not eat, drink or apply cosmetics in the work area
- Avoid the use of needles and lancets if safe and effective alternatives are available
Protect Yourself

- Plan for safe handling and disposal of any sharps and other infectious waste before using them
- Promptly dispose of used sharps in appropriate sharps disposal containers
- Report all occupational exposures promptly to ensure that you receive appropriate follow-up care
- Participate in training related to infection prevention
- Get a Hepatitis B vaccination
Vaccination for HBV infection

- All HCP’s must take at least three doses of Vaccine
  - 0 – 1 – 6 months
  - without discontinuation of the schedule

- All Health care providers many not attain equal response.

- High risk HCP’s should undergo estimation of anti HB s (antibodies) to know whether they were well protected.
Follow Universal Precautions
What are Universal Precautions

- Universal precaution are control guidelines designed to protect workers from exposure to diseases spread by Blood and other Body fluids.
- All our patients should be treated as though they have potential blood born infections, and can infect the caring health care workers.

CDC
(Centre for disease control)
HAND WASHING

- There is no Health precaution like Hand washing.
- Washing with simple toilet soap - reduces the rate of transmission of common infections including the HIV.

Soap, water and Common sense are Best Antiseptics

William Osler
How to Wash our hands

Procedure 1
Wet hands and wrists. Apply soap.

Procedure 2
Right palm over left, left over right.

Procedure 3
Palm to palm, fingers interlaced.

Procedure 4
Back fingers to opposing fingers interlocked.

Procedure 5
Rotational rubbing of right thumb clasped in left palm and vice versa.

Procedure 6
Rotational rubbing backwards and forwards with tops of fingers and thumb of right hand in left and vice versa.

NOTE: Repeat procedures 1-6 until the hands are clean. Rinse hands and pat dry.
Use of Gloves

Use of a pair of disposable plastic gloves can protect if chances of contact with Blood or Body fluid is anticipated.
Use of Mask, Cap, Eye Wear

- Will certainly protect us from splashes of Blood or Body fluids.
- Don't underestimate the importance of Use of Cap and Mask
- It equally protects our patients.
Use of Impervious Gown

- A simple thin Plastic apron underneath the linen is of great help in preventing the soaking our inner clothes and exposure to harmful microbes.

Use of Foot wear

- Wearing foot wear covering entire sole protects the entry of Microbes from the contaminated floors with Blood and Body fluids.
- Remember many of us have cracks on our feet.
Biological waste disposal
Biomedical waste

- Solid waste generated during the diagnosis, testing, treatment, research or production of biological products for humans or animals (WHO)

- WHO estimates
  - 85% of hospital waste is Non-hazardous
  - 10% infectious
  - 5% Non-infectious but hazardous e.g. chemicals
Forms of Medical Waste

- **Solid**
  - Labware (flasks, tubes, plates, bottle, vials)
  - Pipettes (could also be sharps)
  - Lab waste (stocks, specimens, cultures, swabs, vaccines)
  - Gloves, apparel, wipes

- **Liquid**
  - Aspirates, culture fluids, rinses, washes
  - Sera, body fluids

- **Sharps**
  - Anything with a point or edge capable of piercing or cutting
Medical Waste Does Not Include

- Waste generated in food processing
- Urine, feces, saliva, sputum, nasal secretions, sweat, tears, or vomitus, unless it contains fluid blood
- Medical solid wastes i.e., paper towels or empty specimen containers that are not biohazardous, bandages/dressings containing dried blood
- Hazardous waste, radioactive waste, household waste
- Waste generated on agricultural or livestock practices on a farm or ranch
Sharps Waste

- Any device having acute rigid corners, edges, or protuberances capable of cutting or piercing.

- Needles, needles with syringes, contaminated syringes, blades, needles with attached tubing

- Broken glass items i.e., Pasteur pipettes, blood vials contaminated with biohazardous waste
HOSPITAL WASTES

Non Infectious  Infectious

Biodegradable  Non Biodegradable  Non Sharps  Sharps

Solids  Liquids

Incinerable  Non Incinerable (Autoclave, Microwave)
Indian data

- 1-3 Kgs per hospital bed per day
- Total waste generation - 330,000 Tones per year
- 70 Tones in Delhi per day
- The Ministry of Environment and Forests, Govt of India
  - biomedical waste (management and handling) - 1998
- 10 categories of biomedical waste
# SCHEDULE – 1 (See Rule 5)
## CATEGORIES OF BIO MEDICAL WASTE

<table>
<thead>
<tr>
<th>OPTION</th>
<th>WASTE CATEGORY</th>
<th>TREATMENT &amp; DISPOSAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category No. 1</td>
<td>Human Anatomical Waste</td>
<td>Incineration / deep burial</td>
</tr>
<tr>
<td>Category No. 2</td>
<td>Animal Waste</td>
<td>Incineration / deep burial</td>
</tr>
<tr>
<td>Category No. 3</td>
<td>Microbiology &amp; Biotechnology Waste</td>
<td>Local autoclaving / microwaving / incineration</td>
</tr>
<tr>
<td>Category No. 4</td>
<td>Waste Sharps</td>
<td>Disinfection by chemical treatment / autoclaving / microwaving and mutilation / shredding</td>
</tr>
<tr>
<td>Category No. 5</td>
<td>Discarded Medicines and Cytoxic drugs</td>
<td>Incineration / destruction and drugs disposal in secured landfills</td>
</tr>
<tr>
<td>Category No. 6</td>
<td>Solid Waste</td>
<td>Incineration / autoclaving / microwaving</td>
</tr>
<tr>
<td>Category No. 7</td>
<td>Solid Waste</td>
<td>Disinfection by chemical treatment / autoclaving / microwaving and mutilation / shredding</td>
</tr>
<tr>
<td>Category No. 8</td>
<td>Liquid Waste</td>
<td>Disinfection by chemical treatment and discharge into drains.</td>
</tr>
<tr>
<td>Category No. 9</td>
<td>Incineration Ash</td>
<td>Disposal in municipal landfill</td>
</tr>
<tr>
<td>Category No. 10</td>
<td>Chemical Waste</td>
<td>Chemical treatment</td>
</tr>
</tbody>
</table>
NEED FOR SAFE DISPOSAL

- Nosocomial infections
- Risk of infection in general population
- Environmental pollution
- Repacking
<table>
<thead>
<tr>
<th>COLOUR CODING</th>
<th>TYPE OF CONTAINER</th>
<th>WASTE CATEGORY</th>
<th>TREATMENT OPTIONS as per Schedule I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow</td>
<td>Plastic Bag</td>
<td>Cat. 1, 2, 3 and 6</td>
<td>Incineration / deep burial</td>
</tr>
<tr>
<td>Red</td>
<td>Disinfected container / Plastic Bag</td>
<td>Cat. 3, 6, and 7</td>
<td>Autoclaving / Microwaving / Chemical Treatment</td>
</tr>
<tr>
<td>Blue / White Translucent</td>
<td>Plastic Bag / puncture proof container</td>
<td>Cat. 4, Cat. 7</td>
<td>Autoclaving / Microwaving / Chemical treatment and destruction shredding</td>
</tr>
<tr>
<td>Black</td>
<td>Plastic Bag</td>
<td>Cat. 5, 9 and 10 (Solid)</td>
<td>Disposal in secured landfill</td>
</tr>
</tbody>
</table>
Collection and segregation

- Waste should be collected and segregated at the point of generation
- Segregation means separation of waste into various categories as per nature of waste
- Use of colour coded plastic bags and containers is mandatory
SEGREGATION OF WASTE

RED BAG OR CONTAINER

PLASTIC WASTE
IV Sets
Tubings
Blood & Urine bags
Syringes

No Sharps
In this bag
SEGREGATION OF WASTE

YELLOW

BAG OR CONTAINER

INFECTIOUS WASTE
Soiled bandages
Dressings
Cotton Swabs
Sanitary Pads

No Plastics
In this bag
SEGREGATION OF WASTE

- BLACK BAG OR CONTAINER
- GENERAL WASTE
  - Paper & Plastic Packaging
  - Unsoiled Plaster Castes
  - Kitchen waste
SEGREGATION OF WASTE

- Sharps - a rigid puncture resistant container that, when sealed, is leak resistant and cannot be reopened without great difficulty.

Needles and Ampoules to be put in the separate puncture proof bin provided.
Transportation and storage

- Site of generation
- Central storage
- Final disposal site
Safe storage and transport
Hazardous isn’t it !!!
Waste disposal

- Waste disposal - 2 steps
  - Pre-treatment
  - Final Disposal

- Pre-treatment
  - Chemical disinfection – 1% hypochlorite sol
    - Plastic, rubber and metallic items
  - Autoclave – Insulated chamber with high pressure and temp
  - Microwave irradiation
  - Shredder
FINAL DISPOSAL

- Incineration
- Land fill
- Electro thermal deactivation
- Plasma arc technology
Your role

- Ensure compliance of hospital scheme
- Help patients understand it
- Use colour coding
- Ensure all injections are cut with needle cutter
- All Plastics and gloves are cut and put into bleach
- Culture plates in separate bleach
- Learning and education
Summary

- Our aim - Quality care
- Our target - Patient safety
- Protect yourself
- Protect your patient
- Protect environment