Principles of Decontamination of equipment and small surfaces

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Objectives

- Recognize difference between decontamination, disinfection, and sterilization
- Understand strengths and limitations to disinfectants
- Micro-organisms have various innate resistance to disinfectants.

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- Equipment
- Environments
- Personnel

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Definitions

- **Decontamination** – A process to remove contamination. Decontamination renders an area, device, item, or material safe to handle, that is, reasonably free from a risk of disease transmission.

Types of decontamination

- ***Sterilization*** - act or process, physical or chemical, that destroys or eliminates all forms of life, especially microorganisms. The definition is categorical and absolute - an item either is sterile or is not.

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Types of decontamination

- ***Disinfection*** **-** Generally less lethal process than sterilization. It is the elimination of nearly all recognized pathogenic micro-organisms but not necessarily all microbial forms (e.g., bacterial spores, generally used on nonliving things).

Types of decontamination

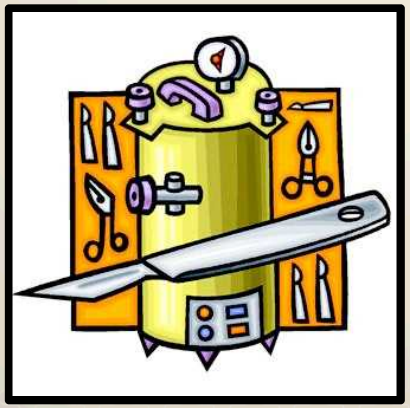
- ***Antiseptic*** - a substance that prevents or arrests the growth or action of microbes, either by inhibiting their activity or by destroying them (e.g. used on living things).

  "septic" – containing disease causing organism,

  "anti" - remove

Decontamination methods

- Chemical (e.g., bleach)
- Thermal (e.g., autoclave)
- Radiation (e.g., UV light)
- Filtration (e.g., HEPA filter)



Decontamination Methods

- Thermal
  - Autoclave
  - Incinerator
- Filtration
- Radiation
  - Non-ionizing (UV light, microwave)
  - Ionizing (E-Beam, gamma and x-rays)

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Classes of chemical disinfectants

Chemical Disinfectants

- Halogens (Chlorine, Iodophors)
- Aldehydes (Glutaraldehyde/Formaldehyde)
- Phenolics
- Alchohols
- Acids (Peracetic acid) & Alkalis (NaOH)
- Oxidizing Agents (Hydrogen peroxide)
- Quaternary Ammonium compounds
- Biguanidines (Chlorhexidine)

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Discussion activity

- Which classes of chemical disinfectants are available for use in Yemen?
  - When are they used?

Factors affecting disinfection

- Number of microorganisms
- Location of microorganisms
- Innate resistance to the disinfectant
- Concentration and potency of the disinfectant
- Physical and chemical factors
- Presence of organic matter
- Appropriate contact time between disinfectant and the contaminate.
- Biofilms

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Environmental Factors

- Dried spills may limit contact between disinfectant and target organism
  - Pre-cleaning is usually necessary for spills
- Dirt, grease, and oils can protect the organisms
  - Grease and oils will repel water based disinfectants

Product factors

Product Factors

- **Age** of the product/solution
- **Method** of application
    - spray vs. wipe
- **Rate** of application
- **Storage** conditions
  - Opaque vs. clear containers

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Resistance to disinfectants

Resistant

Prions (agents causing Creutzfeldt-Jakob Disease)

Bacterial spores (*Bacillus anthracis*)

Coccidia (*Cryptosporidium*)

Mycobacteria (*M. tuberculosis*)

Nonlipid or small viruses (polio, coxsackie)

Fungi (*Aspergillus, Candida*)

Vegetative bacteria (*E. coli, S. aureus*)

Lipid or medium-sized virus (HIV, herpes, hepatitis B)

Susceptible

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Decontamination activity

- **In your groups**, please spend **5 minutes** to **read the scenario** provided.
- **Discuss and select** an appropriate disinfectant.
- Using the template spend **15 minutes** to **write an SOP** for decontaminating the area in the scenario.

Standard Operating Procedure for: Chemical Disinfection	
Conditions	
Who should use the SOP?	Everyone in the laboratory
When should it be used?	Before and after the laboratory procedure
Why should the SOP be used?	To disinfect the surfaces and reusable materials
Where should it be used?	In the laboratory
Context	
Input(s):	Contaminated surfaces and reusable materials
Output:	Disinfected surfaces and reusable materials
Preparation required:	
Actions (steps required to move from the input to the output)	
Step 1	
Step 2	
Step 3	
Step 4	
Step 5	

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Evaluate the SOP

- Return to the scenario locations
  - Remember your personal protective equipment if necessary!
  - Use the SOP developed to decontaminate the surface areas.
- Return to classroom to discuss how the SOPs worked and if limitations were identified

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Questions?

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