Cleaning and Sterilisation

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Thanks to

- David Pescod
- Keith Streatfield
- Amanda Baric
- Charles Ducat
• For non experts by a non expert

• To remind you of the basics of cleaning and sterilisation

• To give an idea what you might find out there
Definitions

• Decontamination: reducing the bio-burden by removal of organic matter and other residues

• Disinfection: elimination of many pathogenic micro-organisms, except spores

• Sterilisation: removal of all micro-organisms including spores
## Spaulding classification (1968)

<table>
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<tr>
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<th>Critical</th>
<th>Semi-critical</th>
<th>Non-critical</th>
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<tbody>
<tr>
<td><strong>Definition</strong></td>
<td>Invasive</td>
<td>In contact with mucosa</td>
<td>In contact with skin or no contact</td>
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<td><strong>Examples</strong></td>
<td>IV, ETT, spinal needles</td>
<td>Endoscopes, face masks, oropharyngeal airways</td>
<td>Stethoscopes, oximeters, BP cuffs, ECG leads</td>
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Pathway

Non critical
- Decontamination
- Dry and Store

Semi critical
- Decontamination
- Disinfection
- Dry and Store

Critical
- Decontamination
- Sterilisation
- Dry and store

Adapted from David Pescod
Decontamination

• Clean at a temperature of 50 – 60°C

• Detergent. Not household soap

• Use sterile water or at least running water

• Use brushes to clean the inside of a lumen

• Rinse with (sterile) water

• Dry in cabinet at 65 – 75°C
Disinfection

- Semi-critical (Intermediate risk): e.g. laryngoscopes, endotracheal tube, nasopharyngeal airway

- High level disinfection: Destroys all vegetative bacteria, viruses

- Intermediate disinfection: vegetative bacteria, most visus, TB and fungi

- Low level disinfection: Staph, Salmonella, CMV, RSV, HBV, HIV
Disinfection

- **Boiling for 20 minutes (altitude independent)**
- **Steaming**
  - > 80 °C for 10 minutes
  - > 70 °C for 20 minutes
- **Chemical agents (high level)**
  - Formaldehyde 8% (avoid skin and eye contact)
    - Avoid contact with chlorinated water (toxic)
  - Glutaraldehyde 2 – 4% is less irritant
    - Both need to be rinsed with boiled water three times
  - Hydrogen peroxide 6% is highly corrosive to zinc, copper, aluminium and brass
  - **Chlorine 0.1%** 20 minutes, effective and cheap (sodium hypochlorite = bleach)
Disinfection

• Chemical agents (non-high level)
  • Alcohol (ethyl-alcohol 60 – 90%)
    • Effective against HBV, HIV, TB, Staph & Strep, but not spores
    • Better than isopropyl alcohol
    • [http://www.cdc.gov/hicpac/Disinfection_Sterilization/6_0disinfection.html](http://www.cdc.gov/hicpac/Disinfection_Sterilization/6_0disinfection.html)
  • Milton’s solution (1% sodium hypochlorite (NaClO) + 16.5% NaCl)
    • LMAs, Guedel airways and Hudson masks
    • Add 2 Milton Tablets per 4 litres of clean cold water into plastic bowl
    • After soaking items in made-up Milton solution for 15 minutes minimum, items are ready for use. Wash hands before removing items. Shake off any excess solution and use immediately. No need to rinse
    • Can add items continuously
    • Solution good for 24 hours
    • Cheap and easy (25 cents/tab)
  • Dakin solution = 0.5% NaClO
Sterilisation

- Critical (High risk): e.g. surgical instrument, spinal and hypodermic needles

- Steam (autoclave), dry heat, gas or gamma irradiation

- Autoclave is the preferred method of sterilisation.
Steam (autoclave)

- Most commonly used and most effective
- It is dependable, non toxic and inexpensive
- Open discharge tap until steam has come out for 5 minutes
- Close and wait for T & P to rise
- Time, temperature and pressure
  - 121°C for 20 minutes (unwrapped)
  - 134°C for 4 minutes (unwrapped)
  - 121°C for 30min (wrapped)
  - 134°C for 15min (wrapped)
- Bowie Dick tape
Other sterilisation

- Dry heat sterilisation
  - Reaches surfaces of instruments that cannot be disassembled but is not suitable for articles that will burn or melt
  - Requires 160°C for 2 hours

- Gas
  - Suitable for articles which are temperature and moisture sensitive
  - Ethylene oxide
  - Expensive and toxic

- Radiation
  - For mass production
Check sterilisation
Pack and store

Packing

- Before sterilisation/disinfection
  - Advantage: less risk of contamination
  - Disadvantage: takes longer to sterilise
- After sterilisation/disinfection
  - Advantage: quicker to sterilise
  - Disadvantage: greater risk of contamination

Storage

- Put date on the pack
- Avoid damage to packing
- Put latest items at the back
In the Real World

- Autoclave
- Boiling
- 0.1% Chlorine
Conclusion

• Cleaning and sterilisation are important issues

• Find out how it’s done where you visit

• Think steam and 0.1 chlorine

• Beforehand talk to your friendly nurse OR nurse who goes on outreach