Rural Sterilisation of Laparoscopic Instruments

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Contents of today

- Study of reprocessing laparoscopic instruments in rural India
- Suggestion for reprocessing laparoscopic instruments
- Access to new information
What is reprocessing

• Cleaning
  – The removal visible soil, blood, protein substances, microorganisms and other debris from instruments
  – Cleaning is essential before sterilisation or disinfection

• Disinfection
  – Thermal or chemical destruction of microorganisms
  – Disinfection is less lethal than sterilization. It reduces the number of microorganisms to a level that safe to handle

• Sterilisation
  – The complete destruction of all microorganisms including bacterial spores

Why reprocessing?

• Surgery is a good investment

• Health care associated infections, HAIs

• Antimicrobial resistance
Why reprocessing?

• Why is rural reprocessing different than regular reprocessing?
  – Standards (ISO)
  – Knowledge transfer
  – Industry Networks
Study of reprocessing in rural India

- Observations of reprocessing methods
- Interviews with surgeons and nurses
- Autoclave measurements
Study of sterile processing in rural India

- Cleaning performed by nurses
- Laparoscopy puts a big burden on staff
- Reprocessing time is under pressure
- Dedicated spaces were not used
- Chemical disinfection over sterilisation
- Who is responsible?
Observations - Cleaning
Observations - Drying
Observations - Disinfection
Reprocessing

Staffing

- Staff
- Responsibility
- Checklists/Procedures/SOP
Sterile supply department

- Compressed (filtered) air
- Waterjet

https://www.hygitech.co.uk/academy/decontamination-sterilisation/decontamination-room-layout/sterilization-room-layout/
Personal protection

- Splash Masks
- Waterproof gowns
- Gloves
  - Suitable for chemicals (No Latex)
Collection & Transportation

• Keep instruments moist
  – Damp towel
  – Soaking

• Bleach/chlorine
  – Instrument corrosion
  – De-activation of detergent
Cleaning

- Soil protects microbes from disinfectants
- Biofilm formation

What are biofilms? Montana State University, http://www.biofilm.montana.edu/biofilm-basics/what_are_biofilms.html
Cleaning
Cleaning laparoscopic instruments

- Manual methods
- Mechanical/automated methods
Cleaning agents

• Enzymatic/Detergents
• Look for manufacturers instructions
Cleaning agents

• Substances harmful for instruments
  – Saline
  – Bleach (powder)
  – Iodine based preparations
  – Abrasive cleaners
  – Laundry detergents
  – Surgeons hand scrub
  – Soap
Cleaning

Third Generation: Can be completely disassembled to allow proper cleaning.

Second Generation: With cleaning port.

First Generation: Very difficult to clean.

Laparoscopic Instruments

Cleaning laparoscopic instruments

https://www.olympusprofed.com/gs/stms/16417/
Sterilization and Maintenance of Instruments & Equipment, Deepraj S Bhandarkar, Avinash N. Katara
Cleaning

• Rinse bio-burden
• Disassemble
• Submerge instrument
• Brush
  – Soft nylon brush (toothbrush) is used for surfaces
  – Lumen need specific brush
• Dry
Cleaning - Disposables

• Clear protocol is needed for each device
• Validation must be performed
• Research licenced reprocessors
Drying

• Reduces microbial growth
• Dry using:
  – Clean cloth
  – Compressed filtered air
• Inspection
• Dilution of disinfectant
Inspection

Packaging

• Cotton sheets are acceptable
• Single use materials should not be reused
• Closable drums are unreliable
## Disinfection/Sterilization

<table>
<thead>
<tr>
<th>Resistant</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prions (Creutzfeldt-Jakob Disease)</td>
<td>Prion reprocessing</td>
</tr>
<tr>
<td>Bacterial spores (<em>Bacillus atrophaeus</em>)</td>
<td>Sterilization</td>
</tr>
<tr>
<td>Coccidia (<em>Cryptosporidium</em>)</td>
<td>Disinfection</td>
</tr>
<tr>
<td>Mycobacteria (<em>M. tuberculosis, M. terrae</em>)</td>
<td>High</td>
</tr>
<tr>
<td>Nonlipid or small viruses (polio, coxsackie)</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Fungi (<em>Aspergillus, Candida</em>)</td>
<td>Low</td>
</tr>
<tr>
<td>Vegetative bacteria (<em>S. aureus, P. aeruginosa</em>)</td>
<td></td>
</tr>
<tr>
<td>Lipid or medium-sized viruses (HIV, herpes, hepatitis B)</td>
<td></td>
</tr>
</tbody>
</table>

[https://www.cdc.gov/infectioncontrol/guidelines/disinfection/tables](https://www.cdc.gov/infectioncontrol/guidelines/disinfection/tables)
Steam sterilisation

- Should be main form of sterilisation
- High penetrating ability
- Reliable validation methods
- No dangerous chemicals
- Modern laparoscopic instruments are designed for steam sterilisation
Steam sterilisation

- Boiling & Autoclaves
Steam Sterilisation

• Hollow lumen

Jan Huijs, https://heartware.nl/presentations-by-jan/
Steam sterilization

PRE and POST VACUUM CLASS B AUTOCLAVE CYCLE

- VACUUMING
- PRESSURIZING
- VENTING
- STERILIZING
- VACUUM DRYING
Steam Sterilisation - Verification

- Autoclave tape is not verification
- Bowie Dick test
- Biological Indicators
- Yearly Calibration
Low temperature sterilization

• Hydrogen peroxide plasma (Sterrad)
  – Safe for most instruments
  – Expensive system
  – No chemicals

• EtO (Ethylene Oxide)
  – Safe for most instruments
  – Long cycle time (8-12 hours)
  – Toxic gas
  – Explosive
High Level Disinfection

• Is occasionally practiced with laparoscopic instruments
• CDC: Acceptable when practiced carefully
• Does not sterilize spores
• Cannot be used for storage
High Level Disinfection

- Limited control and monitoring
- Need for sterile rinsing water
- Could be used for single use devices
- All disinfectants have advantages and disadvantages
High Level Disinfection

- Formalin/Formaldehyde
  - Carcinogen
  - Slow
  - Unreliable
High Level Disinfection

- Glutaraldehyde/Cidex
  - Binds proteins
  - Biofilm formation
- Need for test strips
High Level Disinfection

• Per-acetic Acid (PAA)
  – Corrosive to some metals
  – Safe by-products

• Cidex OPA
  – Expensive
  – Faster than Cidex
Key messages
Key Messages

• Who is responsible?
• Look for options to train staff
• Develop Checklists/Procedures for all instruments
• Reprocessing is hazardous
  – Get PPE
  – Learn about chemicals
(How to find) new resources

• WHO guides:
  – Decontamination and Reprocessing of Medical Devices for Health-care Facilities

• CDC
  – Guideline for Disinfection and Sterilization in Healthcare Facilities
(How to find) new resources

• IFU
  – Instructions for Use (IFU) on manufacturers website (Karl Storz)
    • https://www.karlstorz.com/de/en/reprocessing.htm
  – CIDEX Glutaraldehyde IFU

• Other
  – APSIC guidelines for disinfection and sterilization of instruments in health care facilities
    • https://www.eventreg.purdue.edu/info/central-service/pdf/crcst/CRCST160.pdf
  – “Recommended Practices for Cleaning and Caring for Surgical Instruments and Powered Equipment”