Medical devices in dentistry

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Dr Mikael Zimmerman
DDS, PhD, Associate professor
Sweden
Cross infection control, hygiene and sterilization. Today's most important tasks in all health care systems.
Modern dentistry perform highly sophisticated and invasive procedures!
Decontamination, cleaning and disinfection

Sterilization and wrapping

Logistics and instruments

Maintaining fragile barriers
Sterile does not mean "clean and safe"

If gods not ultra-clean sterilization will not be successful!

Inadequate methods will destroy delicate and expensive instruments

Manual handling of instruments will include hazards

Biological barriers are fragile
Healthcare-associated infections (HCAI):

- cause tremendous additional costs,
- increase antibiotic resistance
- jeopardize treatment outcomes,
- prolong patient suffering,
- decreases treatment capacity,
- creates “bad-will”
A very conservative estimate of healthcare-associated infections (HCAI) shows each year approximately:

- 4 million cases
- 37,000 directly attributable deaths
- 16 million extra hospital days
- € 5.5 billion direct costs (average € 334 per day)

Source: ECDC Annual Epidemiological Report 2008
How many cases will be:
- Discovered?
- Reported?
- Analyzed and evaluated?
- Published?
- Commonly known among dental professionals?

How can we gain competence if we don’t know the real truth?
To reduce the number of post-operative infections aseptic techniques are important not only in surgical procedures.

Antibiotic must never be an alternative to aseptic techniques, disinfection and sterilization!
Resistance to beta-lactam antibiotics

*Bacteroides, Prevotella* 25.0% of strains showed resistance


*Fusobacterium, Peptostreptococcus, Prevotella, Streptococcus* 7.1% of strains showed resistance


High prevalence in subgingival microflora of adult patients with periodontitis. *(Prevotella spp, Actinomyces spp)*


35.6% in anaerobic gr- rods from pus specimens of orofacial odontogenic infections *(Prevotella spp)*

Patient-to-patient Hepatitis B virus transmission. Identical DNA-match between two patientens on the same day, in the same dental office, treated by the same dental team – both patients undergoing tooth extractions.

Redd J.T. Journal of Infectious Diseases, April 2007
The most common risk factor for transmission of HCV (Hepatitis C virus) infection, study from Turkey:

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>history of surgery</td>
<td>98%</td>
</tr>
<tr>
<td>blood transfusion</td>
<td>39.7%</td>
</tr>
<tr>
<td>dental procedure</td>
<td>27.5%</td>
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<tr>
<td>abortion</td>
<td>21.2%</td>
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<tr>
<td>long-term hospitalization</td>
<td>11.6%</td>
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<tr>
<td>hemodialysis</td>
<td>10%</td>
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<tr>
<td>history of intravenous drug abuse</td>
<td>3.1%</td>
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<tr>
<td>history of suspected sexual contact</td>
<td>1.5%</td>
</tr>
</tbody>
</table>

Department of Gastroenterohepatology, Istanbul Medical Faculty
EU Medical Devices Directives 2007/47

All medical devices must be produced in a safe environment and all products must be safe for patients, personnel, technicians and others.

These legal requirements must be fulfilled by manufacturers and **must be maintained and monitored by the end user during the entire lifespan of the medical device.**
Sterile does not mean “clean and safe”

If gods not ultra-clean sterilization will not be successful!
Endodontic files cannot be totally cleaned using a washerdisinfector alone.

The instrument holding mechanism within the machine has a significant effect on the cleanliness of the files after one intensive cleaning cycle.

Picture showing junction between handle and tip of instrument. Instrument which has been in daily use at dental care clinic.
Colonies of bacteria close to the junction
Manual handling of instruments will include hazards
Drying blood causes corrosion!
Corroded metall – tip of instrument
Corroded metall in larger magnification, gives retention for microorganisms
Corrosion will destroy surface of delicate instruments. Instruments should be of high quality stainless steel.
Disinfection and sterilization

Steam-sterilisers **without pre- and post vacuum** process show great variations. **Up to 60% do not result in sterile gods !**

Skaug et al., Acta Odont Scand 1999;57:175-180
Commonly used items in dental clinics could not be sterilized in the gravity steam autoclave (type N process) or unsaturated chemical vapor sterilizers.

Dental instruments requires high-vacuum steam autoclave (type B process).

Turbines and handpieces must be clean before sterilization.
Internal axcis from handpiece used for implant surgery!
Turbines and handpieces

- External and internal cleaning and disinfection.
- Lubrication
- Sterilization
- Process time 12 min

...makes B-class sterilization even safer...
• Dishwashers are **not effective** for cleaning instruments and they do not disinfect the instruments.

• Dishwashers are **not designed** by manufactures for processing dental instruments prior to sterilisation.

• The use of dishwashers should **not be recommended** in dental clinical practice.

The most effective stage of any decontamination procedure is thorough physical cleaning.

**Automated processors offer the safest, most reliable option.**

Washer disinfectors must according to European standard **remove all biological material on instruments.** (EN 15883).

CDC (Centre for Disease Control, USA) Sterilization or Disinfection of Medical Devices: General Principles
Washer-disinfector was extremely effective in eliminating microorganisms (>7-log(10) reduction), including vegetative and spore-forming bacteria from surgical instruments.

Tray system and proper logistics:

- more efficient, save time,
- cleaning and disinfection will be safer and better,
- instruments will last longer
- better economy
- reduce risks for sharp injuries
- professionalism
Dental instruments must be recognized as delicate and sophisticated medical devices.

The dental profession must follow directives and normes accordingly.
“The continues use of old medical equipment as well as outdated routines...

...is very difficult to justify on professional, moral, ethical or economical grounds.”

“Hygiene in dentistry must include antibiotic hygiene and infection oriented care.”
Make the world safer!
Thank you for your attention

Dr. Mikael Zimmerman

Contact information:

mz@admodum.se

Mobile: +46-(0)708-49 56 30