

HYGIENE IN HEALTHCARE

Basic infection prevention measures in dental health care settings

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CHAIN OF INFECTION



SOURCE

TRANSMISSION

SUSCEPTIBLE
PERSON

SOURCE IN HEALTHCARE

Other person



Health-care professional



Patient



PATIENT as a source

- **WHEN:**
 - misdiagnosis
 - in incubation period
 - abortive or latent form
 - underestimation of risk
 - carrier MRSA, TBC, VHB, VHC,...



You are certainly not healthy, because medicine is so advanced today that a healthy person basically does not exist!

EACH PATIENT SHOULD BE SUSPECTED TO BE INFECTIOUS!!!

TRANSMISSION in healthcare

- The most frequent route is **a contact**, as direct or mostly indirect way of transmission.

- **The most of contact transmissions**
- **of pathogens**
- **happen via healthcare workers hands!**

(WHO Guidelines on Hand Hygiene in Health Care)



PATIENT as a susceptible person

IMMUNOCOMPROMISED INDIVIDUAL:

- HIV patients,
- oncology patients,
- smokers,
- diabetics,
- alcoholics,
- patients that have autoimmune or other chronic disorders.



INFECTION
PREVENTION
PRECAUTIONS



Safer care for patients.



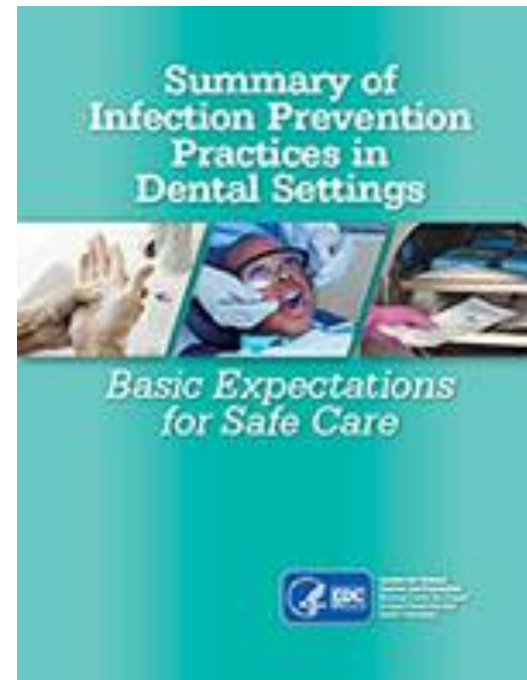
Protection for healthcare professionals.

CDC
(Centre of
disease control
and
prevention)

„Summary of Infection Prevention Practices in Dental Settings“

2016

www.cdc.gov/oralhealth/infectioncontrol/guidelines/index.htm



INFECTION PREVENTION PRECAUTIONS



- Need of written infection prevention procedures (program) based on evidence-based guidelines, regulations, or standards,
- according to state requirements,
- high adherence to Standard Precautions of WHO,
- personal responsibility of all staff members.

WHO Standard precautions

summary

- Hand hygiene.
- Use of personal protective equipment (e.g., gloves, masks, eyewear).
- Respiratory hygiene / cough etiquette.
- Sharps safety (engineering and work practice controls).
- Safe injection practices (i.e., aseptic technique for parenteral medications).
- Sterile instruments and devices.
- Clean and disinfected environmental surfaces.

Standard Precautions are the minimum infection prevention practices that apply to all patient care, regardless of suspected or confirmed infection status of the patient, in any setting where health care is delivered.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

|

in Dental Settings

Wear gloves whenever there is potential for contact with blood, body fluids, mucous membranes, non-intact skin or contaminated equipment.

- **a.** Do not wear the same pair of gloves for the care of more than one patient.
- **b.** Do not wash gloves. Gloves cannot be reused.
- **c.** Perform hand hygiene immediately after removing gloves.



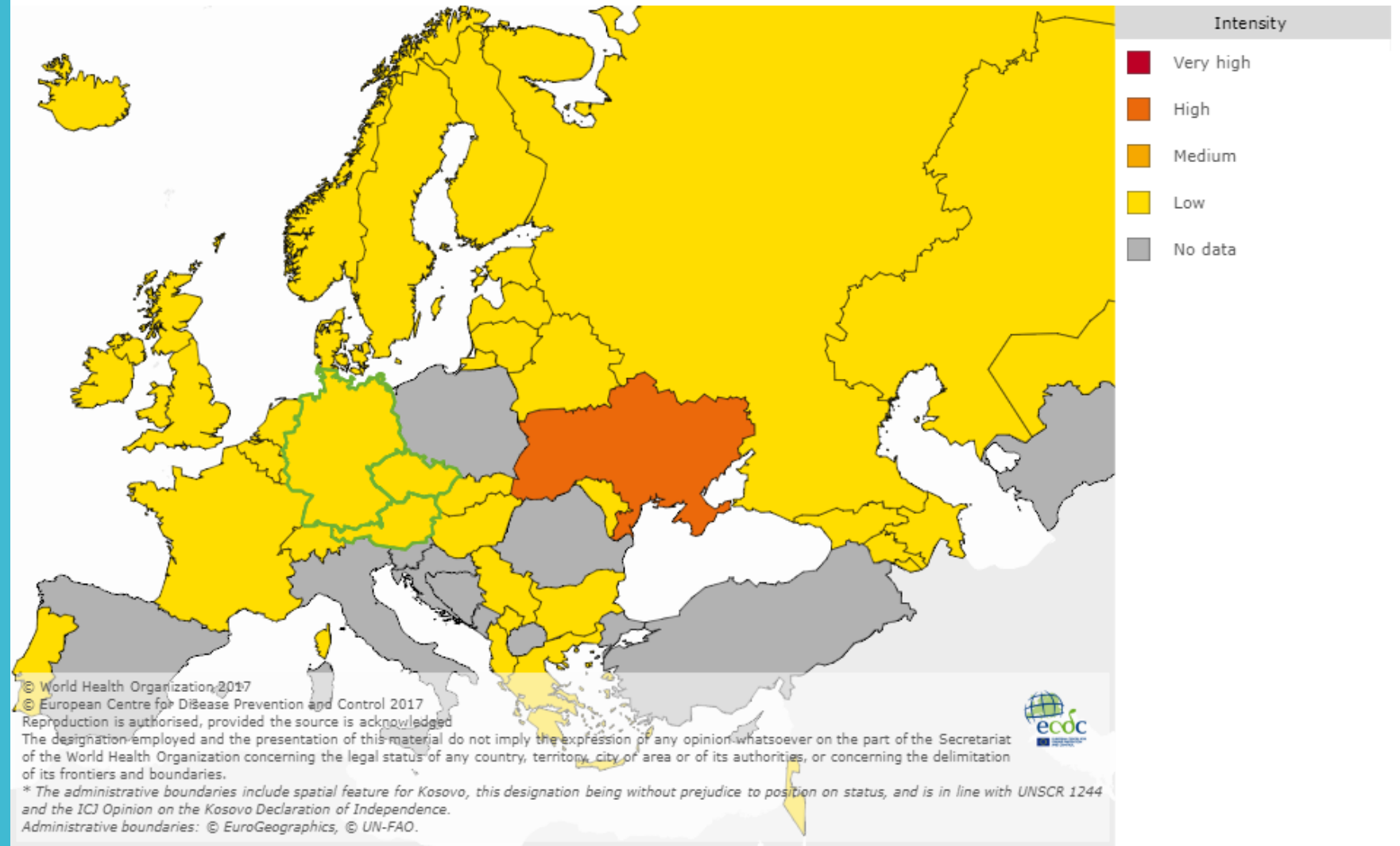
PERSONAL PROTECTIVE EQUIPMENT (PPE) II

in Dental Settings

- Wear protective clothing that covers skin and personal clothing during procedures or activities where contact with blood, saliva is anticipated.
- Wear mouth, nose, and eye protection during procedures that are likely to generate splashes or spattering of blood or other body fluids.
- Remove PPE before leaving the work area.



Influenza
intensity
week 43/2017
(23 – 29 October
2017)
(ECDC
[https://flunews
europe.org/](https://flunews europe.org/))



RESPIRATORY HYGIENE / COUGH ETIQUETTE |

in Dental Settings

Post this information in entrance for patients:

- Cover your mouth / nose when coughing or sneezing.
- Use and dispose of tissues.
- Perform hand hygiene after hands have been in contact with respiratory secretions.



RESPIRATORY HYGIENE / COUGH ETIQUETTE II

in Dental Settings

- Provide tissues and no-touch receptacles for disposal of tissues.
- Provide resources for performing hand hygiene in or near waiting areas.
- Offer masks to coughing patients and other symptomatic persons when they enter the dental setting.
- Provide space and encourage persons with symptoms of respiratory infections to sit as far away from others as possible.



New cases of HIV+ persons in Czech Republic

(data from „National Institute of Public Health“)

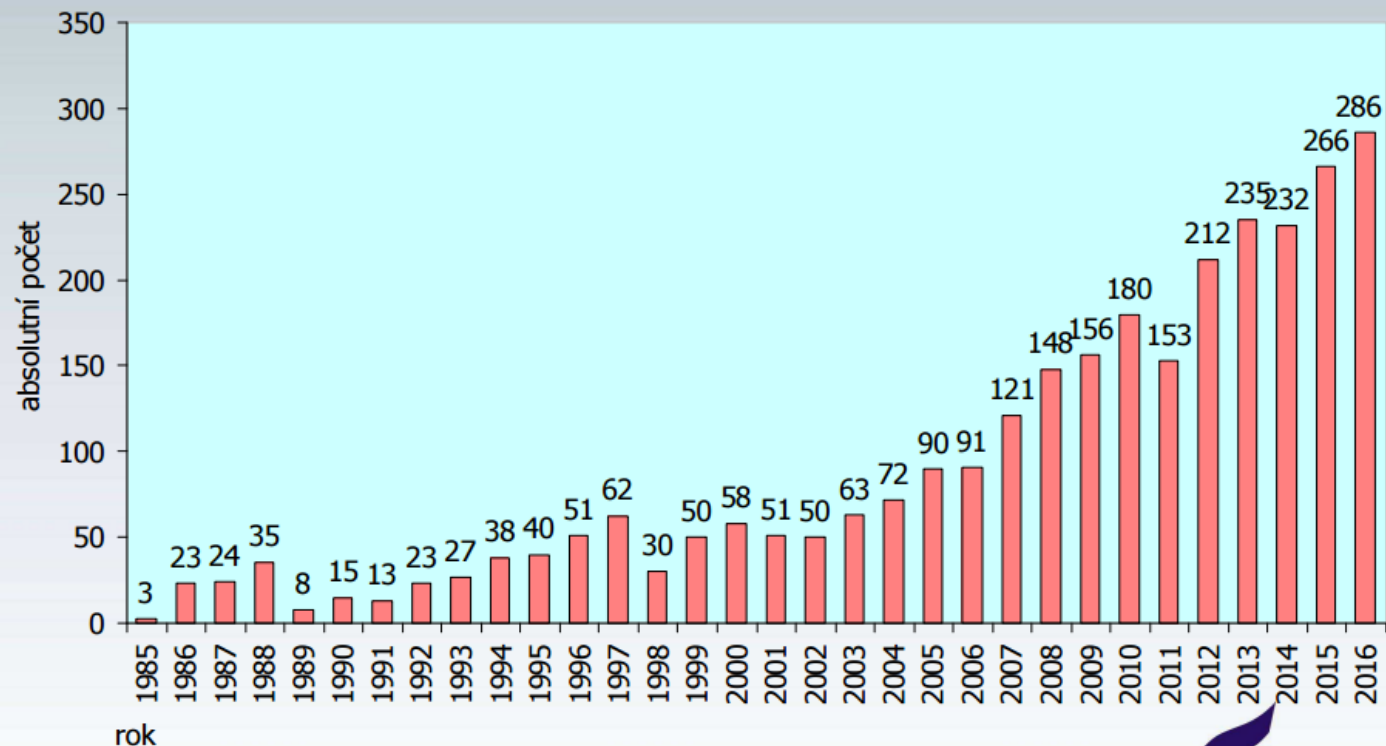
NOVÉ PŘÍPADY INFEKCE HIV V ČESKÉ REPUBLICE

V JEDNOTLIVÝCH LETECH

(občané ČR a cizinci s dlouhodobým pobytem)

Absolutní údaje ke dni

31.12.2016



NRL AIDS

Graf 1



PREVENTION OF NEEDLE STICK AND INJURIES FROM OTHER SHARP INSTRUMENTS

|



- Protection especially from bloodborn pathogens transmission .
- Most exposures in dentistry are preventable.
- Each sharp item (e.g., needle, scaler, bur, lab knife, and wire) that is contaminated with patient blood and saliva is potentially infective!!!
- Basic methods to reduce exposures to pathogens from sharp instruments and needles are engineering and work-practice controls.

PREVENTION OF NEEDLE STICK AND INJURIES FROM OTHER SHARP INSTRUMENTS

II

- Engineering controls should be used as the primary method ((e.g., self-sheathing anesthetic needles, safety scalpels, and needleless IV ports).






- Work-practice controls are behavior-based and should be used when engineering controls are not available.
- Place used disposable syringes and needles, scalpel blades, and other sharp items **in appropriate puncture-resistant containers** located as close as possible to the area where the items are used.



Sterilization and Disinfection |

- Instruments and equipment that may be contaminated with blood or body fluids – special procedures for handling, containing, transporting.
- Reused instruments must be treated according to the manufacturer's instructions and state legislatives.
- Reprocessing procedures must be stated in written form and all concerned person have to be trained for it.
- Using single-use items if appropriate is preferred.
- Single-use items are for one patient only and must be disposed of appropriately.

Sterilization and Disinfection II

- Patient-care items (e.g., dental instruments, devices, and equipment) are **categorized** depending on the potential risk for infection associated with their intended use:
 - A. Critical items - surgical instruments, periodontal scalers (penetrate soft tissue or bone)  **should always be sterilized.**
 - B. **Semicritical items** (e.g., mouth mirrors, amalgam condensers, reusable dental impression trays) come in contact with mucous membranes or non-intact skin  **should be also sterilized** (dental handpieces and associated attachments), or if impossible, at a minimum, be processed using **high-level disinfection.**
 - C. Noncritical items (e.g., radiograph head / cone, blood pressure cuff, facebow), contact intact skin  cleaning, or if visibly soiled, **cleaning followed by disinfection** with registered hospital disinfectant is adequate.

SELECTION OF DISINFECTANT

Destroying
activity

1. **Bactericidal**
2. **Virucidal** (full spectrum – also for non-enveloped viruses (VHA), partial spectrum – only for enveloped viruses (HIV, VHB))
3. **Sporicidal - C**
4. **Tuberculocidal - T**
5. **Fungicidal - V**

DISINFECTION SOLUTIONS

Chemical composition I

- **Aldehydes** are widely used as potent sterilants and high-level disinfectants with **broad spectrum**, covering bactericidal, sporicidal, fungicidal and virucidal activity.
- **Hydrogen peroxide** used for sterilisation and high-level disinfection in healthcare settings.
- **Peracetic acid** – **broad spectrum**, solutions are sporicidal, bactericidal, virucidal and fungicidal at low concentrations;
- **Chlorine-releasing agents** - **broad spectrum**, high concentrations of sodium hypochlorite display significant levels of sporicidal and virucidal activity.
- **Iodine** – **broad spectrum**, bactericidal, fungicidal, tuberculocidal, virucidal and sporicidal properties (also as antiseptic).

DISINFECTION SOLUTIONS

Chemical composition II

- **Phenols** - disinfectants are effective bactericides, fungicides, tuberculocides and virucides, but are **ineffective against spore-forming bacteria such as Clostridium difficile**.
- **Quaternary ammonium compounds** - possess bactericidal, fungicidal and virucidal properties; however, **they only display mycobacteriostatic and sporostatic activity**.

DISINFECTION products

Utility

- Hands
- Skin (antiseptics)
- Surfaces
- Equipments



Always follow manufacturer instructions for use registered disinfectants (e.g., amount, dilution, contact time, safe use, disposal).

STERILIZATION

Instrument reprocessing requires multiple steps (using specialized equipment):

1. Pre-sterilization preparation (decontamination, cleaning, disinfection, drying, packaging)
2. Sterilization
3. Storage appropriate (in covered or closed cabinets)
4. Control tools for all these procedures.



STERILIZATION

Pre-sterilization preparation

- Decontamination of all instruments contaminated by human liquids before handling and mechanical cleaning as a protection of staff **(with virucidal disinfection)**.



- Cleaning and disinfection – both in one step. Using washer-disinfector and other device (ultrasonic cleaner) is recommended.
- Rinsing with drinking water, drying and function check.
- Packaging into disposable packages or placing into container systems. Packages should be labeled to show the sterilizer used, the cycle or load number, the date of sterilization, and, if applicable, the expiration date.



STERILIZATION

Physical methods

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A. **HEAT STERILIZATION** - for heat tolerant materials

1. **Dry heat** (metal, glass, powder,...)

- Parameters of sterilization (CZ):

- 160 °C 60 min.

- 170 °C30 min.

- 180 °C20 min.

- Usually cheaper than autoclaving.

2. **Moist heat (steam)** – autoclaves (metal, glass, plastic, ...)

- Parametres of sterilization (CZ):

- 121 °C - 205 kPa20 min.

- 134°C - 304 kPa10 min.

B. Radiation sterilization – using gama X- rays

STERILIZATION

Chemical methods



NON - HEAT STERILIZATION

- for heat - sensitive materials (plastic, device components, ...)

1. Ethylene oxid (toxic gaz) - wide range of material compatibility.
2. Formaldehyde

STERILIZATION

Monitoring



Using a combination of biological, mechanical, and chemical indicators:

1. **Biological indicators** (spore tests) - they assess the sterilization process directly by killing known highly resistant microorganisms (e.g., *Geobacillus* or *Bacillus* species).
2. **Mechanical monitoring** - checking the sterilizer gauges, computer displays, or printouts; documenting the sterilization pressure, temperature, and exposure time in sterilization records.
3. **Chemical monitoring** - uses sensitive chemicals that change color when exposed to high temperatures or combinations of time and temperature (tapes, strips or tabs, and special markings on packaging materials).

(Mechanical and chemical indicators do not guarantee sterilization; however, they help detect procedural errors and equipment malfunctions.)

ENVIRONMENTAL INFECTION PREVENTION AND CONTROL (CDC guidelines)

- Establish procedures for routine cleaning and disinfection of environmental surfaces.
- Use surface barriers to protect clinical contact surfaces, particularly those that are difficult to clean (e.g., switches on dental chairs, computer equipment) and change surface barriers between patients.
- Clean and disinfect clinical contact surfaces that are not barrier-protected with a registered hospital disinfectant after each patient.
- Use a virucidal disinfectant if visibly contaminated with blood.
- Select registered disinfectants or detergents / disinfectants with label claims for use in health care settings.

DENTAL UNIT WATER QUALITY



- Use water that meets standards for drinking water for routine dental treatment output water.
- Consult with the dental unit manufacturer for appropriate methods and equipment to maintain the quality of dental water.
- Follow recommendations for monitoring water quality provided by the manufacturer of the unit or waterline treatment product.
- Use sterile saline or sterile water as a coolant / irrigant when performing surgical procedures.

DENTAL UNIT WATERLINE !!!



- They consist of narrow-bore, plastic tubing, which are highly susceptible to biofilm contamination.
- Despite various disinfection and flushing methods, it remains a problem in dentistry.
- Oral Streptococcus species, human pathogens such as Pseudomonas aeruginosa and Legionella species, and nontuberculosis Mycobacterium species had all been isolated from dental water systems.
- Cross contamination between patients has been reported in numerous studies.
- Serological studies have also shown a higher prevalence of antibodies to L pneumophila in dentists and dental practice staff, suggesting a potential health risk for these workers.

CASE REPORT

I

- 82-year-old woman was admitted to the intensive care unit with fever and respiratory distress. Legionnaires' disease was diagnosed. The patient died in 2 days.... An investigation to find the source of *L. pneumophila* infection was initiated.
- During the incubation period (2–10 d) she left her house only to attend two appointments at a dental practice....
- Samples were taken from the tap and the high-speed turbine of the dental unit waterlines, from the dental practice's taps, and from the patient's home (taps and shower).
- All samples from her home were negative on culture, but those from the dental practice were positive for *L. pneumophila* (the same serogroup 1, max. amount 6.2×10^4 CFU/L.)

Pneumonia associated with a dental unit waterline. *Maria Luisa Ricci, Stefano Fontana, Federica Pinci, Emanuela Fiumana, Maria Federica Pedna, Paolo Farolfi, Maria Antonietta Bucci Sabattini, Maria Scaturro*

Lancet 2012; 379: 684

CASE REPORT

II

Legionella pneumophila

- Gram-negative bacterium ubiquitous in natural water environments and found also in manmade water systems;
- It can infect people by inhalation or microaspiration of aerosolised water causing a severe pneumonia known as Legionnaires' disease, or a flu-like disease, known as Pontiac fever.
- Potential health risk especially for immuno-compromised persons (old persons, smokers, with cancer).

CASE REPORT III

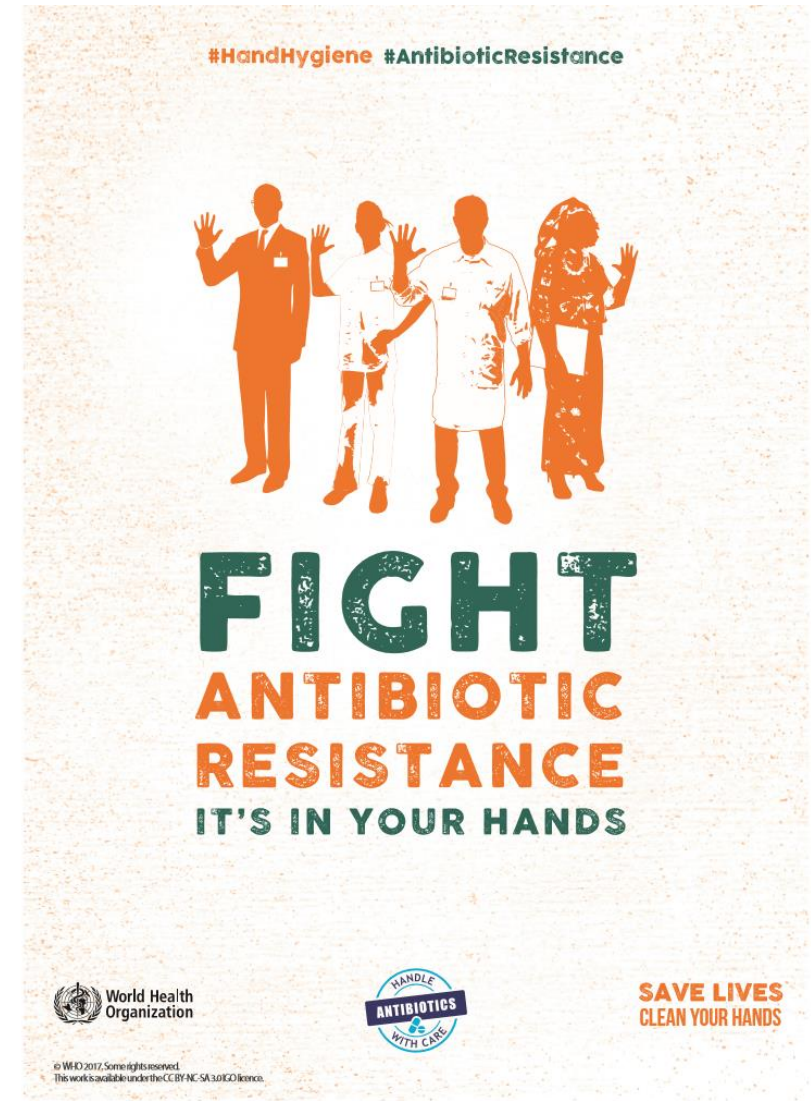
Recommendations from authors

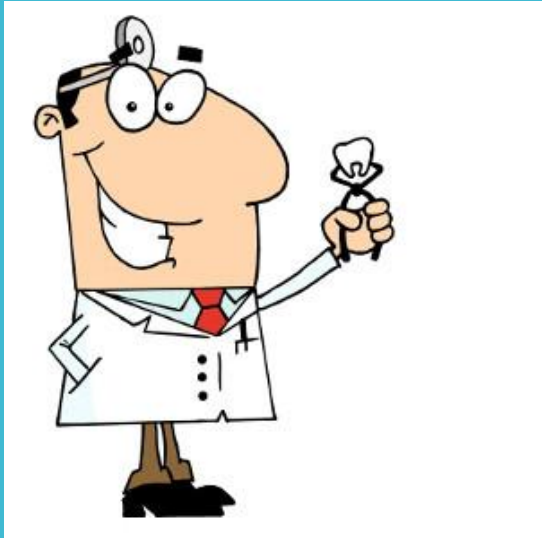
- Use of anti-stagnation and continuous-circulation water systems;
- Use of sterile water instead of the main water supply in the dental unit waterline;
- Application of discontinuous or continuous disinfecting treatment; daily flushing of all outlets and before each dental treatment;
- Use of filters upstream of the instruments;
- Annual monitoring of the waterline.

5th May

International
hand hygiene
day

<https://youtu.be/K-2XWtEjfl8>





Questions?