



DISINFECTION POLICIES AT HOSPITALS: WHY? HOW? WHERE? WHEN?

Duygu Esel, MD

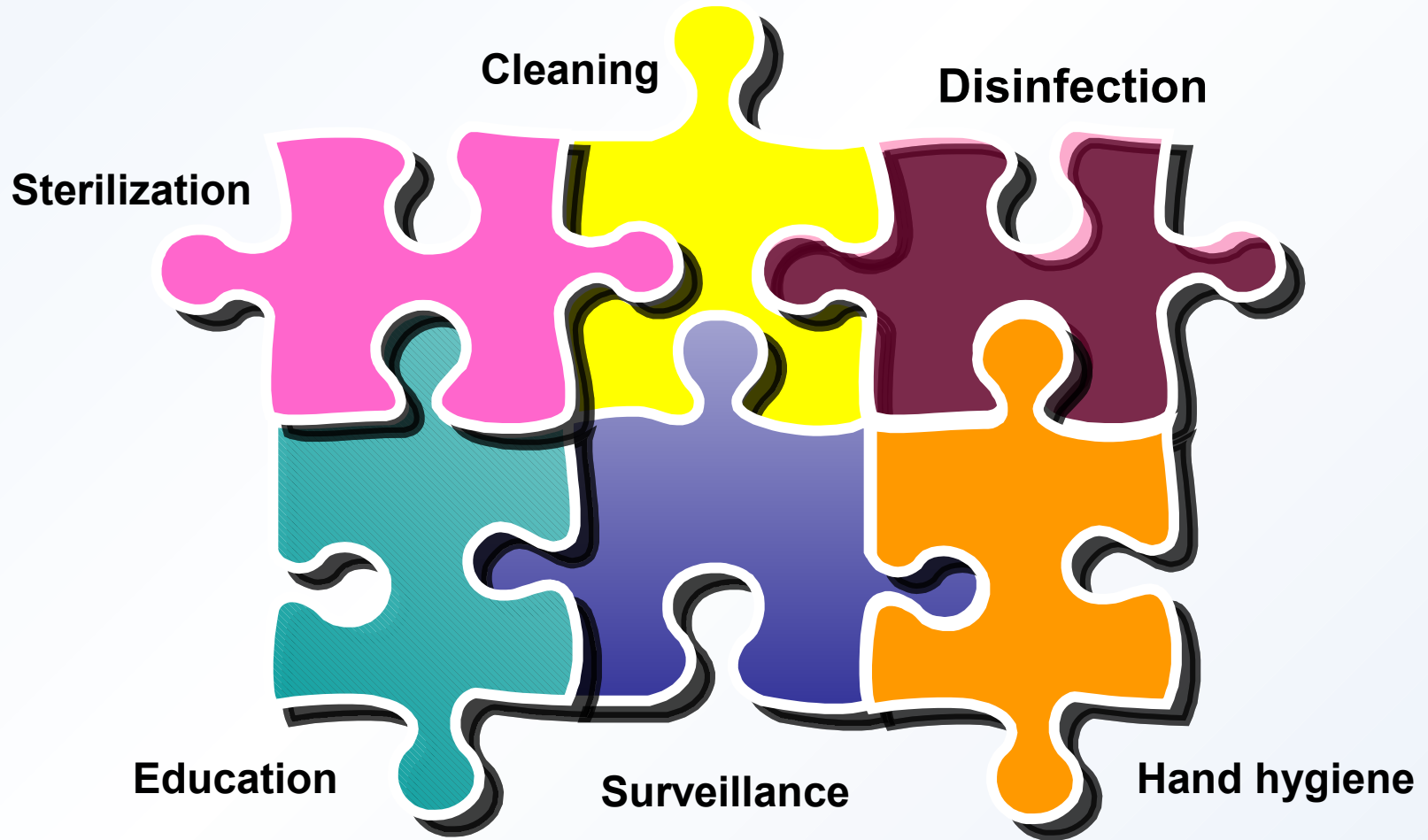
Department of Microbiology and Clinical Microbiology

Erciyes University Faculty of Medicine

Kayseri-TURKIYE

eseld@erciyes.edu.tr

Infection Control in Hospitals



Disinfection



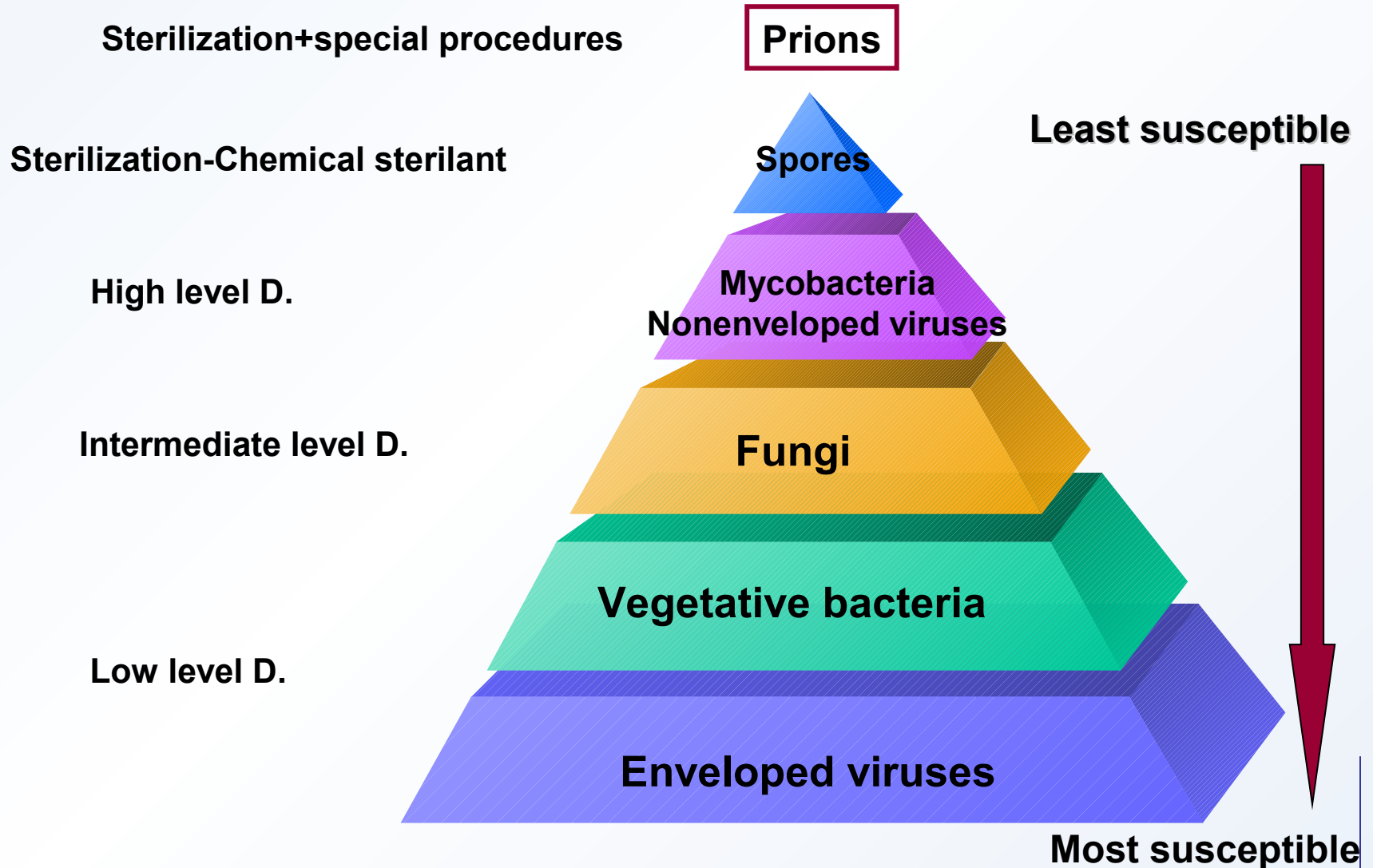
- Disinfection is the removal or destruction of “**adequate numbers**” of “**potentially harmful**” microorganisms to allow the item to be handled or used safely
- The objective is to prevent infection

SPAULDING CLASSIFICATION



- **Spaulding approach to disinfect items depends on their intended use:**
 - **Critical:** devices that enter normally sterile tissue or the vascular system (surgical instruments, implants...)
 - **Semicritical:** devices that touch mucous membranes or nonintact skin (endoscopes...)
 - **Noncritical:** devices that come in contact with intact skin (blood pressure cuffs, crutches, bed rails, EKG leads, bedside tables...)

Susceptibility to Disinfectants



Chemical Sterilization of “Critical Objects”



Chemical sterilant	time	condition
Glutaraldehyde (> 2.0%)	10 hours	20-25°C
Hydrogen peroxide-HP (7.5%)	5 hours	20-25°C
Peracetic acid-PA (0.2%)	12 min	50-56°C
HP (1.0%) and PA (0.08%)	8 hours	20°C
HP (7.5%) and PA (0.23%)	180 min	20° C
Glutaraldehyde (1.12%) and Phenol/ phenate (1.93%)	12 hours	25°C

FDA, September, 2006

High Level Disinfection of “Semicritical Objects”



Germicide	Concentration
Glutaraldehyde	> 2.0%
Ortho-phthalaldehyde (OPA)	0.55%
Hydrogen peroxide (HP)*	7.5%
HP and peracetic acid*	1.0%/0.08%
HP and peracetic acid*	7.5%/0.23%

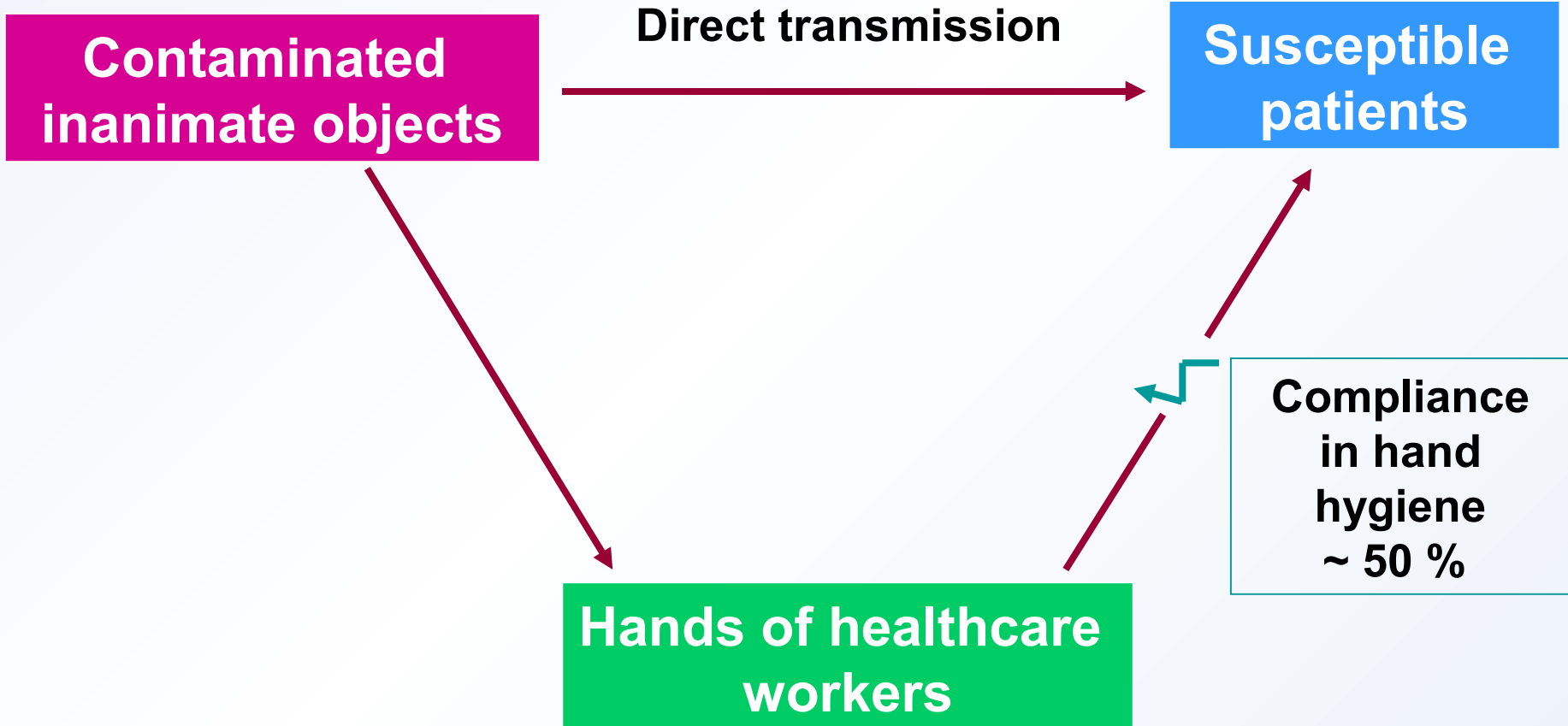
*May cause cosmetic and functional damage

Low level disinfection and cleaning of noncritical devices



- Cleaning with a detergent and drying is normally adequate
- Disinfection: any article which comes into contact with bodily fluids (bedpans, linen)
- Disinfection of environment of the patient
 - Only if it is necessary, e. g. ICU high touch surfaces!

Contribution of environmental contamination to hospital infections



Persistence of clinically relevant bacteria on inanimate surfaces (1)



<i>Acinetobacter</i> spp.	3 days-5 months
<i>C. difficile</i> spores	5 months
<i>E. coli</i>	1,5 hour-16 months
Enterococci (including VRE)	5 days-4 months
<i>Klebsiella</i> spp.	2 hours-30 months
<i>M. tuberculosis</i>	1 day-4 months
<i>P. aeruginosa</i>	6 hours-16 months
Staphylococci (including MRSA)	7 days-7 months

Persistence of clinically relevant bacteria on inanimate surfaces (2)



<i>Candida albicans</i>	1-120 days
<i>C. parapsilosis</i>	14 days
<i>Torulopsis glabrata</i>	100-150 days
SARS associated virus	72-96 hours
CMV	8 hours
HAV, HBV	>1 week
HIV	>1 week

Guidelines for Environmental Infection Control in Health-Care Facilities

**Recommendations of CDC and the Healthcare Infection Control
Practices Advisory Committee (HICPAC)**

**U.S. Department of Health and Human Services
Centers for Disease Control and Prevention (CDC)
Atlanta, GA 30333**

2003

According to the guideline:



- High-touch surfaces must be disinfected at least once a day in **high risk areas**
- Cleaning with water and detergent is sufficient for floors and walls, but if contaminated with blood or blood stained bodily fluids, floors must be disinfected

Categories of environmental risk



Minimal Risk	Low Risk	Intermediate Risk	High Risk
Offices Storage areas Archive	<ul style="list-style-type: none">•Kitchen•Laboratories•Waiting lounges•Ambulatory patient clinic•Rehabilitation rooms	<ul style="list-style-type: none">•Emergency CSSD•Bacteriology lab	<ul style="list-style-type: none">•Operating rooms•ICU•Burn units•Oncology department•Infectious diseases department

Choosing surface disinfectant



- What do we want to achieve, what's the spectrum?
- How fast does the disinfectant work?
- Is the disinfectant inactivated by organic material?
- Is it compatible with the surfaces on which it will be used?
- Is it safe enough for the healthcare workers and patients who will come into contact with the surface?
- What about cost of the disinfectant?
- What is the environmental impact?

Chlorine compounds



- Most frequently used surface disinfectant
- Effective against a wide variety of microorganisms
- Less suitable in the presence of organic matter
- Effective between a pH range of 6-8
- Strength decreases over time
- Corrosive for metal surfaces
- Inexpensive

Dilution of household bleach (5% Sodium hypochlorite with 50000ppm)



Intended use	Dilution	Available chlorine
Cleanup blood spills	1 part bleach to 9 parts water	0.5 % 5000 ppm
Surface disinfection	1 part bleach to 50 parts water	0.1 % 1000 ppm
Food surfaces	1 part bleach to 200 parts water	0.025 % 200 ppm
surfaces contaminated with tissue infective for CJD	1 part bleach to 1 part water or undiluted	2.5 % 20 000 ppm or % 5- 50 000 ppm

Quarternary ammonium compounds



- Narrow antimicrobial spectrum
- Bacteriostatic in low concentrations
- Not active against HBV
- *P. aeruginosa* strains have intrinsic resistance to QAC
- Inactivated by organic material, soap and anionic detergents as they are cationic disinfectants

Alcohols



- Can be used with other disinfectants (quaternaries, phenolics, and iodine) to make solutions
- Fairly inexpensive
- Flammable, toxic and eye irritant
- **NOT** recommended for disinfecting large surfaces and biosafety cabinets
- **NOT** active when organic matter present
- **NOT** active against certain viruses

Controversy over contribution of environmental contamination



- Presence of any microorganism on a surface never means that it is the cause of the infection

Clin Infect Dis 2004;39:1182-9

- There is an increasing body of evidence that cleaning or disinfection of the environment can reduce transmission of healthcare associated infections

J Hosp Infect 2007;65:50-4

Controversial issues regarding surface disinfection



- Using disinfectants leads to antibiotic-resistant organisms
- Surface disinfection (including floors) must be done only if there is an MDRO in normal wards
- Disinfectants harm the environment

Why a disinfectant policy?



- We need a policy in hospitals regarding disinfection
 - to protect patients and staff against transmission of infections from medical equipment and devices
 - to implement safe working practices

Disinfection policy provides



- Team responsible for the policy
 - **Who will draft, implement, audit and update it?**
- Reasons for disinfection
- Purposes for which disinfectants are used
- Definition of terms and risk assessment of items and surfaces
- Detailed information on usage of disinfectants (preferably in tables)
 - **Items, method, frequency, concentration, condition (heat, pH...), exposure time**

The infection control committee



Is responsible for

- Preparing a safe and effective policy
- Ensuring that the correct disinfectant and methods are used
- Updating the policy regularly
- Training the staff
- Auditing the methods

To implement the disinfection policy



All hospital staff must

- Be aware of the policy
- Be informed about the implementation, responsibilities and priorities
- Know health and safety issues and properties of disinfectants

External contract cleaners have to be trained in the same way as the hospital staff

Keep in mind



- Choose disinfectants according to the risk categories
- Try to limit the number of disinfectants
- Eliminate disinfectant use
 - **When sterilization rather than disinfection is the object**
 - **When single-use devices are more economical**
- Always write safety precautions as outlined in the Material Safety Data Sheet
- Follow the international guidelines about disinfection
- Follow the instructions of the manufacturer of the instruments for cleaning, disinfection and sterilization

General rules when preparing solutions (1)



- Follow the manufacturer's instructions to prepare solutions
- Diluted disinfectants rapidly become inactive, so use the same day
- Always mix them in a clean separate vessel with fresh tap water
- Always use personal protective equipment when appropriate

General rules while preparing a solution (2)



- Replace container caps securely after use
- A sterile solution, once opened, should be regarded as nonsterile
- The expiry date on each solution should be checked before use
- Water must never be left standing in clean buckets, even if it contains a disinfectant
- Partially full bottles of disinfectant should never be 'topped up'

Conclusions



- Cleaning and disinfection are very important steps to prevent hospital infections
- Every hospital should have an effective disinfection policy and use disinfectants rationally
- Training of hospital staff is a must to implement the policy effectively
- Current disinfection and sterilization guidelines should be included in the disinfection policy



Супасибо!

Thank you!