

University of Medicine and Pharmacy "Victor  
Babeş" Timișoara  
Epidemiology Department



# Prevention of healthcare associated infections

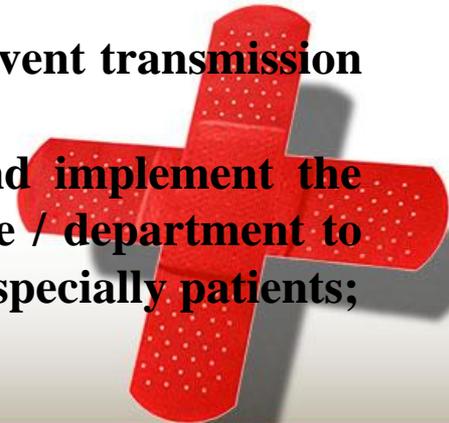
Asist. univ. Dr. Luminița Bădițoiu

**DECREE nr. 1.101 from 30 September 2016  
on the approval of the Norms for the  
supervision, prevention and limitation of  
healthcare associated infections**



# THE DOCTOR'S TASK (REGARDLESS OF SPECIALTY)

- a) **protect their own patients from other infected patients or staff who may be infected, in accordance with the isolation guide developed by the service / the Department of Prevention of healthcare associated infections;**
- b) **the application of the procedures and protocols implemented by the service / department for the prevention of healthcare associated infections;**
- c) **analyzing the microbiological specimens required when an infection is present or suspected in accordance with the diagnostic protocol and the case definitions and prior to the initiation of antibiotic therapy;**
- d) **is responsible for the detection and timely reporting of healthcare associated infections;**
- e) **counseling patients, visitors and staff about procedures to prevent transmission of infections;**
- f) **establish appropriate treatment for their own infections and implement the measures set up by the healthcare-related prevention service / department to prevent the transmission of these infections to other people, especially patients;**



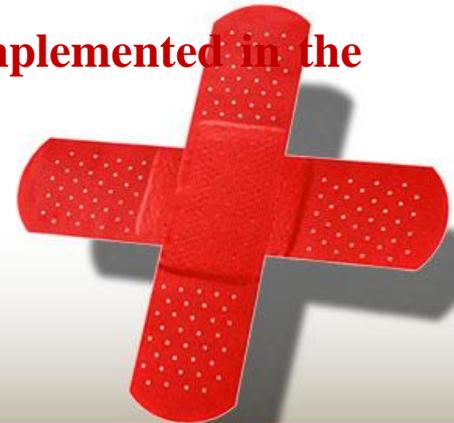
# THE DOCTOR'S TASK (REGARDLESS OF SPECIALTY)

- g) requesting the consultation of infectious diseases in situations where they are needed and / or according to local guidelines / protocols, in compliance with the policy on the use of antibiotics, implemented in the sanitary unit;
- h) complies with the procedure for declaring infections associated with healthcare provided by the service / department for the prevention of healthcare associated infections in accordance with the legislation in force;**
- i) is responsible for conducting screening of patients in intensive care units and other risk areas for the detection of multidrug-resistant germs in accordance with the national program for supervision and control of healthcare-associated infections and monitoring of the use of antibiotics and antibiotic resistance;
- j) communicates infection with dangerous germs when transferring patients to another department / other medical unit



# THE TASK OF HEAD DEPARTMENT

- a) organizes, controls and is responsible for the conduct of the section's own activities, according to the annual plan of department for the prevention of healthcare associated infections in the health unit;**
- b) is responsible for the activities carried out by the staff of the department, in compliance with the procedure for the declaration of healthcare associated infections, elaborated by the service / department for prevention and limitation of healthcare associated infections, according to the legislation in force;**
- c) is responsible for the detection and timely reporting of infections associated with healthcare;**
- d) is responsible for complying with the antibiotic use policy implemented in the healthcare unit;**



# THE TASK OF HEAD DEPARTMENT

e) is responsible for the application by the assistant chief of the daily triage and the declaration of any suspected disease susceptibility to the service / department for the prevention of healthcare associated infections ;

f) in the case of heads of department in risk areas, is responsible for conducting screening of patients for the detection of multi-resistant germ infections, in accordance with the provisions of the national program for supervision, prevention and limitation of healthcare associated infections;

g) is responsible for making the isolation decision / type of precaution and its application, the department for the prevention of healthcare associated infections and the medical director;

h) is responsible for developing procedures and protocols to prevent and limit infections associated with healthcare.



# ELECTRONIC REGISTRY TO MONITOR INFECTIONS ASSOCIATED WITH HEALTHCARE

1. in each unit of the healthcare unit, a unique electronic healthcare monitoring record is set up in electronic format.
2. The registry covers all cases of suspected infection associated with healthcare detected by any of the methods of surveillance, as well as by screening of patients.
3. Sections send the monitoring registry weekly to the department for the prevention of healthcare associated infections every monday for the previous week.
4. Classification of cases will be made on the basis of case definitions by the healthcare prevention department.
5. The unique electronic register of the sanitary unit will be made available to the manager and the committee for the prevention of infections associated with healthcare for analysis.
6. The unique electronic register of the sanitary unit will be transmitted electronically to the department for surveillance of communicable diseases within the county public health department every week, every Tuesday for the previous week.



# ELECTRONIC REGISTRY TO MONITOR INFECTIONS ASSOCIATED WITH HEALTHCARE

se organizează baza de date electronică a unității, după formatul unic național, care va fi transmisă direcției de sănătate publică județene și a municipiului București.

4. Direcțiile de sănătate publică județene și a municipiului București introduc fișele în baza de date națională/alipesc bazele de date ale spitalelor; formatul electronic al bazei de date este pus la dispoziție de către Institutul Național de Sănătate Publică.

5. Direcțiile de sănătate publică județene și a municipiului București transmit baza de date completată și verificată către Institutul Național de Sănătate Publică - centrul regional la care sunt arondate, până la data de 15 a lunii pentru luna precedentă.

6. Baza de date națională este gestionată de Institutul Național de Sănătate Publică - Centrul Regional de Sănătate Publică București, care are obligația analizei și elaborării rapoartelor trimestriale și anuale.

Figura 1

Registrul electronic unic de monitorizare a infecțiilor asociate asistenței medicale al unității

\*Font 7\*

Nr. crt.	Secția	Nr. FOCG	Vârsta	Sex	Data inter-nării	Data depis-tării	Mod de depistare (activă, pasivă, studiu de prevalență, screening)	Germene identificat Da/Nu Dacă da, care?	Rezistență microbiană MDR*) Da/Nu, Dacă MDR, precizați	Tipul de probă în care a fost identificat germenele	Tipul infecției/ localizarea colonizării	Originea infecției/ colonizării (internare anterioară, internare prezentă/ nedeterminată)	Clasificare finală (colonizare/ infecție/ infirmat)

Notă

\*) MDR = MRSA, ESBL, VRE, CRE/CPE, altele.

Figura 2

Fișa cazului de infecție asociată asistenței medicale

FIȘA cazului de infecție asociată asistenței medicale (IAAM) Codul pacient/  
FO.....

Județul..... Spitalul..... Secția..... Specialitatea.....

Se completează și se semnează de medicul curant din unitatea sanitară  
raportoare:



# REPORTING ON THE HEALTHCARE ASSOCIATED INFECTION RECORD

- ❖ **The file is completed by the doctor of the case and signed.**
- ❖ **Instances of infections associated with health care are transmitted monthly to the County Public Health Department by the 5th of the month for the previous month.**
- ❖ **In the sanitary units where this is possible the electronic database of the unit is organized according to the national single format, which will be sent to the County Public Health Department .**



# REPORTING ON THE HEALTHCARE ASSOCIATED INFECTION RECORD

County..... Hospital..... Section..... Specialty.....

Se completează și se semnează de medicul curant din unitatea sanitară raportoare:

## DATE DE IDENTITATE

Nume..... Prenume ..... Data nașterii \_\_/\_\_/\_\_ Vârsta :... ani;  
dacă vârsta < 1 an.... luni Sex:[ ] M [ ] F Domiciliu [ ] urban [ ] rural

## DATE CLINICE:

Data internării \_\_/\_\_/\_\_ Data externării \_\_/\_\_/\_\_  
Diagnosticul la internare  
Diagnosticul infecției asociate asistenței medicale (IAAM)  
Unde este cazul  
Data aplicării dispozitivului medical/intervenției chirurgicale \_\_/\_\_/\_\_  
Tipul intervenției  
Tratamentul antibiotic: (antibiotic, cale de administrare, perioadă)  
Izolată da/nu Contactați:da/nu..... Atitudine:  
Statusul la externare:  
[ ] vindecat [ ] ameliorat [ ] transferat [ ] decedat, dacă DA:  
Data decesului \_\_/\_\_/\_\_  
Cauza decesului [ ] IAAM [ ] posibil cauzată de infecția IAAM [ ] fără legătură cu IAAM [ ] necunoscut

## FACTORI DE RISC ASOCIAȚI

## DATE DE LABORATOR:

Etiologia: Germene / germeni în situația infecțiilor cu etiologie multiplă  
Rezistența microbiană

## CLASIFICAREA CAZULUI - originea:

Din spitalul raportor  Din alt spital  
 Unități de îngrijire cronici/vârstnici  Alte tipuri de îngrijiri medicale

Semnătura și parafa medicului curant: ..... Data completării: .....  
.....

Data validării Fișei de șeful serviciului de prevenire a infecțiilor asociate asistenței .....  
..... Semnătura și parafa:



# Standard precautions

- measures applied to prevent the transmission of pathogens, **predominantly parenterally**, during the medical act (ex: VHB, VHC, HIV).
- These procedures are designed to protect health care staff and prevent the spread of infections.

- ✓ All patients should be considered potentially infected;
- ✓ Blood, other biological fluids and tissues should be considered potentially contaminated with VHB, VHC, HIV or other pathogens;
- ✓ Needles and medical instruments should be considered contaminated after use.

The contact of the skin and mucous membranes with the following biological products should be considered risky :

- ✓ **blood;**
- ✓ pericardial fluid;
- ✓ pleural;
- ✓ peritoneal fluid;
- ✓ amniotic fluid;
- ✓ synovial fluid;
- ✓ Cerebrospinal fluid;
- ✓ sperm, vaginal secretions;
- ✓ **tissue;**

or any other organic fluids

obviously contaminated with blood!



✓ In the absence of visible blood in saliva, tears, sweat, urine, faeces, milk - these biological products are not considered at risk of HIV infection and do not require antiretroviral prophylaxis and post-exposure surveillance;

## **STANDARD ISOLATION :**

- ✓ Applies to most patients;
- ✓ Consists in applying Universal Precautions;
- ✓ Decontamination;

## Standard measures include :

- 1. hand hygiene**, which is essential to reduce the risk of spreading infections. The use of alcoholic antiseptics is the preferred method in all clinical situations, except when hands are visibly dirty (eg blood, other biological fluids) or after examination of patients with *Clostridium difficile* sau norovirus infection, situations where water and soap should be used;
- 2. use of personal protective equipment** (for example: gloves, gowns, facial protectors), depending on anticipated exposure. Hand hygiene is always the final step after removing and throwing the equipment;
- 3. safe injection techniques**, specific procedures to prevent the transmission of infectious diseases from one patient to another or between a patient and healthcare professionals during the preparation and administration of parenteral medicinal products;

## Standard measures include :

**4. safe handling of medical equipment or contact with potentially contaminated surfaces near the patient** - to prevent the transmission of infectious diseases from one patient to another or between a patient and healthcare personnel, during the handling of medical equipment and contact with objects or areas in the environment;

**5. breath hygiene and cough technique** (coughing and sneezing with the use of single use hanky and positioning at least 1 meter from other people, followed by hand hygiene) as an element of standard precautions addressing primarily patients and their visitors with possible symptoms respiratory infection, and applies to any person with such manifestations when entering the sanitary unit (patient reception and triage areas).

# Precautions addressed to the transmission path :

Precautionary measures addressing the pathogen pathway are intended to supplement standard precautions in patients with possible or known infections, with dangerous germs.

These additional precautions are used for situations where the transmission pathway is not completely discontinued by using standard precautions.



# Transmission by contact :

**1. directly**, when the micro-organism can be transmitted from one person to another (**contact with biological products**): during health care by healthcare professionals or in contact with family members or other patients;

**•2. indirectly** through contaminated surfaces / objects that involve the transfer of a micro-organism through previous contamination (**contamination of objects, equipment, food**), such as :

- staff hygiene is inadequate;
- the equipment is not properly cleaned, disinfected or sterilized;
- germs are transmitted using instrumentation.

# "CONTACT" ISOLATION :

- For pathogens :
  - Hepatitis A virus
  - *Herpes simplex*
  - Enteric pathogens : *Cl. difficile*
  - Multi-resistant bacteria : MRSA, VRE
- It also extends to patients with potentially contagious secretions :
  - Wound infections, drainage abscesses, eschar
  - Impetigo
  - Scab
  - Patients with incontinence (including infants, children, mentally altered patients), etc.

# "CONTACT" ISOLATION :

- **Require :**

- Placement in a private salon and grouping patients with the same pathology;
- Limited transportation;
- Equipping with non-sterile gloves and gown before entering and removing them after leaving the salon;
- Rigorous hand cracking with antiseptic agents;
- Separate tools with rigorous decontamination after use;
- Current and terminal decontamination!



## The *Flügge's drops* isolation :

1. infected expelled droplets when sneezed or coughing are too heavy to float in the air and transfer to less than 2 m from the source;
2. spreading droplets can be :
  - **directly** - is achieved when they reach the mucous membranes or are inhaled;
  - **indirectly** - occurs when they fall on surfaces or hands and are transmitted to mucous or food; is more common, described **in common respiratory infections.**

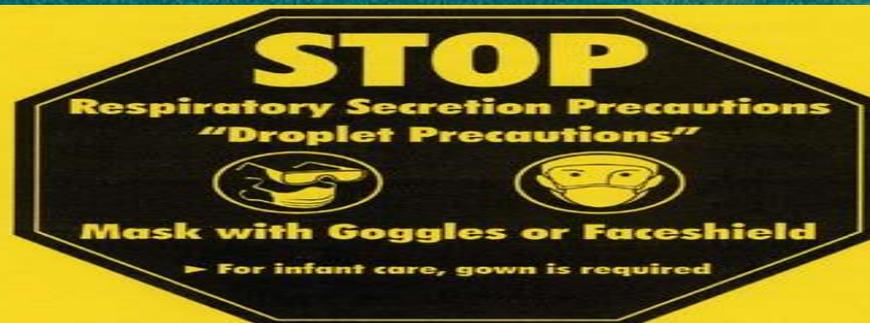
## The *Flügge's drops* isolation :

- For pathogens transmitted by Flügge drops with O peste 5  $\mu\text{m}$ :
  - *Haemophylus influenzae*
  - *Neisseria meningitidis*
  - *Streptococcus pyogenes*
  - *Corynebacterium diphtheriae*
  - *Bordetella pertussis*
  - **Influenza virus**, rubella, urlian, syncytial, etc.

# The *Flügge's drops* isolation”:

- **Require :**

- Placement in a private salon and grouping patients with the same pathology;
- Limited transport with mask;
- **Wearing the mask at a distance of less than 3 m**
- **Current decontamination, sometimes and terminal!**



**See reverse side for details**

**Visitors must speak with nurse before entering room**

Los visitantes tienen que hablar con una enfermera antes de entrar a la habitación

訪客必須在進入病房前 見一見護士

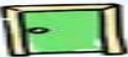
# Air transmission :

Transmission by **small particles** ( $\leq 5 \mu\text{m}$  in size) which carry microbes and can be transferred by air, over 2 m from the source.

**Isolation Room**



**To prevent the spread of INFECTION  
use the protective clothing  
provided !**

-  **Wear mask & goggles**
-  **Gloves**
-  **Gown**
-  **CLOSE -neg pressure door**

**Hand Hygiene!**  
wash hands  
  
or use a  
**alcohol hand rub**

www.visualhealthresources.com

# "Respiratory" isolation :

- For pathogens transmitted by air :

- *Mycobacterium tuberculosis*
- Varicella-zoster virus  
The measles virus
- Require :
- Placing in a private saloon with negative air pressure or air filtration system and sealed doors;
- Grouping patients with the same pathology;
- Limited transport with mask;
- Triage of visitors depending on susceptibility to the pathogen;
- Surgical mask mandatory!
- Current and terminal decontamination



# PROTECTIVE EQUIPMENT, COMPLETE AND CORRECT, MUST BE USED

## 1. GLOVES

a) **IT IS USED** in the following situations :

- **anticipated contact of hands with blood, contaminated biological fluids, other biological fluids with visible blood traces, human tissues;**
- **venous or arterial puncture;**
- **Collecting cerebrospinal fluid ;**
- **contact with patients with skin lesions (open wounds, eschar, bleeding lesions, etc.)**
- **handling, after use, of contaminated instruments for decontamination and disinfection.**

# PROTECTIVE EQUIPMENT, COMPLETE AND CORRECT, MUST BE USED



b) such as :

➤ **sterile, single use, used in :**

- **surgery (sometimes double gloves recommended);**
- **clinical examinations;**
- **interventions involving contact with body regions, normally sterile;**
- **vascular puncture;**
- **contact with damaged skin;**
- **handling of potentially contaminated materials;**

# PROTECTIVE EQUIPMENT, COMPLETE AND CORRECT, MUST BE USED



## ➤ non-sterile, clean, is used for:

- current examinations, involving contact with mucous membranes (unless otherwise recommended);
- handling of contaminated materials;
- cleaning, removal of contaminated biological products;

## ➤ for domestic use, of rubber, for:

- maintenance activities, involving contact with blood and other infectious biological products;
- collection / handling of contaminated materials, cleaning, decontamination of instruments, soft material, contaminated surfaces;
- cleaning, removal of biological products.

**PROTECTIVE EQUIPMENT,  
COMPLETE AND CORRECT, MUST  
BE USED**



**c) DIRECTIONS FOR USE:**

- Change after each patient;
- after use, remove by pulling the edge of the first gloves outward, throw them into the collection container and the other with their free hand inside, carefully remove them and drop them into the same container at hand;
- after removing the gloves, wash hands for 30 seconds, even if the gloves show no visible signs of damage;
- single use gloves are not reused!



## **2. Wearing a gown :**

- during all activities in the medical unit.

## **3. APRON ; WATERPROOF BLOUSE :**

- in addition wearing a gown when splashing, droplets, splashes of potentially contaminated biological products are anticipated, protecting the health care workers from:
  - surgical sections;
  - laboratories;
  - pathological anatomy services, legal medicine;
  - some administrative activities;
  - Emergency services.



**4. MASK** is used for protection :

- facial skin and
- oral mucosa, nasal, when it is anticipated the production of splashes, drops, spills of biological products.

**5. FACIAL PROTECTION** (glasses, screen protector) protects :

- facial skin;
- oral, nasal, ocular mucosa.

**6. BONNET** - simple (textile) or waterproof.



## *WASHING THE HANDS*

- the most important and sometimes the only way to prevent microbial contamination and dissemination!!!

### **WHEN ?**

- when entering / leaving the workplace;
- at the entrance / exit of salons;
- before and after examination of each patient;
- before and after treatment;
- before and after invasive investigations and procedures;
- special attention to patients with immune deficiencies!



- after removing the protective gloves;
  - after removing the mask used in the workplace, before preparing and distributing food and medication;
  - after passing his hand through his hair;
  - after administrative, household activities;
  - after personal hygiene: using the handkerchief; toilet
- HOW ?**
- remove jewelery (rings, bracelets, watches);
  - nails should be cut short and carefully cared for;



Wet hands.



Use soap.



Wash hands and count to 20.



Rinse completely.

- normal water and soap are used for normal washing;
- two consecutive soaps are required - 30 seconds;
- in case of emergency it is allowed to use antiseptics (can replace washing only in exceptional situations!);
- Washing is complemented with hand antiseptics in the following cases:
  - after manipulation of septic patients, contagious patients and those with severe immunodepression;
  - before and after performing parenteral treatments (gloves port is mandatory in vascular puncture and lumbar puncture);
  - after changing the bandages (with gloves!)
  - after intrarectal thermometry, enema,
  - after the lazy toilet (with gloves!);



- after performing the patient's toilet at admission;
  - after the handling and transportation of the corpses;
  - before and after examinations / ophthalmologic, dental and general examinations before and after any kind of maneuver involving the treatment or the production of skin injuries (with gloves!).
- WIPING and DRYING are MANDATORY!
- with single use paper towel.

# HAND SCANNING SYSTEM



2 Pictures of the hands are taken in the UV-lighted box with integrated wide angled digital cameras. Both palmar and the dorsal sides of the hands are scanned simultaneously.



## Reporting system

Hand-in-Scan Reporting System is a personalized software interface providing statistics about hand hygiene compliance and progress.

Hand-in-Scan has the ability to track individuals with its identification system, thus a continuous, unbiased and comprehensive monitoring is available. Individual practices together outline the organization's hand hygiene trends, allowing for targeted intervention.



# PREVENTION OF ACCIDENTS AND OTHER TYPES OF PROFESSIONAL EXPOSURE

## PROFESSIONAL EXPOSURE

- **by percutaneous inoculations :**

- **puncture;**
- **cutting;**

**contaminating the skin with injuries;**

- **mucosal contamination during :**

- **performing invasive medical procedures with needles and sharp instruments;**
- **handling of potentially contaminated biological products;**
- **handling of instruments and other sanitary materials contaminated with potentially infected biological products,**
- **handling of medical waste;**



## PREVENTION METHODS

### 1. contamination by sharp objects :

- minimizing parenteral procedures;
- collection, immediately after use, in puncture and cutting-resistant containers, marked appropriately - for destruction;
- avoiding recover, bending;
- avoiding removal of needles from disposable syringes;
- handling over sharp instruments carefully.

## PREVENTION METHODS



### 2. transmitting germs by lingerie:

- handling contaminated blood and other potentially contaminated biological products as little as possible;
- sorting and processing with suitable protective equipment in specially designed areas;
- **collecting in impermeable bags**, if required, marked;
- avoiding their prolonged storage before processing;
- ensuring a correct and complete cycle of processing / cleaning and decontamination;

## PREVENTION METHODS



### 3. Environmental decontamination:

- use of gloves to remove traces of blood or other biological fluids or tissues;
- initial decontamination with chlorinated substances, removal with absorbent paper (collected in containers or plastic bags marked);
- disinfection with germicidal solution;
- drying of the cleaned surface;
- using standard techniques for cleanliness, sterilization, decontamination of medical equipment, pavements, walls, furniture, dishes, glassware, cutlery.

## PREVENTION METHODS



### 4. Contamination by infectious waste:

- neutralization by burning or autoclaving;
- collection in waterproof containers, marked for clear differentiation, color and labeling.

### 5. Strict personal hygiene:

- washing hands;
- washing skin that has come into contact with potentially contaminated biological products or potentially contaminated materials;
- avoiding solutions for skin continuity; of immune deficiencies.

Even in emergencies will ensure the necessary to observe universal precautions !!



# PREVENTION OF URINARY NOSOCOMIAL INFECTIONS

- ❖ Limiting the recommendation and **duration of the bladder probe**;
- ❖ Continuous education of medical staff and **training of teams regularly** trained in the techniques of bladder surveys and possible complications;
- ❖ **Using the closed bladder probe** in which the probe and the collection bag are assembled together and avoid subsequent disconnections (even temporary, when not absolutely necessary); aseptic emptying of the bag through a lower tap and the urine sampling is also aseptic.
- ❖ hand washing with antiseptics immediately before or after any catheter handling;
- ❖ **use of sterile gloves** when mounting the probe;
- ❖ Preparation of the genito-urinary area by washing with soap and water, after a local antiseptics is practiced;
- ❖ Lubrication of the single use bladder probe is made with a single-dose lubricant;
- ❖ the probe lumen should be as small as possible to prevent trauma to the urethra;



# PREVENTION OF URINARY NOSOCOMIAL INFECTIONS

- ❖ **installing the bladder probe and collecting bag using an aseptic technique;**
- ❖ fixing the probe to prevent the movement and traction of the urethra;
- ❖ fixing the collection bag allowing for the regular removal of urine but preventing the bag from contacting the pavement;
- ❖ urinary leakage is done with strict aseptic measures;
- ❖ periodically emptying the collection bag in an individual container (**at 8 h or when filling  $\frac{3}{4}$** ) for each patient without direct contact between the bag and the non-sterile container;
- ❖ the patient with the bladder probe requires: a rigorous daily toilet, proper hydration, clinical observation;
- ❖ **the hygiene of medical staff** is crucial to reducing germ transmission;
- ❖ lavage and bladder irrigation should be avoided (except when obstruction occurs);
- ❖ it is not recommended to perform cybacteriological examinations, **but bacterial cultures;**



# PREVENTION OF URINARY NOSOCOMIAL INFECTIONS

- ❖ if antibiotic therapy is needed, the **duration should be as short as possible**. If the bladder probe is not removed, the therapeutic decision is based on clinical development and less on microbiological results;
- ❖ **Asymptomatic bacteriuria** is generally not treated, except immunocompromised patients or patients infected with *Serratia* sp., *Klebsiella pneumoniae*, or endovascular / valvular prosthesis carriers or preoperative prophylaxis for the installation of prostheses of this type. se evită scoaterea sondelor după intervale fixate arbitrar;
- ❖ to prevent transmission of germs, the placement of infected patients in beds close to those not uninfected is avoided;



# PREVENTION OF EXOGENOUS NOSOCOMIAL PNEUMONIA (SURGERY, INTENSIVE CARE)

- ❖ **Decontamination of staff hands** by washing with antimicrobial soap or alcohol-based antiseptic lotion, before and after contact with the patient,
- ❖ **gloves are used** when handling the endotracheal tube or aspiration of bronchial / oropharyngeal secretions;
- ❖ **sterilization / disinfection** of whole instrumentation - intubation probes, nasal probes, oxygen therapy masks, assisted ventilation equipment or general anesthesia (or use of single use materials);
- ❖ **changing nasal or oxygen masks** when patients leave, and using sterile water to moisturize oxygen;





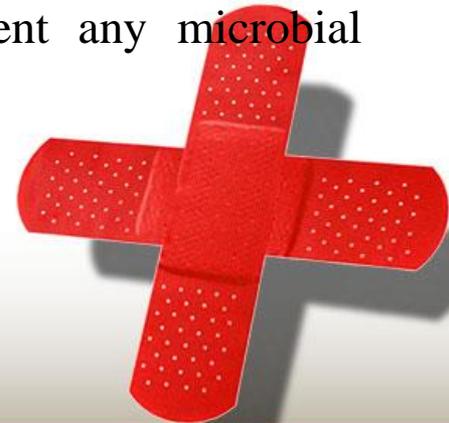
# PREVENTION OF EXOGENOUS NOSOCOMIAL PNEUMONIA (SURGERY, INTENSIVE CARE)

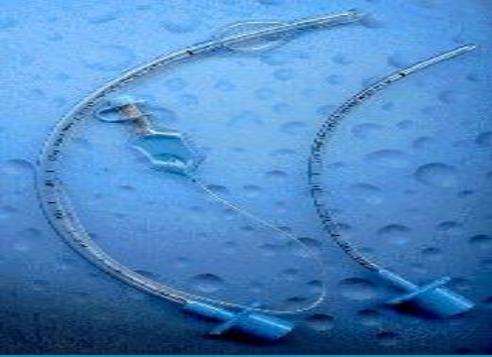
- ❖ humidifiers - cleaned, disinfected, dried daily; Oxygen therapy with a flow rate of less than 3 l / min rarely requires humidification;
- ❖ control of the hospital air conditioning system to avoid pathology caused by *Pseudomonas aeruginosa* or *Legionella pneumophila*;
- ❖ "drop" isolation - for patients infected with respiratory viruses or colonized / infected with multi-resistant aerogenic bacteria;
- ❖ the establishment of quarantine / restricting visitors' access during periods of community-based respiratory epidemics.



# PREVENTION OF EXOGENOUS NOSOCOMIAL PNEUMONIA (SURGERY, INTENSIVE CARE)

- ❖ Internal components of the anesthesia machine (gas source, pressure regulators, vaporizers):
  - are not considered as important sources of bacterial contamination of anesthetic gas
  - no routine sterilization or high level disinfection is required.
- ❖ **reusable components** that come in direct contact with the oro-tracheal mucosa (facial mask, tracheal probe) that can be contaminated with respiratory secretions (Y-piece, inspiratory and expiratory tubes, attached sensors, humidifier, reservoir):
  - Must be cleaned and sterilized by autoclaving or ethylene oxide (when the material allows) or high level disinfection through pasteurization over 70 ° / 30 minutes or by using liquid chemical disinfectants.
  - They should then be rinsed with sterile water to prevent any microbial contamination.





# PREVENTION OF EXOGENOUS NOSOCOMIAL PNEUMONIA (SURGERY, INTENSIVE CARE)

- ❖ Intubation probes, tracheostomy cannulas - disposable;
- ❖ Masks are disinfected at a high chemical level between 2 uses;
- ❖ Humidity and proper temperature of inhaled gas must be ensured by the use of filters.
- ❖ To prevent transmission, antibacterial and antiviral filters can be used, which will be changed regularly to 48 hours or whenever needed, due to bronchial saturation.





# PREVENTION OF EXOGENOUS NOSOCOMIAL PNEUMONIA (SURGERY, INTENSIVE CARE)

- ❖ the use of gloves when manipulating the endotracheal tube or aspiration of bronchial / oropharyngeal secretions;
- ❖ Preventing aspiration of the gastric fluid by **lifting the upper body** at an angle of 30-45 ° C, avoiding prolonged, long-lasting sedatives and not recommending the routine administration of H2 antagonists, antacids and sucralfate for mechanically ventilated patients;
- ❖ Prevention of aspiration of oropharyngeal and tracheal secretions by oropharyngeal antiseptics and periodic **aspirations at regular intervals** (3-4 hours), after prior lavage with antiseptic solutions or sterile physiological saline serum;
- ❖ The use of non-invasive ventilation, if the clinical condition allows, or the preferred orotracheal intubation, if assisted ventilation is indispensable;
- ❖ Avoid colonization of inferior airways by keeping the cough reflex. The colonization of the airways is also controlled by aerosols with antimicrobial solutions: perioperative antisepsia;
- ❖ **Avoid excessive use of antibiotics to minimize the risks of multi-resistance!**





# PREVENTION OF ENDOGENOUS NOSOCOMIAL PNEUMONIA (INTENSIVE CARE)

- ❖ In intensive care units where there is a high risk of contacting endogenous nosocomial pneumonia:
  - various selective decontamination regimens of the digestive tract can be applied by administering nonresorbable antibiotics - Polimixin, Colistin, aminoglycosides - Gentamicin, or quinolones - Ciprofloxacin, Norfloxacin, antifungal - Amphotericin B, Nystatin, oral or oral or by a nasopharyngeal probe;
    - administration of systemic anti-inflammatory chemotherapy(i.v.).
- ❖ **the benefits of these schemes are counterbalanced by the increase in the potential of many bacterial resistance;**
- ❖ **Selective decontamination schemes are not routinely recommended for all intubated / mechanically ventilated patients intensive care units !**





# PREVENTION OF POST-OPERATIVE NOSOCOMIAL PNEUMONIA (INTENSIVE CARE)

- ❖ **smoking prohibited** at least 15 days before the intervention,
- ❖ **treatment of preoperative** respiratory infections,
- ❖ **facilitating airway drainage** by pre- and postoperative kinetic therapy - deeply inspire and favor cough reflex,
- ❖ **early mobilization** and
- ❖ **postoperative analgesia** that does not inhibit cough reflex.





# PREOPERATIVE PREVENTION

- ❖ Limiting the preoperative hospitalization period by performing ambulatory tests;
- ❖ Treatment of preoperative infections prior to intervention (eg. urinary or cutaneous infections)
- ❖ **Shaving is forbidden!** If depilation is required, it is preferable to cut the hair at the skin just before the act (possibly chemical depilation, after skin sensitivity testing). In cases where shaving is still used, it should be strictly limited to the surgical incision area, made with an antiseptic soap monodose, only in the operating block;
- ❖ The patient's personal toilet includes a general shower (including hair) with antiseptic soap, made on the evening before the intervention and repeated if possible in the morning;
- ❖ Asks the patient about allergic antecedents before selecting the antiseptic solution;





# PREOPERATIVE PREVENTION

- ❖ The antisepsis of the incision area is done with soap and then the application of an antiseptic solution **in concentric circles from the center to the periphery**;
- ❖ Restricting access to the operator block, for authorized medical and care staff only;
- ❖ Washing hands and dressing of the operating team according to the protocols in force;
- ❖ Decontaminating the operator block by cleaning followed by high-level disinfection or sterilizing all materials that permit such a process, according to the existing protocol;
- ❖ Permanent check of the proper function of the air conditioning system in the operator unit;
- ❖ Obligation of medical staff to declare infectious pathology, temporarily relieving professional duties, without fear of possible repercussions;



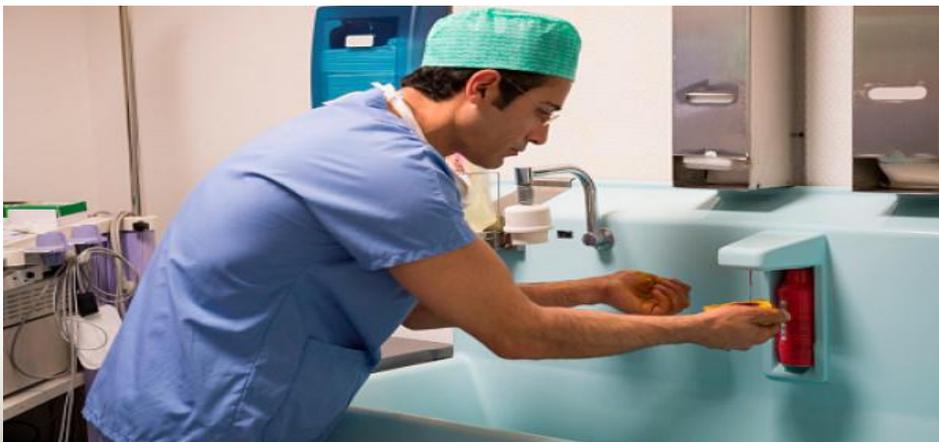
# INTRAOPERATIVE PREVENTION

- ❖ Wear appropriate and sterile protective equipment by all team members - gown, mask, cap, glasses, gloves. It is recommended to use 2 pairs of sterile surgical gloves with change of the external pair after each operator time or in case of contamination / perforation / penetration of blood or other biological products;
- ❖ Use of appropriately sterilized surgical instruments;
- ❖ The entire surgical technique should be performed with rigorous observation of asepsis and minimization of operator traumas (effective haemostasis, minimal tissue devitalization);
- ❖ Avoid devitalized spaces in suturing (especially for obese patients);



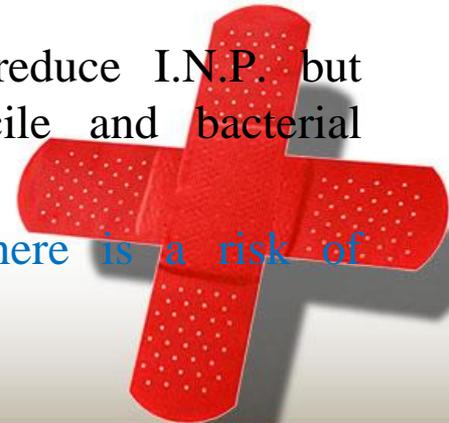
# INTRAOPERATIVE PREVENTION

- ❖ Drainage made by separate incision;
- ❖ In contaminated wounds - suture is delayed;
- ❖ In open wounds - avoiding necrotizing fasciitis !!!
- ❖ Good oxygenation of tissues intra and postoperative;
- ❖ Control of body temperature intra and postoperative;
- ❖ Control of intra and postoperative blood glucose below 200 mg / dl (both diabetic and non-diabetic patients);



# INTRAOPERATIVE PREVENTION

- ❖ Parenteral antibioprohylaxis is indispensable for class I surgery (clean - vascular, cardiovascular surgery) and in clean-contaminated / contaminated or NNIS (National Nosocomial Infection)  $\geq 1$  interventions using anti-infectives chemotherapeutics with proven efficacy in specialist studies;
- ❖ In septic interventions, antibiotic therapy is chosen and applied depending on the location, severity of the infection and the micro-organisms involved;
- ❖ Antibioprohylaxis begins at the time of induction of anesthesia and is limited to the duration of the intervention (with readministration in prolonged interventions), maximum 24-48 hours postoperatively (for class I);
- ❖ Prolongation of postoperative antibioprohylaxis does not reduce I.N.P. but increases the risk of enterocolitis with *Clostridium difficile* and bacterial multiresistance;
- ❖ Oral antibiotic prophylaxis can be used in cases where there is a risk of endocarditis;



# POSTOPERATIVE PREVENTION

- ❖ Apply a sterile dressing (fibrin creates a biologically less environmentally-influenced dressing)
- ❖ We must insist on the rigorous hygiene of medical staff hands before and after changing the dressing or any contact with the surgical suture area;
- ❖ Changing the dressing is done with rigorous asepsis;
- ❖ The administration of local topics has a reduced role in the prevention of I.N;
- ❖ The patient is educated about reporting any symptoms occurring in the postoperative period;
- ❖ Early mobilization to prevent eschar (pressure sores).



# PROPHYLAXIS OF CATHETER INFECTIONS (PERIPHERAL + CENTRAL)

- ❖ Limitation of indications;
- ❖ Achieving and compliance an implantation protocol, maintenance of the intravascular device and diagnosis of nosocomial catheter infections;
- ❖ **Introducing with compliance of a rigorous aseptic by experienced staff;**
- ❖ Preferential use of subclavicular approach in case of central catheterization;
- ❖ Antiseptic site of venipuncture;
- ❖ **Catheter anchoring** to reduce the risk of colonization;
- ❖ **The use of a sterile occlusive dressing**, replaced after 24 hours by a transparent, semi-transparent one, allowing the place to be permanently viewed;



# PROPHYLAXIS OF CATHETER INFECTIONS (PERIPHERAL + CENTRAL)

- ❖ Topical antibiotics at the insertion site are not used due to the risk of developing microbial resistance;
- ❖ Antimicrobial or antiseptic impregnated central catheters (Minocycline, Rifampicin, Sulfatiazide Silver) may be used in adults only for an implantation period of more than 5 days when the other strategies did not achieved the expected results (but not routine!) In child, they can not be used!
- ❖ No intranasal or systemic antimicrobial prophylaxis is administered;
- ❖ Change of peripheral venous line at 72 h intervals;
- ❖ Use only sterile solutions - Check validity, appearance before administration!



# PROPHYLAXIS OF CATHETER INFECTIONS (PERIPHERAL + CENTRAL)

- ❖ Rapid detection of local inflammatory signs by regular visualization and palpation, with patient reporting of any discomfort related to the intravascular device.
- ❖ Record date, catheter insertion time, name of the person who implanted it, date of change of dressing and removal of the intravascular device;
- ❖ Applying hygiene rules by staff, washing hands with water and antibacterial soap or using an alcohol-based product;
- ❖ Limiting handling of the system by administering additional drugs in the solution container **at the end of the infusion line**;





# FOR CENTRAL CATHETERS

- ❖ Training of medical staff - surgical lavage of hands, dressing of sterile equipment - mask, cap, dressing gown, gloves
- ❖ Preparing the catheter insertion area:
  - it is not recommended to shave the skin (if depilation is indispensable, use scissors, depilation cream);
  - Site antisepsis on a larger area than insertion;
  - Installing a sterile field over the insertion region;
- ❖ **Attaching the catheter** to the skin through a non-resorbable, solid suture;
- ❖ **Covering of the insertion area** is accomplished by a standard or semi-permeable sterile dressing to allow daily catheter inspection;
- ❖ Changing pulmonary artery catheters at 4-5 days, and for other locations, whenever malfunctions or suspicions of infection occur.

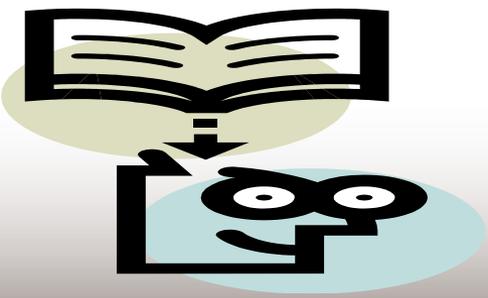




# FOR PERIPHERAL CATHETERS

- ❖ **Avoiding** the peripheral catheter implementation in the lower limb veins;
- ❖ **Change of tubing and perfusion attachments** is performed **at 72 h** and in case of i.v. blood products or lipid solutions after the passage of each product;
- ❖ The connections must be disinfected before each administration.





# Hygiene principles in the preparation and administration of parenteral treatments



# REMINDER :

- ❖ Prior to parenteral treatment, you should:
  - Verified the **shelf-life** of syringe and needle sterilization;
  - Verified **the shelf life of the solutions, their appearance (clear, transparent, without precipitation)** as well as the integrity of the ampoule / vial;
  - The suspensions will shake until the deposits are solubilized;
  - **Hand washing with water and soap / antiseptic solution; venous puncture is carried with sterile gloves;**
  - Disinfect the vial cap;
  - The needle is inserted into the ampoules without touching the edges or tip of the ampoule;
  - Open glass vials can not be stored;



# REMINDER :

- If glass pieces fall in solution, its contents will no longer be used!
- Unlabelled vials / bottles or unreadable inscriptions will be thrown away!
- Do not leave a needle in the rubber stopper between maneuvers! (facilitates content contamination);
- As much as possible, avoid multidose vials - when this is not possible, use a sterile needle every time the solution is withdrawn from the vial;
- Do not inoculate in infected skin areas or injured;
- On the inoculation site an antiseptic is applied like alcohol 70 ° ± another antiseptic;
- Drain air from the syringe before administration;
- Check the needle position by suction;



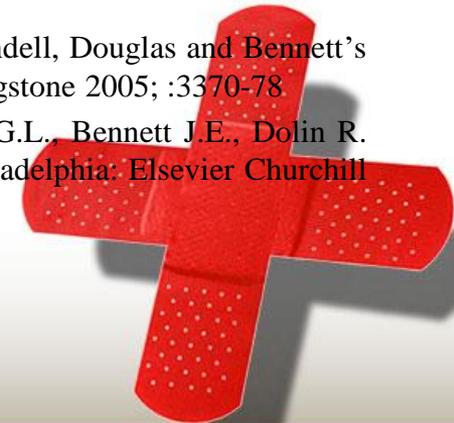
# REMINDER :

- ❖ Strict compliance to indications and contraindications for each route of administration:
  - Selection for the right place of election;
  - Iso and hypertonic solutions are not administered sc. and im. (caustic effect!)
  - Oily solutions are not administered iv. (due to the risk of embolism);
  - Replacement of infusion vials is done before they are fully emptied;
- ❖ Compliance with aseptic rules!!!



# REFERENCES

- ❖ Garner J.S, Jarvis W.R., Emori T.G. et al. CDC Definitions for Nosocomial Infections, in Olmsted R.N. APIC Infection Control and Applied Epidemiology – Principles and Practice. St. Louis 1996; A1-A20
- ❖ Ministerul Sănătății. Ordinului nr.916/iulie 2006, privind aprobarea normelor de supraveghere, prevenire și control al infecțiilor nosocomiale în unitățile sanitare, disponibil pe <http://www.lege-online.ro/lr-ORDIN-916-2006-%2874963%29.html>
- ❖ Ministerul Sănătății. ORDIN nr. 1.101 din 30 septembrie 2016 privind aprobarea Normelor de supraveghere, prevenire și limitare a infecțiilor asociate asistenței medicale în unitățile sanitare - Data intrării în vigoare: 7 octombrie 2016
- ❖ Magiorakos AP, Srinivasan A, Carey RB, Carmeli Y, Falagas ME, Giske CG et al: Multidrug-resistant, extensively drug-resistant and pandrug-resistant bacteria: an international expert proposal for interim standard definitions for acquired resistance. Available from: <http://onlinelibrary.wiley.com/doi/10.1111/j.1469-0691.2011.03570.x/pdf>
- ❖ St. Harbartha, Ruefb Ch., Franciolic P. et al. Nosocomial infections in Swiss university hospitals: a multi-centre survey and review of the published experience. Schweiz. Med. Wochenschr. 1999; 129:1521–28
- ❖ Eggimann P., Pittet D. Infection Control in the ICU. Chest 2001; 120:2059-93
- ❖ Warren J.W. Nosocomial Urinary Tract Infections, in Mandell G.L., Bennett J.E., Dolin R. Mandell, Douglas and Bennett's Principles and Practice of Infectious Diseases, 6th edition, Philadelphia: Elsevier Churchill Livingstone 2005; :3370-78
- ❖ Talbot T.R., Kaiser A.B. Postoperative Infections and Antimicrobial Prophylaxis, in Mandell G.L., Bennett J.E., Dolin R. Mandell, Douglas and Bennett's Principles and Practice of Infectious Diseases, 6th edition, Philadelphia: Elsevier Churchill Livingstone 2005; :3533-44



# REFERENCES

- ❖ CDC. Bacterial Pneumonia, MMWR, 1997; 46, No.RR1-85
- ❖ Barsiç B., Beus E., Marton E. et al. Nosocomial Infections in Critically Ill Infectious Disease Patients: Results of a 7-Year Focal Surveillance. Infection 1999; 27(1):20-26
- ❖ Strausbaugh L.J. Nosocomial Respiratory Infections, in Mandell G.L., Bennett J.E., Dolin R. Mandell, Douglas and Bennett's Principles and Practice of Infectious Diseases, 6th edition, Philadelphia: Elsevier Churchill Livingstone 2005; :3362-69
- ❖ Beekmann S.E., Henderson D.K. Infections caused by Percutaneous intravascular Devices, in Mandell G.L., Bennett J.E., Dolin R. Mandell, Douglas and Bennett's Principles and Practice of Infectious Diseases, 6th edition, Philadelphia: Elsevier Churchill Livingstone 2005; :3347-60
- ❖ CDC Guideline for Prevention of Cateter-Related Nosocomial Infections, MMWR 2002; 51, No.RR10
- ❖ Kalenic S., Borg M. Principles of Antibiotic Policies, in IFIC Basic Concepts of Infection Control, International Federation of Infection Control, Portadown 2007:57-64
- ❖ Brenner P., Ransjo U. Isolation Precautions in IFIC Basic Concepts of Infection Control, International Federation of Infection Control, Portadown 2007:75-82

