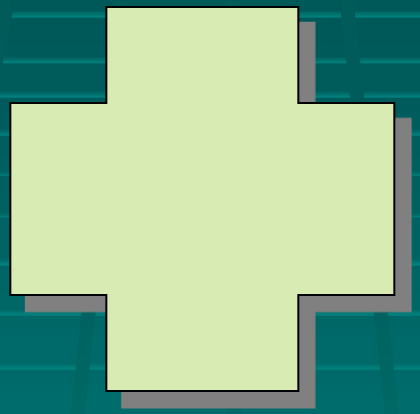
University of Medicine and Pharmacy “Victor Babeş” Timişoara
Epidemiology Department



Prevention of occupational exposure to blood products for healthcare professionals

The task of the person exposed accidentally :

- **immediately apply the management protocol for accidental exposure to biological products, such as:**

1. emergency care :

- **Skin exposure: Wash with water and soap for 5 minutes;**
- **Percutaneous exposure: washing with water and soap, followed by application of an antiseptic with contact time as recommended by the manufacturer;**
- **mucosal exposure: wash with physiological serum or water for 5 minutes.**

2. chemoprophylaxis, for HIV infection, depending on the type of exposure, the condition of the source patient;

3. Post-exposure vaccination :

- **in the first hour of the accident go to the head physician or chief doctor on duty;**
- **within 24 hours goes to the department responsible for the prevention of healthcare associated infections for risk assessment;**
- **within 48 hours notifies the labor medicine physician about the evidence;**

The task of head department or chief doctor on duty :

- **completes and submits to the service / department for the prevention of healthcare associated infections within 24 hours of the occurrence of the accidental exposure, the record of the accidental exposure of health care staff and auxiliary staff to biological products;**
- **records accidental exposure to the accidental exposure register of biological articles of the department;**
- **ensures that blood samples are collected from the source patient within 2 hours of accidental exposure, while complying with the legislation on voluntary testing and counseling;**
- **ensures the collection of blood samples from accidentally exposed personnel within a maximum of 2 hours from the time of exposure, in compliance with the legislation on voluntary testing and counseling;**
- **ensures the transport of blood samples from the source patient to the hospital analysis laboratory where the exposure took place.**

The task of the sanitary unit in which accidental exposure occurred :

- **ensures the sampling and testing of blood samples from the source patient and the person who is accidentally exposed to biological products, according to their known antecedents. The tests are: AgHBs, antiHBs, antiHBc, antiVHC, test HIV;**
- **ensures the evaluation of the person accidentally exposed by the hospital's infectious physician or sending the exposed person to the infectious disease department / hospital / interdisciplinary consultation;**
- **provides for anti-hepatitis B vaccination, if the exposed person has no marker indicating that he or she has been vaccinated or has gone through the disease;**
- **for cases where chemoprophylaxis for HIV infection is required, it is provided by the Infectious Diseases Hospital / Hospital.**

Professional exposure document to biological products

Fişa raportării expunerii accidentale a personalului
medico-sanitar, de îngrijire şi auxiliar
la produse biologice

Judeţul..... Spitalul.....
Secţia/compartimentul unde a avut loc expunerea accidentală
.....

DATE PERSOANĂ EXPUSĂ: Nr. de înregistrare al cazului raportat.....

Iniţiale .... CNP ..... Data naşterii __/__/__ Sex: []M []F
Categorie profesională:
[] medic [] asistent [] personal de îngrijire [] personal auxiliar
Vechime în activitatea profesională..... Vechime în serviciul actual.....
Status vaccinal HVB:
[] vaccinare completă 3 doze [] vaccinare incompletă
[] în curs de vaccinare [] nevaccinat [] necunoscut

DATE DESPRE EXPUNEREA ACCIDENTALĂ:

Data expunerii: _/__/____ Ora expunerii.....
Locul producerii expunerii .....
Manevră [] de rutină [] situaţie de urgenţă
Natura expunerii:
Înţepare ac: [] DA [] NU
Tăiere [] DA [] NU dacă DA: Leziune [] superficială [] profundă
Contact cu fluid biologic: [] DA [] NU,
dacă DA tipul fluidului biologic.....
Locul contactului: [] mucoase [] tegumente intacte [] tegumente lezate

MECANISMUL EXPUNERII ACCIDENTALE

[] Autoaccidentare
[] Accidentare de către un pacient
[] Accidentare de către un coleg
[] Accidentare prin colectare-transport deşeuri tăietoare/înţepătoare
[] Alte mecanisme.....

PREVENIREA:

Aplicarea precauţiilor standard: [] DA [] NU
Echipament de protecţie:
Mănuşi [] DA [] NU Mască [] DA [] NU [] nu este cazul
Halat [] DA [] NU Protector facial [] DA [] NU [] nu este cazul
alte.....

Professional exposure document to biological products

[] Alte mecanisme.....

PREVENIREA:

Aplicarea precauţiilor standard: [] DA [] NU
Echipament de protecţie:
Mănuşi [] DA [] NU Mască [] DA [] NU [] nu este cazul
Halat [] DA [] NU Protector facial [] DA [] NU [] nu este cazul
alte.....

DATE-SURSA EXPUNERII ACCIDENTALE:

Sursă: cunoscută [] DA [] NU
dacă DA - Date pacient-sursă cunoscută:
Status HIV:
infectat [] DA [] NU [] necunoscut dacă da tratamentul.....
Status VHB:
infectat [] DA [] NU [] necunoscut dacă da tratamentul.....
Status VHC
infectat [] DA [] NU [] necunoscut

ATITUDINEA FAŢĂ DE PERSOANA EXPUSĂ

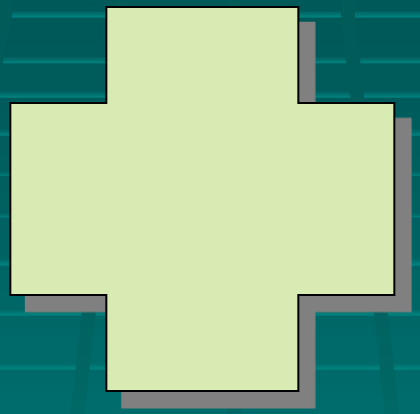
MĂSURI IMEDIATE [] DA [] NU
Spălare cu apă şi săpun [] DA [] NU [] Antiseptic [] DA [] NU
TESTARE
Testul HIV rapid [] DA [] NU dacă nu de ce?.....
Examene serologice iniţiate cu ocazia expunerii
HIV ELISA [] DA [] NU
Antigen HBs [] DA [] NU Anticorpi anti HBs [] DA [] NU
Anticorpi anti HVC [] DA [] NU
Altele.....
VACCINARE HVB [] DA [] NU
CHIMIOPROFILAXIA infecţiei HIV [] DA [] NU data începerii../.../.....
Comentarii:.....

Nume prenume şi semnătură medic şef secţie/compartiment/medic şef
gardă care a înregistrat expunerea accidentală la produse biologice:

.....

Data completării:

.../.../.....



Prevention of HBV infection in medical staff

Risk assessment after accidental exposure to blood

Virus	Risk associated with transmission mode			Risk associated with the biological product		
	Percutaneous	Mucous/ injured skin	Bite	proven	potential	null
VHB 0,00004 ml	2-40 %	Unmeasured, > only for VHC, HIV	Unmeasured but proven	▪Blood ▪biological fluid	▪Sperm ▪Vaginal fluid ▪ oral fluid	▪Urine ▪ feces
VHC	2-8 %	Unmeasured but proven	Unmeasured but proven	▪Blood	▪biological fluid	▪Urine ▪ feces
HIV 1 ml	0,32 %	0,9% 0,04 %	Unmeasured but proven	▪Blood ▪biological fluid	▪Sperm ▪Vaginal fluid ▪ pleural fluid, amniotic ▪Cerebrospinal fluid,	▪Urine ▪ feces ▪oral fluid

Other pathogens transmitted by blood :

- *Plasmodium malarie, falciparum, vivax;*
- *M. tuberculosis; M. leprae;*
- *Leptospira spp.;*
- *Rickettsia spp.;*
- *Treponema spp.;*
- *Toxoplasma gondi;*
- *Staphylococcus aureus;*
- *Brucella spp.;*
- *Citomegalvirus;*
- *Herpesvirus;*

Factors involved in parenteral transmission

Factors related to the type of Accidental Blood Exposure	Percutaneous exposure > mucocutaneous
Mucocutaneos exposure	Long exposure time> short The presence of skin lesions > absence
For percutaneous accidents	Deep injury> superficial Empty needle > full Device iv. > needle sc. sau im. The presence of visible blood > absence Large needle> small size when no gloves are used > when gloves are used
Factors linked to the source patient	Stage AIDS > stages of infection HIV CD_4 under 200 > CD_4 above 200 High viremia + > low + or undetectable AgHBe - = 2-6%; AgHBe + = 30-40% Untreated > treated efficient
Factors related to exposed person	Receptive > immunized Without post-exposure prophylaxis > with prophylaxis

Risk factors in surgical specialties

- **Type and duration of surgery,**
- **Operator team technique,**
- **Type of intervention: higher risk for emergency interventions,**
- **Physical and mental health of each member of the operating team,**
- **Degree of specialization - Residents and recent specialists have higher rates of accidental exposure.**

Medical procedures frequently associated with Accidental Blood Exposure

Percutaneous accidents	**-putting perfusion** **-Surgery suture** **-Arterial / venous catheterization** **-putting the cover (needle)** **-Handling of waste containers**
Splash accidents	**-Performing laboratory tests** **-Oral and nasopharyngeal intubation** **-Ventilation** **-Tracheal aspiration** **-Endoscopy** **-Dialysis / haemofiltration**

Comparison between medical and surgical sections

Accidental Blood Exposure in medical sections	Accidental Blood Exposure in surgical sections
- Percutaneous injuries less common	- Very common percutaneous accidents
- Serious percutaneous accidents	- Less severe percutaneous accidents
- less frequent splash	- More frequent splash
	RISK higher in the surgical section

Non-specific prevention

- ✓Use of disposable materials and tools / appropriate decontamination and sterilization of reusable instruments;

- ✓Applying universal precautions!!!
  - ✓All patients are considered as potential sources of infection for VHB;
  - ✓Wearing protective equipment;
  - ✓Prevent accidental exposure to blood or other infectious biological fluids;
  - ✓Proper hygiene of medical staff;

Wearing protective equipment

Procedure	Hand wash	gloves	Dressing gown	mask	glasses
Examining the patient	*	*			
Blood collection	*	*			
Mounting of venous catheters / venous puncture	*	*			
Aspiration	*	*	*	If there is a risk of splashing	If there is a risk of splashing
Mounting of catheters	*	*	*	If there is a risk of splashing	If there is a risk of splashing
Handling dirty materials	*	*	*	If there is a risk of splashing	If there is a risk of splashing
Intubation / Endoscopy	*	*	*	*	*
Arterial puncture	*	*	*	*	*
Operations / emergency interventions	*	*	*	*	*

Wash / antisepsis of hands, teguments

- **Current washing - with water and soap / antiseptic soap; contact time 40-60 s.**

- **Antisepsis for hands - with antiseptic preparations;**
  - **contact time 20-30 s.**
  - **In case of massive contamination - longer contact time**
- **Antiseptic for skin – Before venous puncture, injections im. – 15 s.; before the joint puncture, before puncture of the cavity organs – minimum 1 min.; before surgery – multiple applications, 10 min.**

Wash / antisepsis of hands, teguments

- **Surgical antisepsy :**
  - **apply antiseptic lotion (alcohol + glycerin) 3-5 ml for each application, 2 times (about 6-10 ml / wash);**
  - **time 3-5 min.;**
  - **Rinse with water;**
  - **Use soft brushes or leather sponges, nail brushes;**
  - **Sterile towels used only for the operator block.**

Non-specific prevention - Special precautions in surgery

- ✓**Wearing 2 pairs of gloves, glasses, mask, cap, plastic apron under the gown, waterproof footwear,**
- ✓**avoiding simultaneous sutures in the same wound–** 1 wound = 1 surgeon
- ✓**Using laser techniques, electrocoagulation,**
- ✓**Using non-invasive methods - laparoscopy,**
- ✓**Using stitch tipped needles, curved needles,**
- ✓**Avoiding the transmission of sharp instruments from hand to hand - put it on a tray.**

Nonspecific Prevention - Special Precautions in Endoscopy

- ✓Wear gloves, apron, mask, glasses,
- ✓Proper ventilation in cabinets,
- ✓The endoscope should be disinfected before the first day procedure and after each procedure,
- ✓The endoscope should be cleaned with water and enzyme compounds by irrigating and brushing the channels;
- ✓Then the endoscope and internal channels are flooded with 2% glutaraldehyde for at least 15 minutes, sterile water washes, immerse in alcohol 70%,
- ✓Minimum level disinfection (chemical sterilization)!
- ✓Cytology brushes and biopsy forceps can be sterilized by autoclaving - separately for each patient;
- ✓Storage to prevent recontamination!

Nonspecific Prevention - Special Precautions in Endoscopy

- ✓ **Gastrointestinal endoscopy :**
  - ✓ **etiological agents : *Salmonella* spp., *Pseudomonas aeruginosa, Clostridium difficile*;**
  - ✓ **clinical connection - from simple colonization to death!**
- ✓ **bronchoscopy :**
  - ✓ **etiological agents : *M. tuberculosis.* M. atipice,**

Nonspecific Prevention - Special Precautions in Endoscopy

Chemical Sterilization of "Critical Objects"

Glutaraldehyde (≥ 2.0%)

Hydrogen peroxide-HP (7.5%)

Peracetic acid-PA (0.2%)

HP (1.0%) and PA (0.08%)

HP (7.5%) and PA (0.23%)

Glut (1.12%) and Phenol/phenate (1.93%)

Exposure time per manufacturers' recommendations

High Level Disinfection of "Semicritical Objects"

Exposure Time ≥ 12 m-30m, 20°C

Germicide	Concentration
Glutaraldehyde	≥ 2.0%
Ortho-phthalaldehyde (12 m)	0.55%
Hydrogen peroxide*	7.5%
Hydrogen peroxide and peracetic acid*	1.0%/0.08%
Hydrogen peroxide and peracetic acid*	7.5%/0.23%
Hypochlorite (free chlorine)*	650-675 ppm
Glut and phenol/phenate**	1.21%/1.93%

*May cause cosmetic and functional damage; **efficacy not verified

Nonspecific Prevention - Special Precautions in the Laboratory

- ✓All samples of blood / biological products are placed in secure containers, which can prevent leaking,
- ✓Avoid contamination of the analysis documents, the front of the test tubes, the container in which the samples are carried,
- ✓All people who handle blood samples must wear gloves!
- ✓Eyeglasses and protective masks are used for splashing or aerosolizing risks;
- ✓Only mechanical pipetting is used!
- ✓The work surface is decontaminated after removal of blood traces and after work is completed,
- ✓It does not eat, does not drink, does not smoke in the lab!
- ✓Reduction of glassware and use of single use materials.

Testing the immune status of medical staff

- **Medical staff must be tested for Ag HBs, Atc HCV, Atc HIV:**

- **On hiring,**
- **In periodical medical test - if there is firm indication,**

- **Biannual serological testing is recommended for the :**
  - **Surgical sections,**
  - **Transfusion Centers,**
  - **Contagious diseases,**
  - **Obstetrics / Neonatology Departments,**
  - **Child Protection Units.**

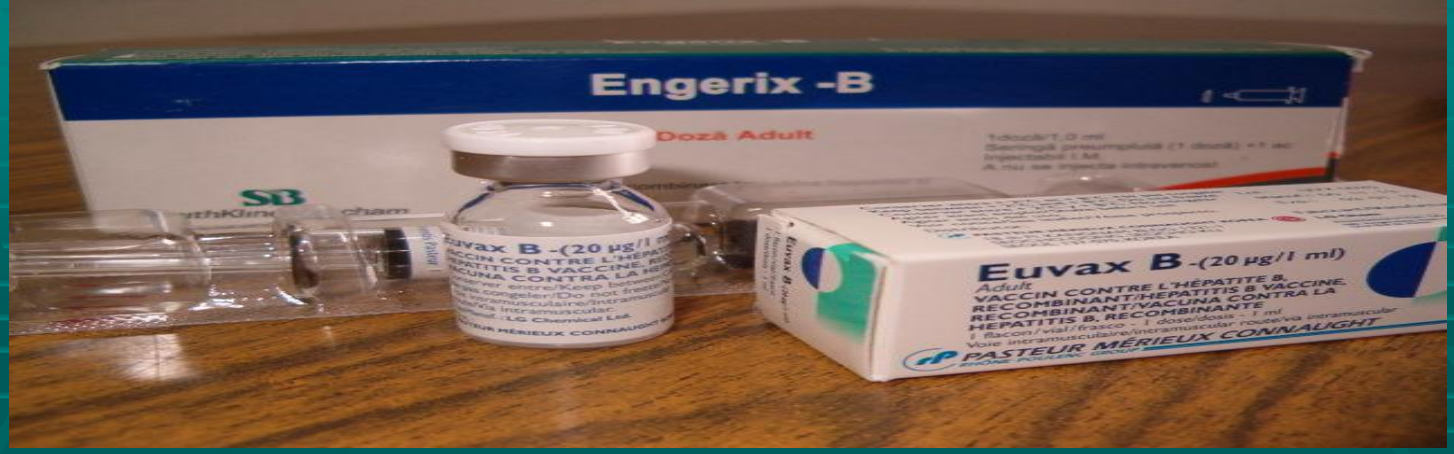
Specific prevention

PASSIVE IMMUNIZATION
administration of Immunoglobulin anti HBs

ACTIVE IMMUNIZATION
• administration of VACCINES with antigenic fragments

Vaccination against hepatitis B

- **It is done with :**
  - **Vaccines of the second generation, obtained by genetic recombination– Engerix B, Euvax B, Recombivax, commonly used in Romania.**
  - **Third Generation Vaccines, also obtained by genetic engineering, on animal cell cultures - Gen Hevac B, Gen HBvax, are available on the foreign market .**
  - **Associated vaccines :**
    - **Twinrix - combines an inactivated anti-hepatitis A vaccine and a recombinant anti-hepatitis B DNA.**
    - **Hexavalent vaccines for infant immunization.**



Administration method

- **Presentation form :**
  - **bottle or pre-filled syringes with 1 dose for pediatric use (10 µg / 0.5 ml) or adult type (20 µg/1 ml);**
  - **The suspension is slightly opalescent and requires shaking before use.**
- **Administration :**
  - **intramuscularly in the antero-external region of the thigh (in newborns, infants and young children) or**
  - **into deltoid muscle in children over 3 years and adults.**

Vaccination strategy

Prophylactic vaccination pre-exposure (before coming into contact with HBV) :

- **Applied in the early years of a medical school or entering the medical service;**
- **Inoculate in the muscles 3 dose de 1 ml (over the age of 15) - at 0, 1, and 6 months after the start of vaccination.**
- **Dose is double for large smokers and overweight people.**
- **Anti-HBs antibodies appear 1-3 months after vaccination in 90% of immunocompetent adults.**
- **A non-protective titre of less than 10 mUI / ml is considered.**
- **Protection lasts for about 15 years.**

Vaccination strategy

Prophylactic vaccination post-exposure (after contact with HBV):

- **It addresses medical staff with major professional risk (by accidental pinching with contaminated needles or splashing with infective biological fluids) or the sexual contact of people with acute or chronic type B hepatitis;**
- **It is administered specific hepatitis B immunoglobulins, 5 ml intramuscularly within the first 24-48 hours of infective contact;**
- **At the same time, the rapid vaccination schedule is started , with 4 dose at 0,1,2 şi 12 months;**
- **Those previously vaccinated against HBV, titre anti-HBs antibodies are made;**
- **In the case of protective levels, no further prophylactic measures are applied;**
- **Medical staff with antibodies of less than 10 miu / ml or with an inherent immune status will be protected by revaccination and / or administration of specific immunoglobulins.**

In case of accidental exposure

- **Wash thoroughly with water;**
- **It is forbidden to press the wound to create micro-lesions that can accelerate virus diffusion;**
- **Apply an antiseptic, directly on the lesion or on the compress - for 5 minutes :**
  - **Clorhexidină - 0,05%,**
  - **Glutaraldehidă – 2%,**
  - **Betadină (other iodophores) – 2-3%,**
  - **Hydrogen peroxide– 3%**
  - **If these are missing - alcohol 70%.**
- **Rinse the ocular / oropharyngeal mucosa for 5 minutes with water or physiological serum (+/- antiseptic eyewater);**

Contraindications / Adverse reactions

- **Contraindications :**
  - **Postponed vaccinations for severe acute febrile illness;**
  - **Immunization of people with an anaphylactic antecedent to beer yeast or plaque sclerosis patients is avoided, whereby any stimulation of the immune system may lead to an exacerbation of the symptomatology.**

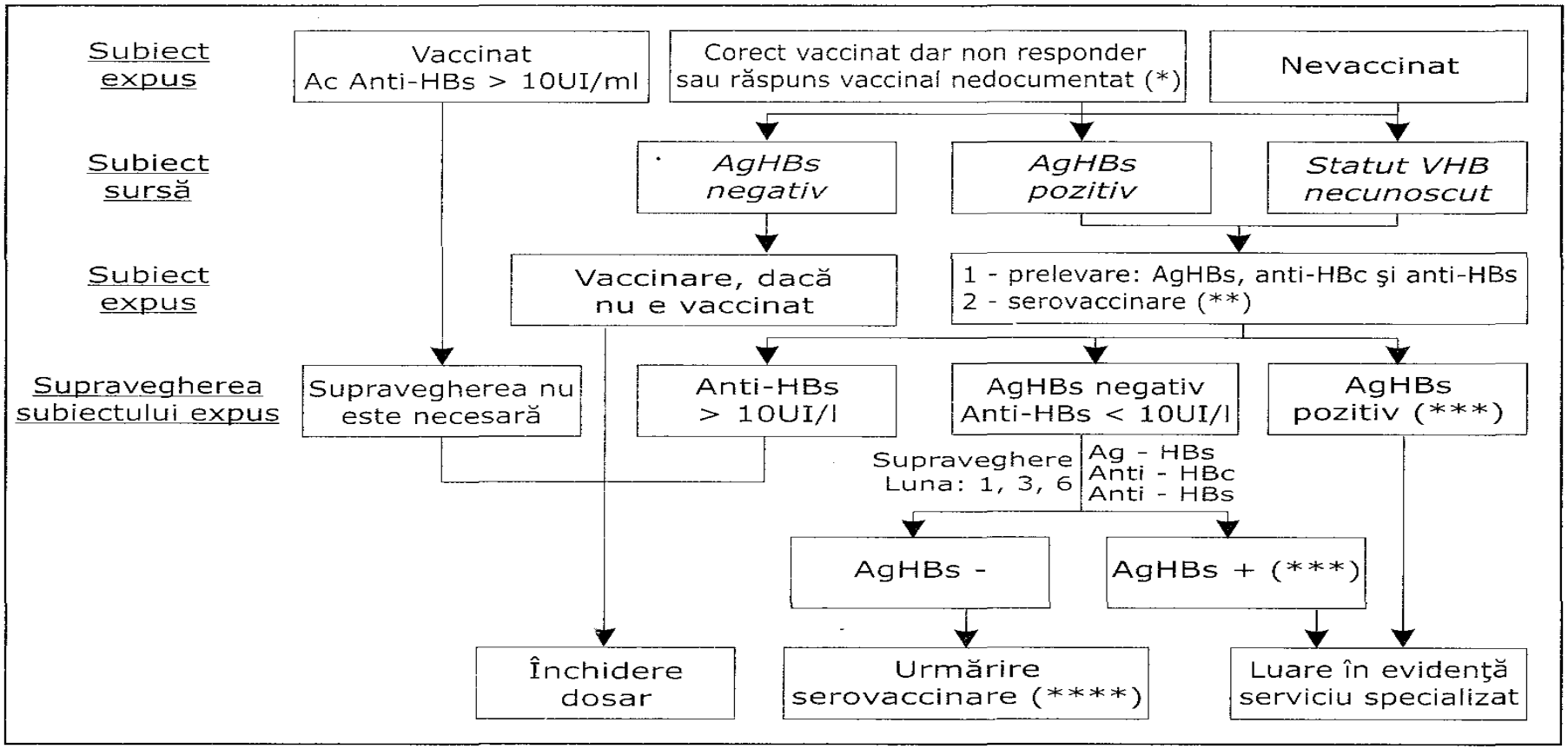
- **Side effects are minor and transient :**
  - **Local reactions may occur– erythema, induration, pain at the site of inoculation;**
  - **General - subfebrility, headache, myalgia, arthralgia; fatigue; digestive disorders - nausea, abdominal pain; allergic manifestations - pruritus, urticaria, erythema. These are light and self-limiting;**
  - **Rarisim cases have been reported with neurological disorders - inflammation of the nerves, encephalitis, paralysis.**

Post exposure monitoring

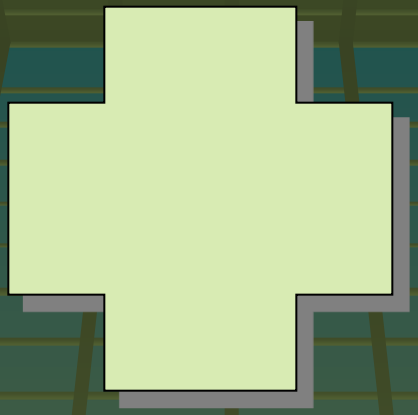
(blood collection for the next 2 hours, performing the test within 48h, effective vaccination in 48h / less effective in 3-7 days)

- stabileşte indicaţiile chimioprofilaxiei.

Atitudinea în cazul AES cu risc de transmitere a VHB



(*) Dacă subiectul expus a fost vaccinat la vârsta de mai puţin de 25 ani, vaccinarea este eficace şi este protejat



Prevention of HCV infection in medical staff

Non-specific prevention

- ✓Use of single use materials and tools / appropriate decontamination and sterilization of reusable instruments;

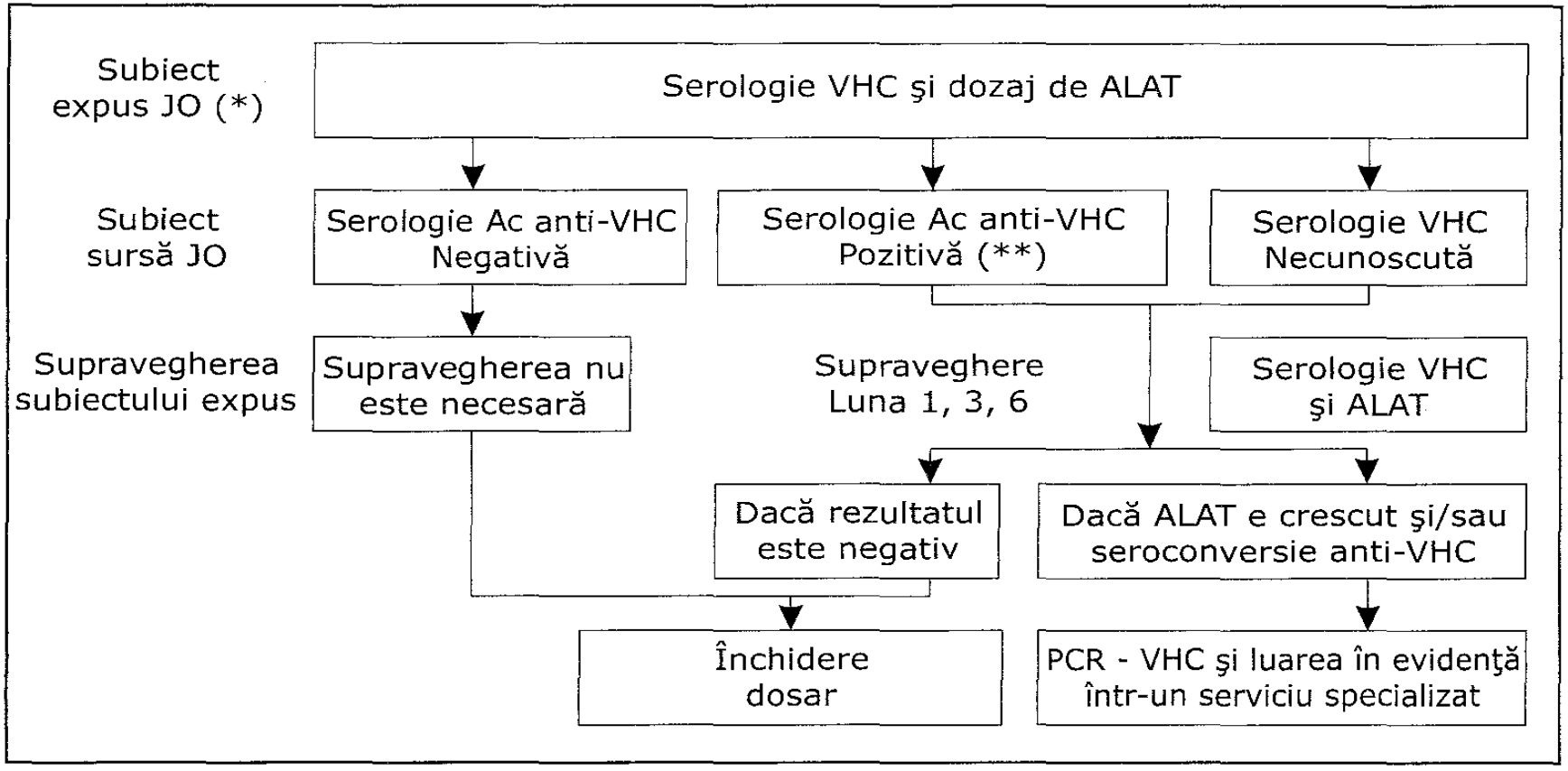
- ✓Applying universal precautions!!!
  - ✓All patients are considered as potential sources of infection VHC;
  - ✓Wearing protective equipment;
  - ✓Prevent accidental exposure to blood or other infectious biological fluids;
  - ✓Proper hygiene of medical staff;
- ✓ Apply special precautions!

Specific prevention

- ✓**The administration of immunoglobulin IgG type does not seem useful;**
- ✓**Ig anti HCV - must prove its effectiveness in the future;**
- ✓**There is no vaccine! (only experimentally);**
- ✓**Prophylactically interferon can be administered in cases with a clear risk of infection VHC.**

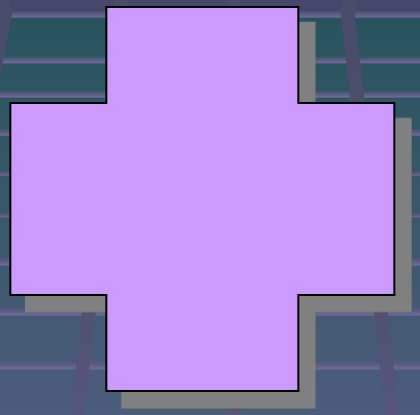
Post exposure monitoring
(blood collection for the next 2 hours, performing the test within 48h)

Atitudinea în cazul AES cu risc de transmitere a VHC



(*) Dacă serologia VHC a subiectului expus este pozitivă, trebuie să se adreseze la un serviciu specializat

(**) Sau să se cerceteze ARN viral prin PCR pentru evaluarea riscului de transmitere



Prevention of HIV infection in medical staff

Risk factors

- professional exposure to the HIV patient's blood +:
  - deep needle inoculations - needle type, needle size, lesion depth, blood quantity,
  - through prolonged cutaneous-mucosal contact (intact / tegumentary skin lesions).

- Additional risk factors :
  - Absence of antiretroviral therapy,
  - high viral load of the patient's source,
  - lack of chemoprophylaxis.

Non-specific prevention

- ✓screening of surgical patients;
- ✓Use of single use materials and instruments / safe blood products / appropriate decontamination and sterilization of reusable instruments;
- ✓**Applying universal precautions!!!**
  - ✓<u>All patients are considered as potential sources of infection;</u>
  - ✓Wearing protective equipment;
  - ✓Prevent accidental exposure to blood or other infectious biological fluids;
  - ✓Proper hygiene of medical staff;
- ✓**Apply special precautions!**

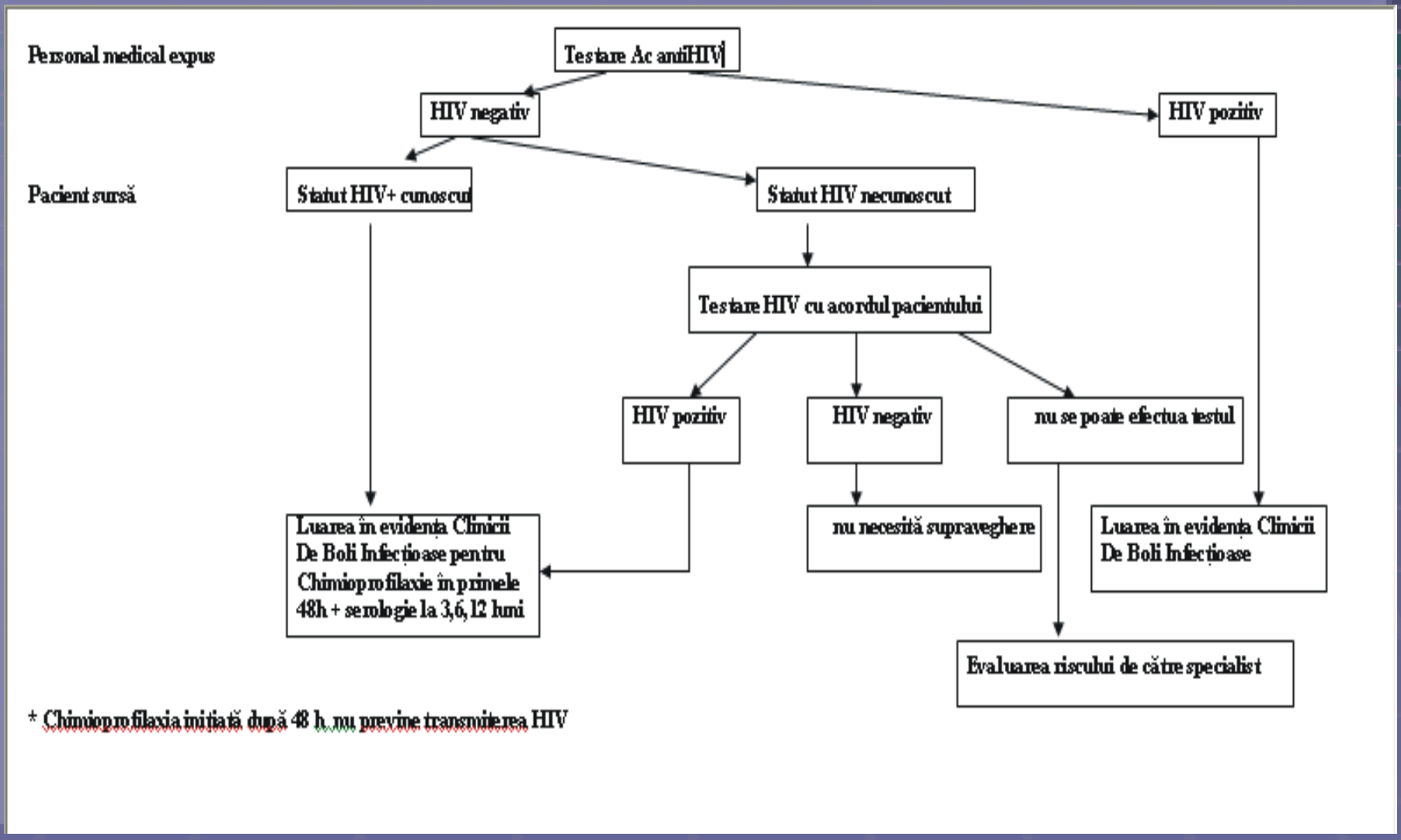
Specific prevention

✓**The administration of immunoglobulin IgG type does not seem useful;**

✓**There is no vaccine!** **(only experimentally);**

✓**At the indication of the infectious disease specialist, three prophylactic antiretroviral therapies are administered in cases of clear infection risk HIV (in the first 48 h AZT 3x200 mg/zi + Lamivudină 2x150 mg/zi + Indinavir 3x800 mg/zi)** / 4 weeks, with the possibility of stopping within 24-48 hours, depending on the results of the blood tests.

Post exposure monitoring (blood collection for the next 2 hours, performing the test within 48h



* Chimioprofilaxia inițiată după 48 h nu previne transmiterea HIV

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2. **Ministry of Health** – "Practical guide for accidental exposure to biological products", 2005

3. **Adrian Streinu Cercel, Sorin Petrea** – "Preventing HIV transmission in medical practice", *www.hivability.ro*

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

Thank you!