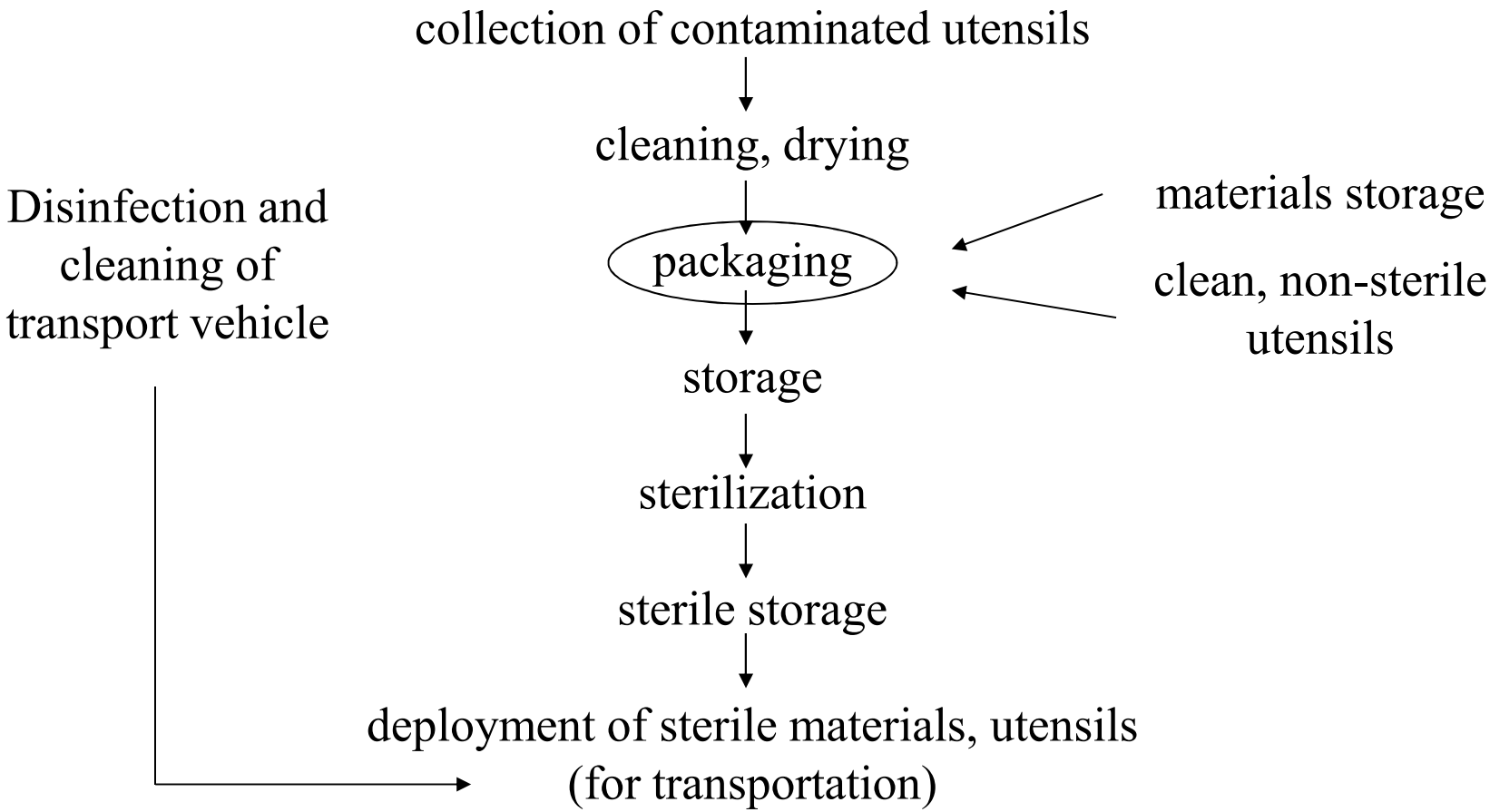
Sterilization, disinfection

Operation of central sterilization facility



<u>One-way process!</u>

<u>Contaminated → clean principle!</u>

The sterilization process 1.

1. **Collection of items**:

   Dry or wet collection (wet collection in pre-treatment solution)

2. **Cleaning:**

   a) soaking (in blood solvent, disinfectant, detergent, >60°C)

   b) mechanical cleaning

   c) final rinsing (running warm water), hollow needles 3% H_2O_2

   d) drying

3. **Sterilization:**

   a) packaging, labeling

   b) actual sterilization procedure (autoclave, dry heat, plasma, formaldehyde/ethylene oxide gas)

   c) regular quality control

4. **Storage**

The sterilization process 2. – Important parameters

	Hot air	Steam	Gas	Solution
Relative humidity				
Concentration of active agent				
Pressure				
Temperature				
Exposure time				

The sterilization process 3.

Material/utensil	Sterilization method
Heat-resistant items	AUTOCLAVE
Heat-resistant, water-sensitive items	DRY HEAT
Heat-sensitive items	ETHYLENE OXIDE (ETO), FORMALDEHYDE GAS PLASMA
Heat-sensitive endoscopes	Special solution (depends on manufacturer) + equipment
Other…	… i.e. filters... etc.

Item collection

Special disinfecting washers

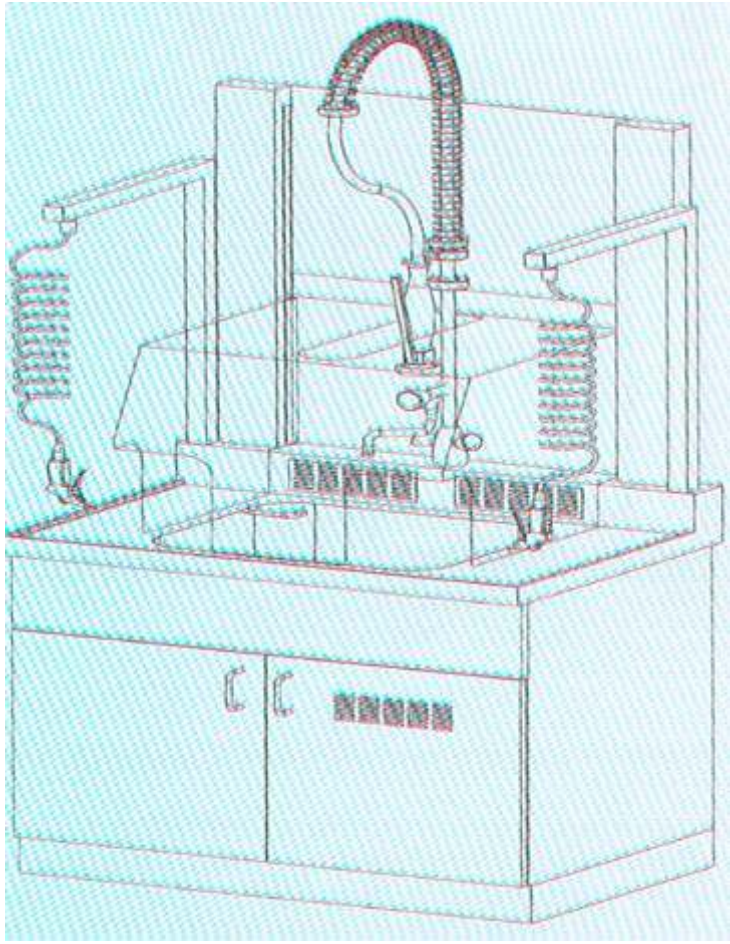
Hospital disinfecting washer 1.

Ultrasound washer

Hospital disinfecting washer 2.

Manual cleaning of utensils

Manual washer with splash-proof hood



Cleaning gun

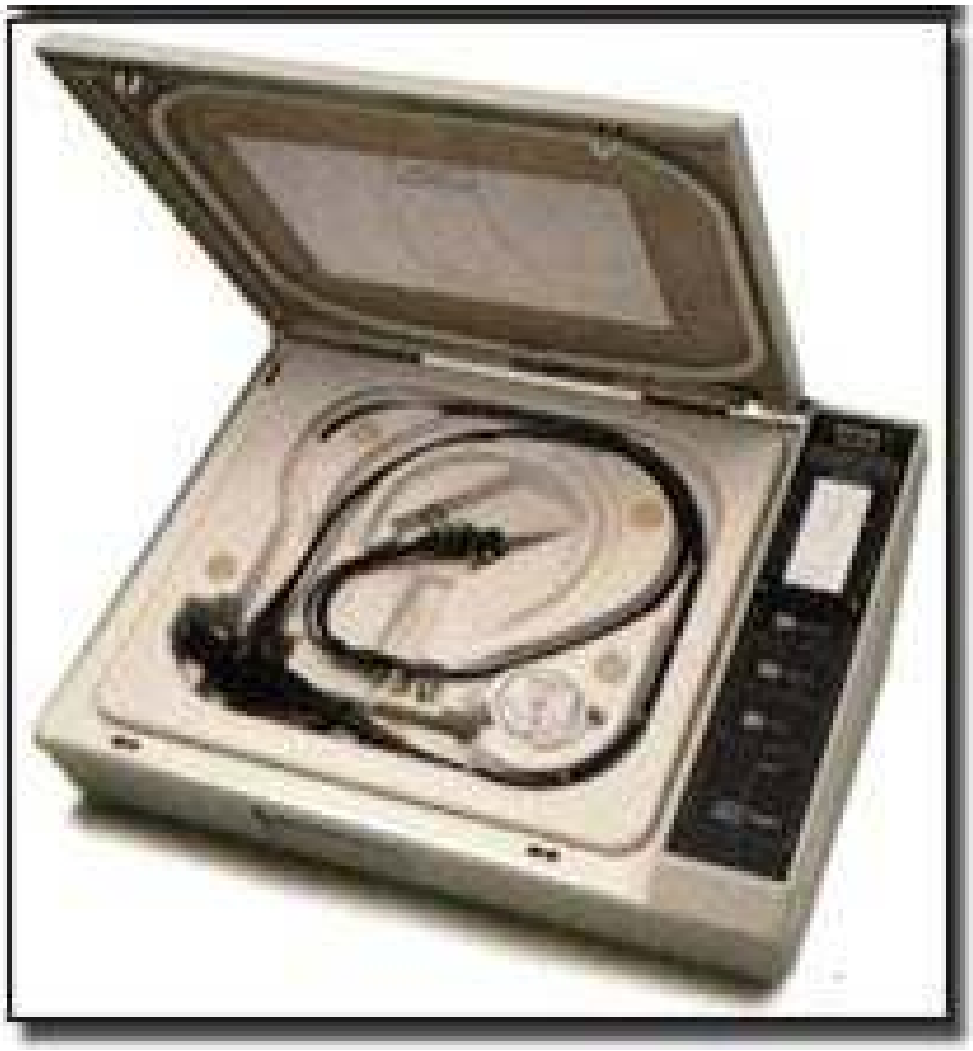
Packaging

Autoclaves 1.

Autoclaves 2.

Benchtop cassette autoclaves

Low-temperature sterilization of endoscopes (with solution)



Quality assurance in sterilization and disinfection 1.

ONLY VERIFIED TECHNOLOGICAL SOLUTIONS THAT CONFORM TO RECOGNIZED QUALITY-ASSURANCE STANDARDS ARE ACCEPTABLE!

EACH STEP IN THE ENTIRE STERILIZATION/DISINFECTION PROCESS SHOULD BE MONITORED INDEPENDENTLY!

Quality assurance in sterilization and disinfection 2.

- ✓ Checking preparatory procedures (technology, blood-stain detection)

- ✓ Checking machinery
  1. initial (new machines)
  2. continuous (operation log)
  3. periodic (technical)

- ✓ Checking the sterilization process
  1. thermo-indicators
  2. chemical indicators
  3. complex indicators (combination of various parameters)

- ✓ Checking sterility (microbiological tests)

Quality assurance in sterilization and disinfection 3.

Quality control procedure	Frequency	Method
Check equipment functioning	Daily (autoclaves) Authorities: every 3 years	Steam-penetration test
Control indicator **on** package	Every package	Process indicators
Batch control	Every batch Authorities: every 3-6 months	Chemical/biological indicators Spore-test
Control indicator **inside** package	Every package	Multi-parameter chemical indicators
Record data	Every package and batch	Sterilization log, labeling… etc.

Package labeling – external indicators

Process indicators

Indicate that the tray, package or packet has been through the process of sterilization (steam, ETO… etc.), but **DO NOT** provide information on the quality of that process; whether necessary parameters were reached during the process, or whether it was successful or not.

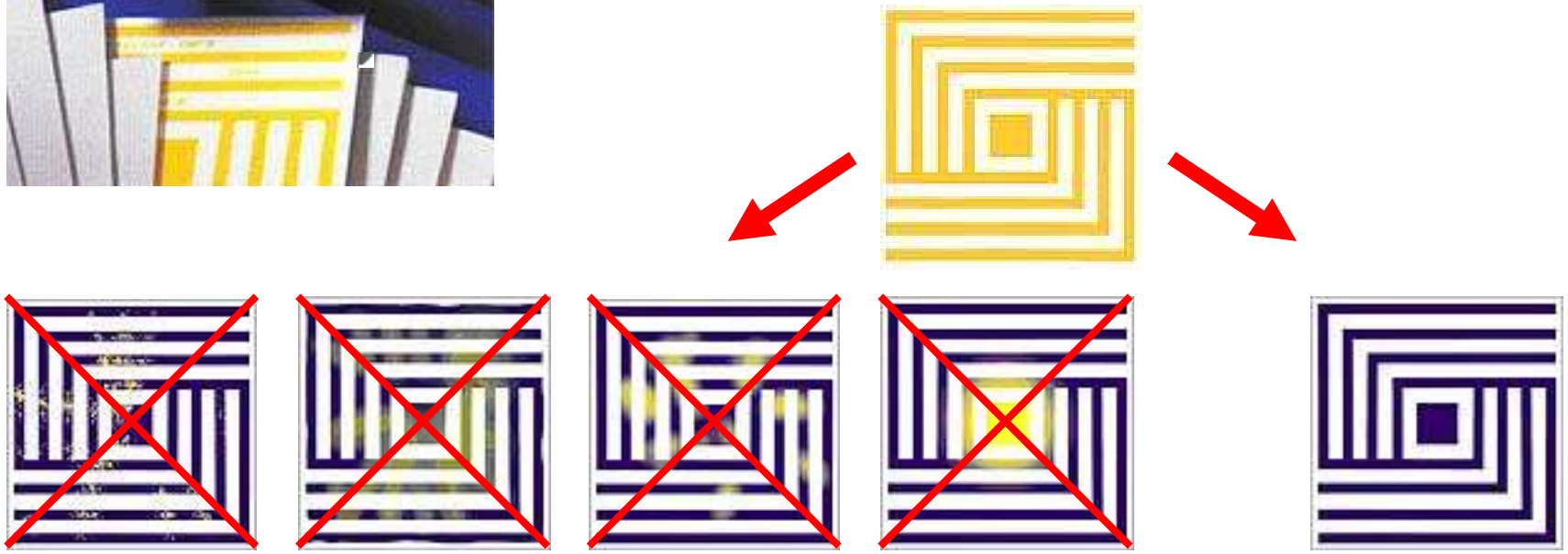
Washer batch indicator

The above indicator has bright-red colored „contamination”. After the batch of equipment and utensils went through the cleaning / disinfecting procedure the amount of red material left indicates possible left-over contamination (blood… etc.).

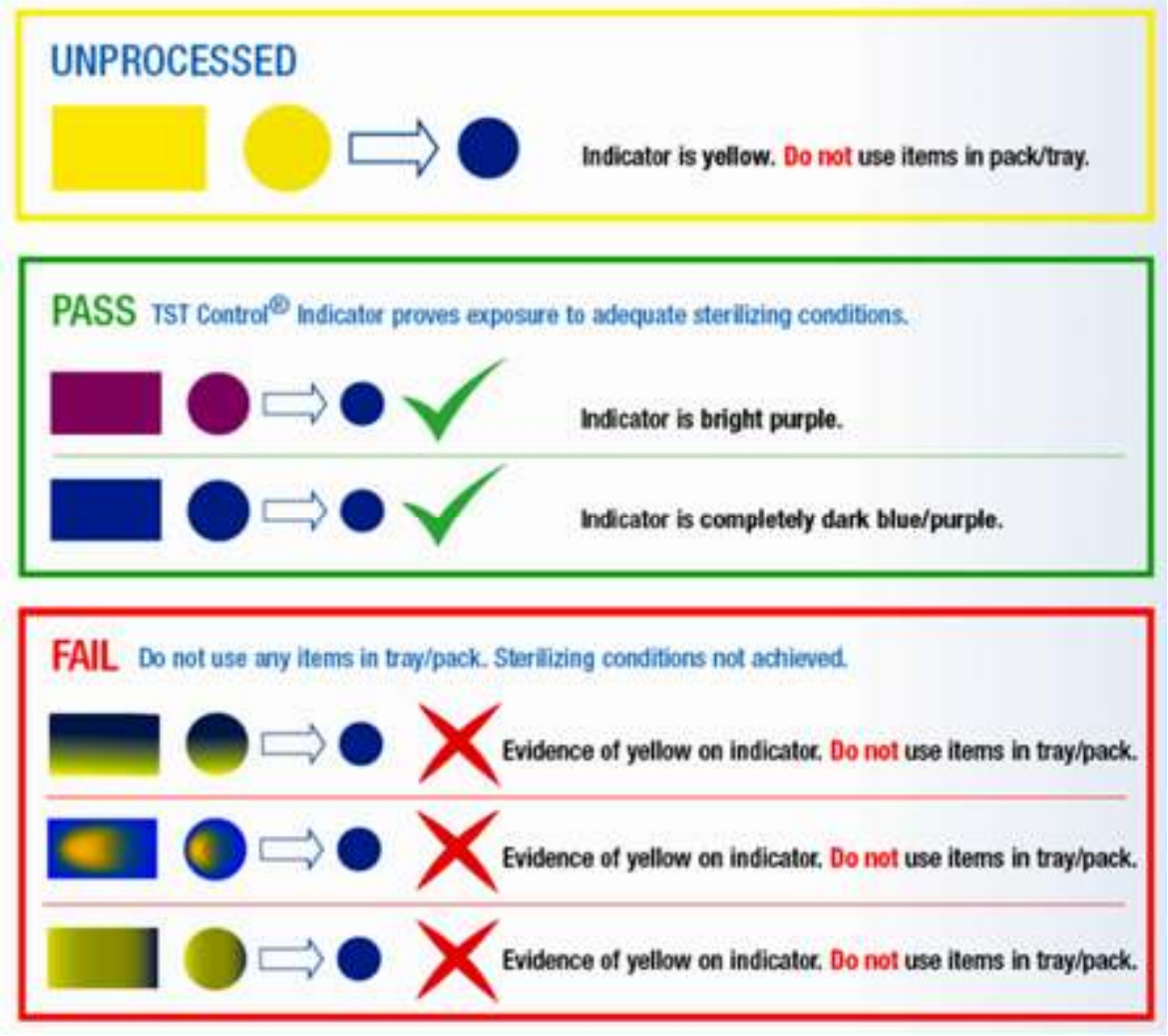
Quality control of process parameters – chemical indicators

Steam penetration indicator for autoclaves

National and international standards require that every autoclave be tested daily with a process indicator, before routine use. Steam penetration indicators verify that pre-sterilization vacuum (air removal) and steam penetration are adequate.



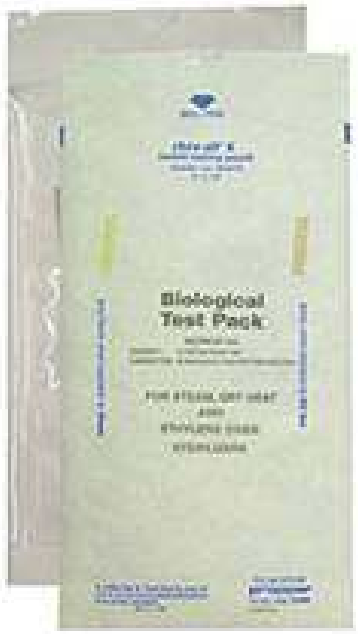
Quality control of process parameters – complex indicators

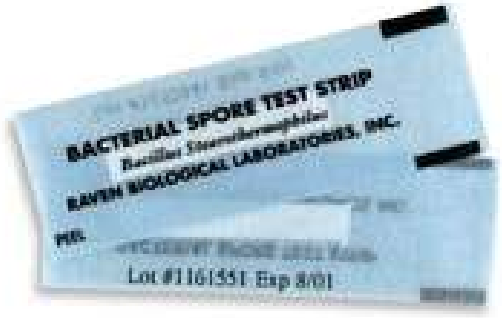


Parameters:

- Time
- Temperature
- Steam quality (penetration)

Quality control for effectiveness of procedure – biological indicators





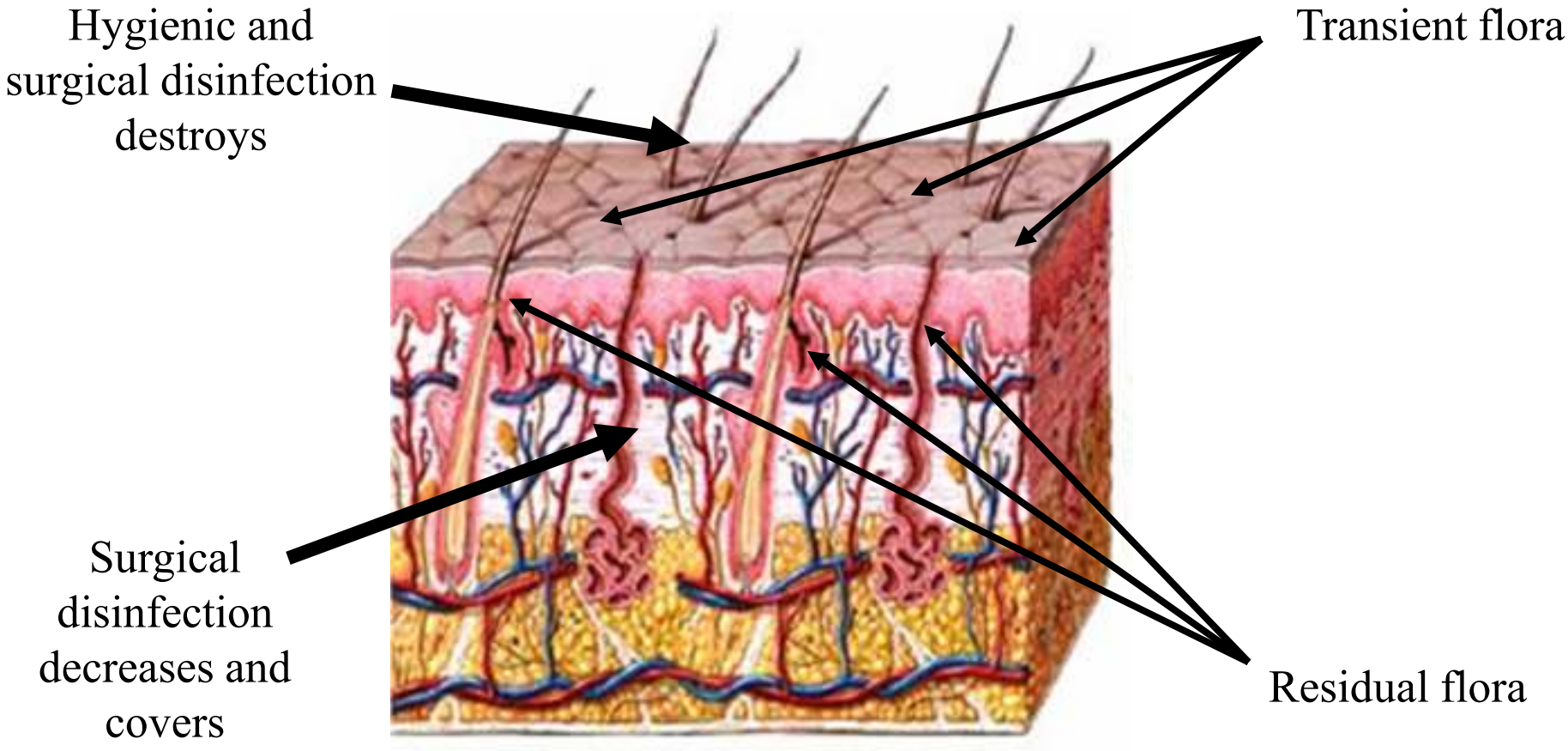
Disinfection 1. – Disinfectants by application type

- Hand disinfectants (hygienic, surgical etc…)
- General skin disinfectants
- Mucous membrane disinfectants
- Surface disinfectants
- Machine/utensil disinfectants
- Machine/utensil disinfectants for use in dentistry
- Endoscope disinfectants
- Incubator disinfectants
- Disinfectants for hemodialysis equipment
- Body-fluid disinfectants
- Disinfecting detergents
- Disinfecting soaps
- Disinfecting machine/utensil cleaners

Disinfection 2. – Disinfectants by activity spectrum

- Baktericidal
  - General
  - Special (MRSA,TB…)
- Sporocidal
- Fungicidal
- Virucidal
- Proticidal
- Parasiticidal

Disinfection 3. – Disinfection of the hands



Disinfection 4. – Disinfection in epidemic control

Disinfection procedures

- *Preventive disinfection*: general hygiene, disinfectant cleaning etc…
- *Concurrent disinfection*: of the surroundings of infectious patients during period of communicability of disease
- *Terminal disinfection*: of prior environment of infectious patients after the end of communicability (convalescence, death)

High-level disinfection usually performed by local public health authorities!

In Hungary, high-level disinfection required in cases of: anthrax, cholera, lepra, malleus, plague, typhus exanthematicus

Disinfection 5. – Disinfection in general cleaning

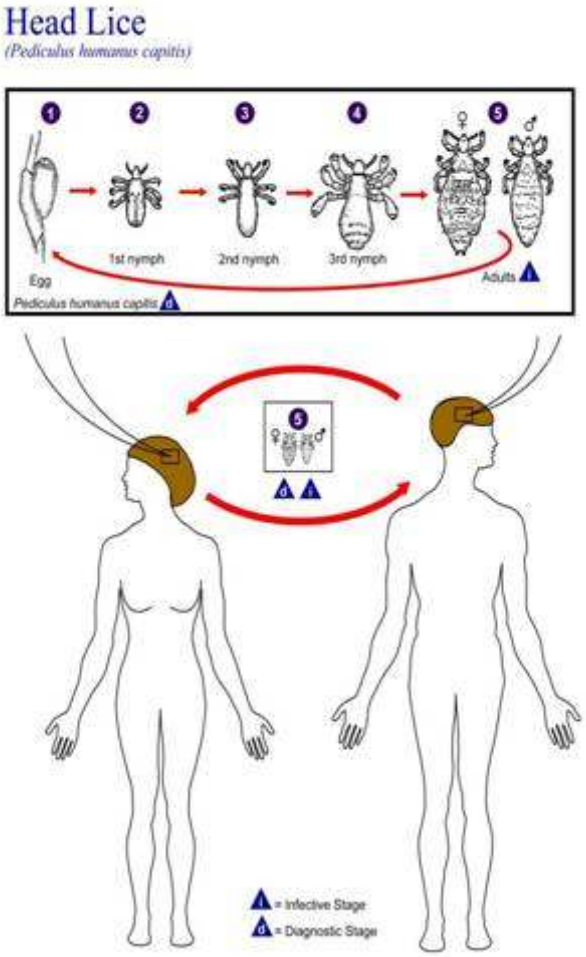
*Guiding principles for hospital cleaning is to use **wet**, **detergent-containing**, and **disinfectant-containing** cleaning.*

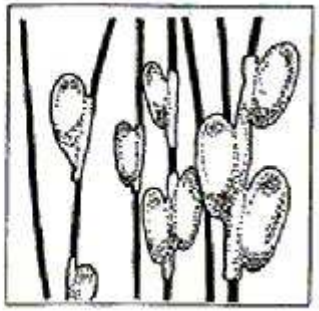
*Modern hospital cleaning is performed with **color-coded instruments** for different parts of the facility (hall, toilets, rooms…).*

*Disinfectant agent **should be appropriately selected according to activity spectrum** (bactericidal, fungicidal, virucidal sporocidal…) depending on circumstances.*

*Information on activity spectrum is **displayed on the container** of the disinfectant.*

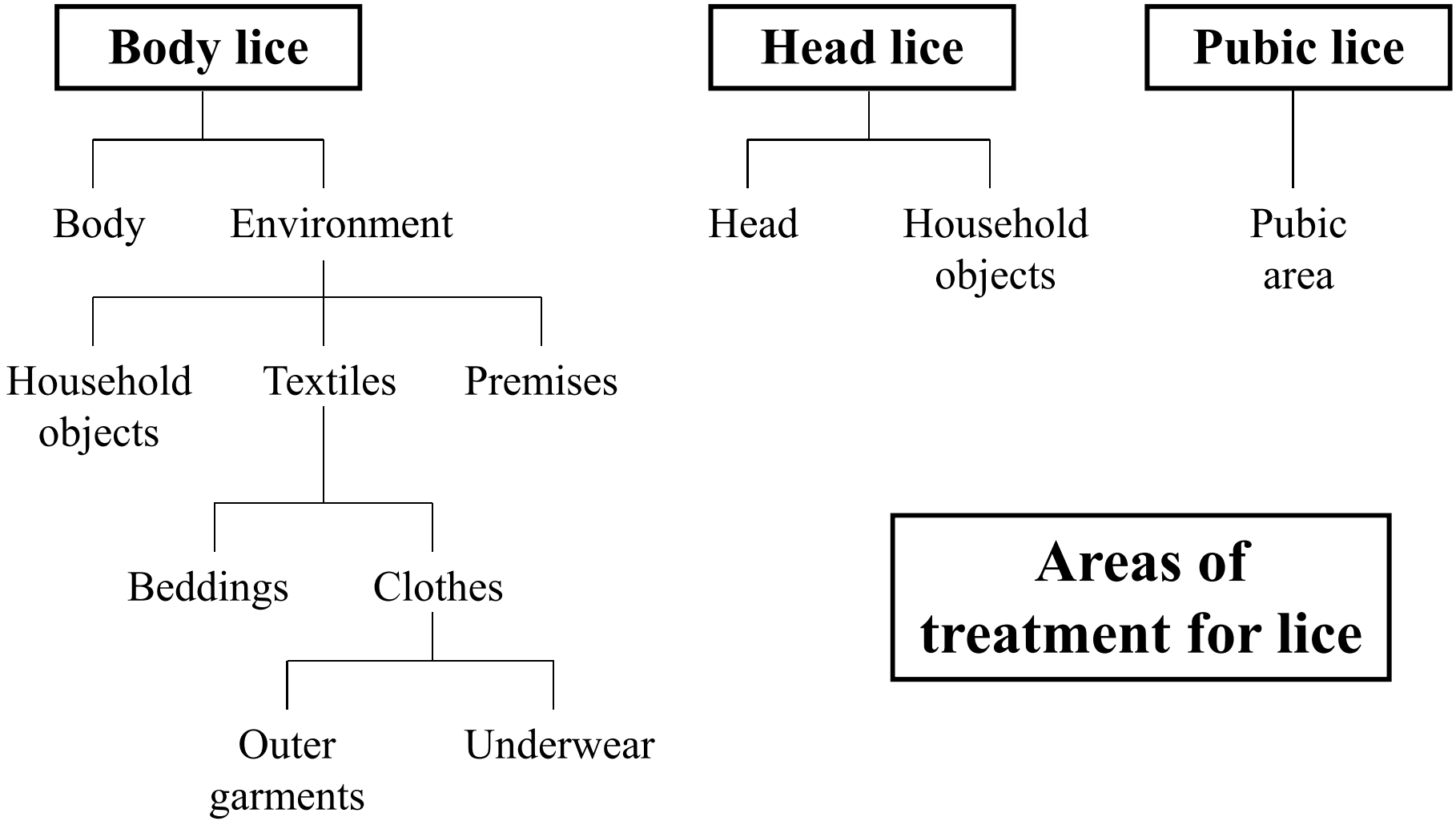
Ectoparasites: Lice A





Source: CDC Public Health Image Library

Ectoparasites: Lice B



Areas of treatment for lice

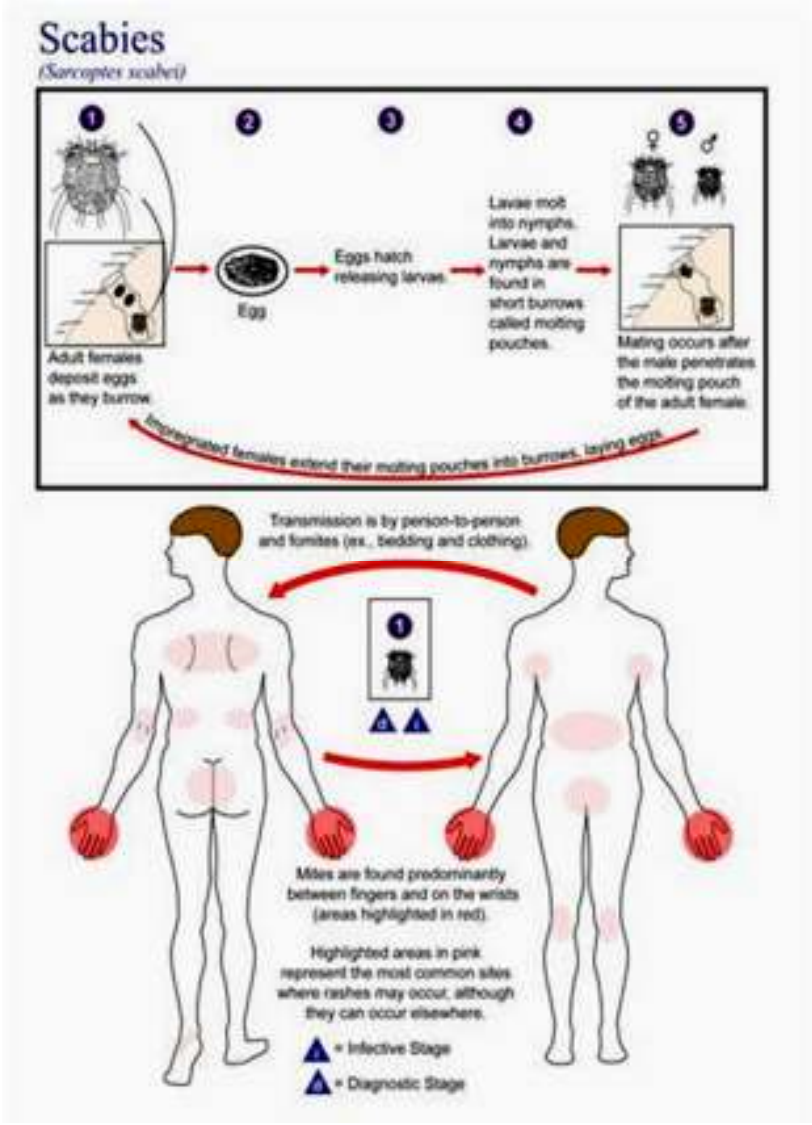
Ectoparasites: Lice C

Method of treatment	Area to be treated			
	Body surfaces	Textiles	Household objects	Premises
Chemical (pediculocides)	• rubbing in • washing • powdering	powdering	• powdering • washing	• spraying • powdering
Physical (heat)	-	• cooking • ironing • heat-drying	• burning • boiling	-

Agents of chemical anti-lice treatment (in Hungary):

- Hair scrubs: Nittyfor, Pedex
- Other: Nix, 2% Chresyl soap
- Powder: Coopex-B powder

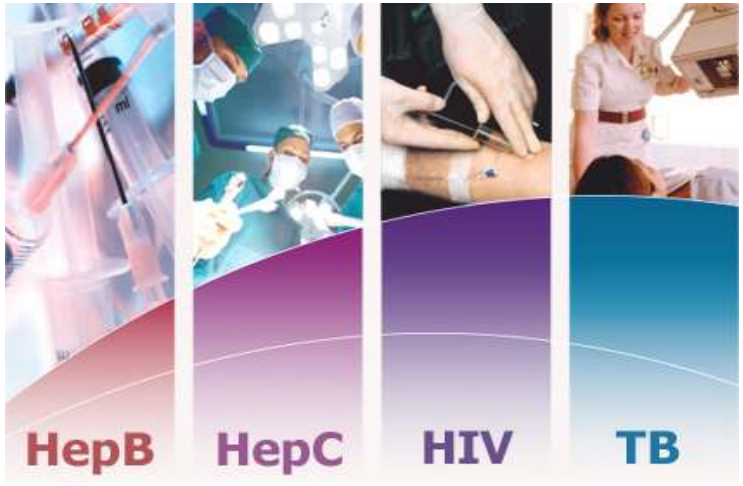
Ectoparasites: Scabies (mites)

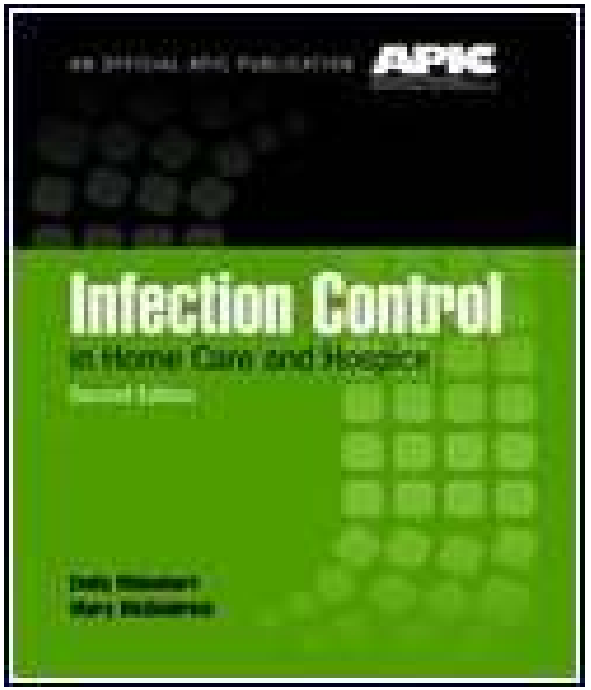


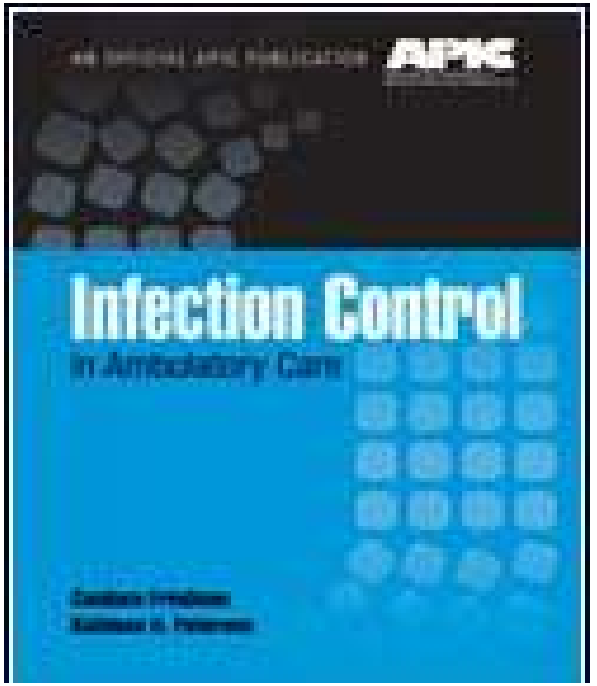
Source: CDC Public Health Image Library

Infection control

Infection control







SU Department of Public Health

Triptych showing the Hôtel Dieu in Paris, about ad 1500.
The comparatively well patients (on the right) were separated from the very ill (on the left). Note there were always two patients to a bed.

Ignaz Philipp Semmelweis

(Hungarian physician, 1818-1865)

The mortality from puerperal fever declined in his clinic from 12.24 percent to 2.38 percent.

His discovery concerning the etiology and **prevention of puerperal fever** was a brilliant example of fact-finding, meaningful statistical analysis, and keen inductive reasoning. **The highly successful prophylactic hand washings made him a pioneer in antisepsis during the pre-bacteriological era** in spite of deliberate opposition and uninformed resistance.

Oliver Wendell Holmes, M.D.,
1809-1894

***Holmes read the existing literature, and* became convinced that the condition was highly contagious, and that doctors, nurses and midwives were the active agents of its spread.**

He began to speak and write on the subject, and in 1843

***published his classic essay* The Contagiousness of Puerperal Fever.**

The essay contains eight rules for the obstetrician, which included not only handwashing and changes of clothing, but also the avoidance of autopsies if obstetric cases were being managed.

Nosocomial infections

definition, rezervoirs, autoinfection, exogenous infection

Evidence suggests that at least 5-6% of patients who go to hospitals in economically developed countries suffer some form of nosocomial infection and 1% of them die as a direct result of this infection.

Distribution of nosocomial infections:

- urogenital infections 35-40%
- pneumonias 15-18%
- postoperative wound infections 16-17%
- sepsis 7-11%
- other infections 23-24%

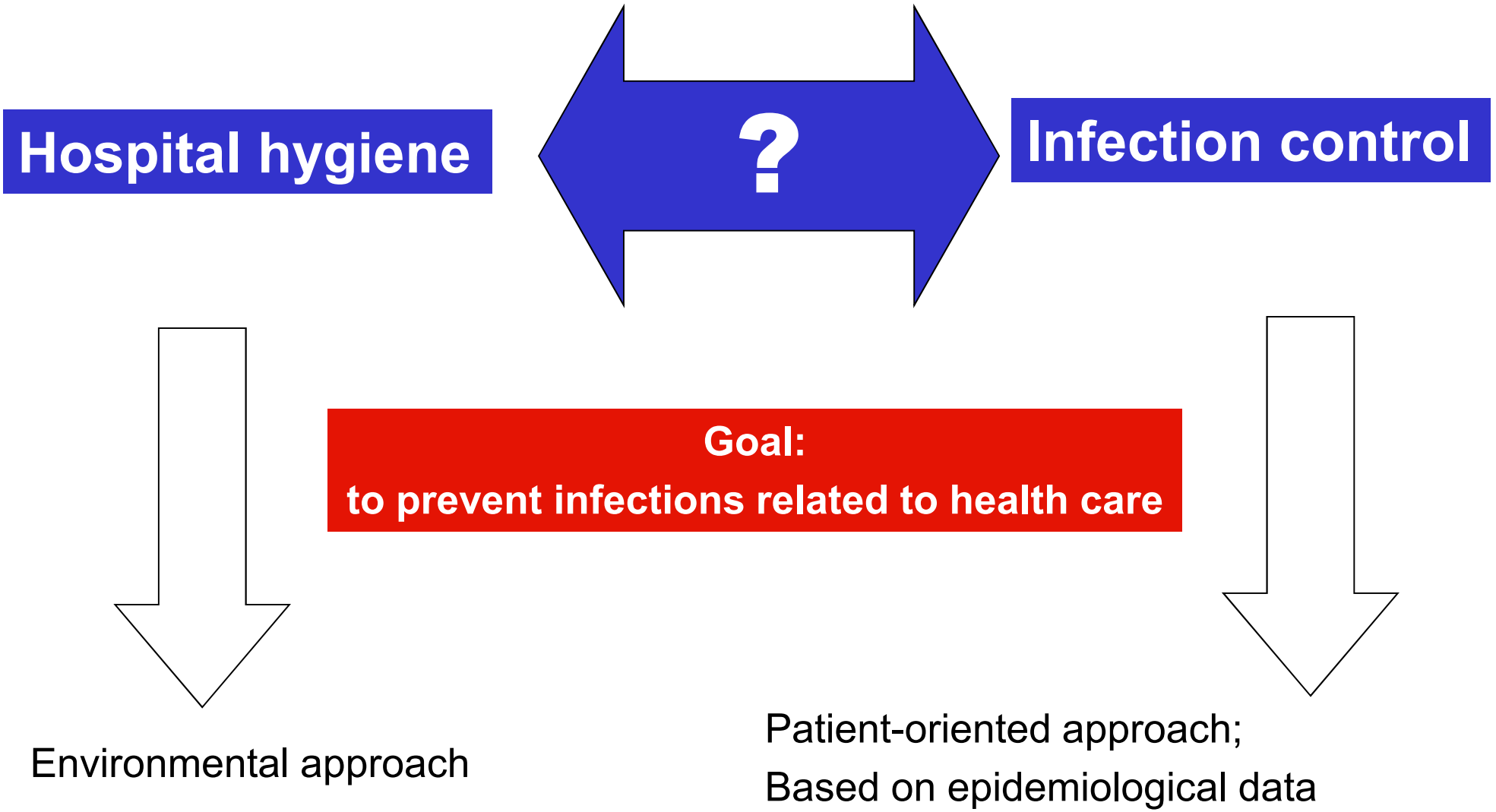
The frequency of nosocomial infecitons in certain hospital wards

(Kende Éva)

Hospital ward	*Frequency of nosocomial infecitons*	*Frequent clinical manifestations*
Surgery	3-10%	Operative infection, pneumonia, urogenital infection, sepsis
Internal medicine	2-5%	urogenital infection, pneumonia, sepsis, skin infection
Obstetrics	1-3%	Operative infection, urogenital infection, mastitis, endometritis
Chronic care/geriatry	5-15%	skin infection, urogenital infection sepsis, gastroenteritis
Pediatrics	6-7%	Respiratory viral infection, gastroenteritis, skin infection
Neonatal care	0,5-2%	skin infection, enteritis, pneumonia
Intensive care	10-20%	Pneumonia, urogenital infection, sepsis
Neonatal intensive care	3-40%	sepsis, pneumonia, conjunctivitis, enterocolitis

The reported nosocomial outbreaks in the last two years *(in Hungary)*

Year	Outbreak	Sick	Death
2006	143	3416	8
2007	128	2054	20


Hospital hygiene
?
Infection control
Goal:
to prevent infections related to health care
Environmental approach
Patient-oriented approach;
Based on epidemiological data

Accomplishing the goal of infection control

Source of infection or reservoir	• **treatment** of infected patient • **isolation** of source of infection • **elimination** of reservoirs
Transmission	• **hand washing/hand disinfection** • **asepsis** • **hygiene in patient care**
Decreasing susceptibility	• **preparation for surgery** • **antibiotic prophylaxis** • **identification of personal risk factors** • **treatment of accompanying disease** • **specific prevention** (vaccination)

Elements of Infection control
(a part of quality assurance in health care)

- **SURVEILLANCE AND REPORTING OF NOSOCOMIAL INFECTIONS (EFRIR)** ✉
- **STERILIZATION AND DISINFECTION**
- **ASEPTICAL TREATMENT AND NURSING**
- **ISOLATION**
- **ANTIBIOTIC POLICY**
- **ANTISEPTIC CLEANING**
- **ANTISEPTIC WASHING**
- **HANDLING OF WASTE MATERIAL**
- **INSECTICIDES AND RODENTICIDES**
- **HEALTH PROTECTION OF STAFF**
- **CONTINUING EDUCATION**

Infection control personnel

Regular staff:

Hygienic physician

Public health inspector

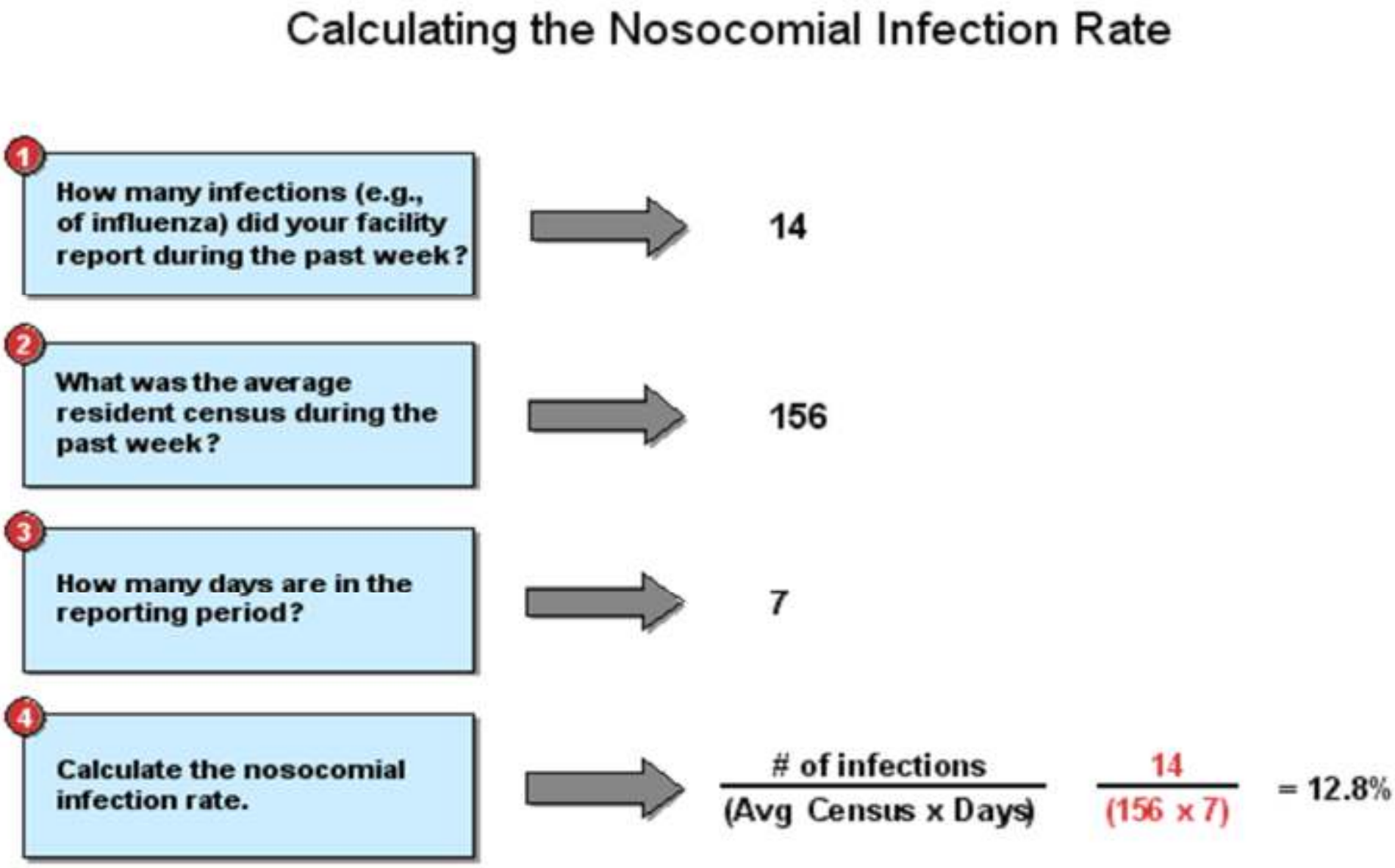
Epidemiological nurse

Effective cooperation necessary

Infectologist (Infectious disease specialist physician)

Microbiologist

Pharmacist



Four steps for calculating a nosocomial infection rate

Nosocomial surveillance 1.
Reporting of nosocomial infections

In the U.S.: National Nosocomial Infections Surveillance – (NNIS) since the 1970s

(http://www.cdc.gov/ncidod/dhqp/nnis.html)

In Europe: Hospital in Europe Link for Infection Control through Surveillance (HELICS) network for harmonization of national policies (1995)

(http://helics.univ-lyon1.fr/helicshome.htm)

In Hungary: National Nosocomial Surveillance System (NNSR) part of the EFRIR (Epidemic surveillance system and supporting IT system) system maintained by the NPHMOS (operational from 2005) – online notification

(http://www.antsz.hu, http://www.oek.hu)

Nosocomial surveillance 2.
Reporting of nosocomial infections in HUNGARY

Purpose:

- **National level:** to gain nationally and internationally comparative data on the incidence of nosocomial infections
- **Local level:** institutions may compare their incidence rates to other institutions
- Identification of areas for quality improvement

Compulsory notification:

1. **Sepsis**
2. **Outbreaks**
3. **Infections caused by multi-drug-resistant pathogens**

Optional notification

Nosocomial surveillance 2.
multi-resistant pathogens in nosocomial infections

Pathogen	Abbreviation	Resistance
Staphylococcus aureus	MRSA	Methicillin/Oxacillin
Staphylococcus aureus	VISA	Moderate sensitivity to Vancomycin
Enterococcus spp.	VRE	Vancomycin
Enterobacter spp	MENB	III.gen.cefalosporins (ESBL) and imipenem and/or meropenem
Escherichia coli	MECO	III.gen.cefalosporins (ESBL) and imipenem and/or meropenem
Klebsiella spp.	MKLE	III.gen.cefalosporins (ESBL) and imipenem and/or meropenem
Acinetobacter baumanii	MACI	imipenem and/or meropenem
Pseudomonas aeruginosa	MPAE	Sensitive to 2 or less of the following: (piperacillin/tazobactam, ceftazidin, cefepim, imipenem, meropenem, ciprofloxacin, gentamicin, tobramycin, amikacin,aztreonam)
Stenotrophomonas maltophilia	MSTM	Cotrimaxazol (sumetrolim)
Clostridium difficile		hyperinvasive

ESBL= Extended Spectrum Beta-Lactamase producing bacteria

Sterilization and disinfection

Only with validated, **officially licensed tools and substances**!

Aseptic patient care

Appropriate documentation for quality monitoring and control!

See previous practical!

If you suffer a **needle stick injury**:

· **Encourage the wound to bleed**;

· **Wash the wound and surrounding area under cold running water**;

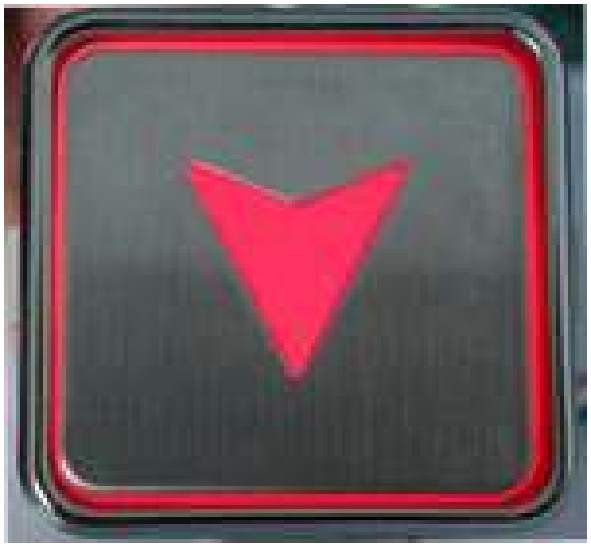
· Cover the wound with a dry dressing;

· **Contact your GP or visit the Hospital's Accident and Emergency as soon as possible** telling them you have sustained a needle stick injury.

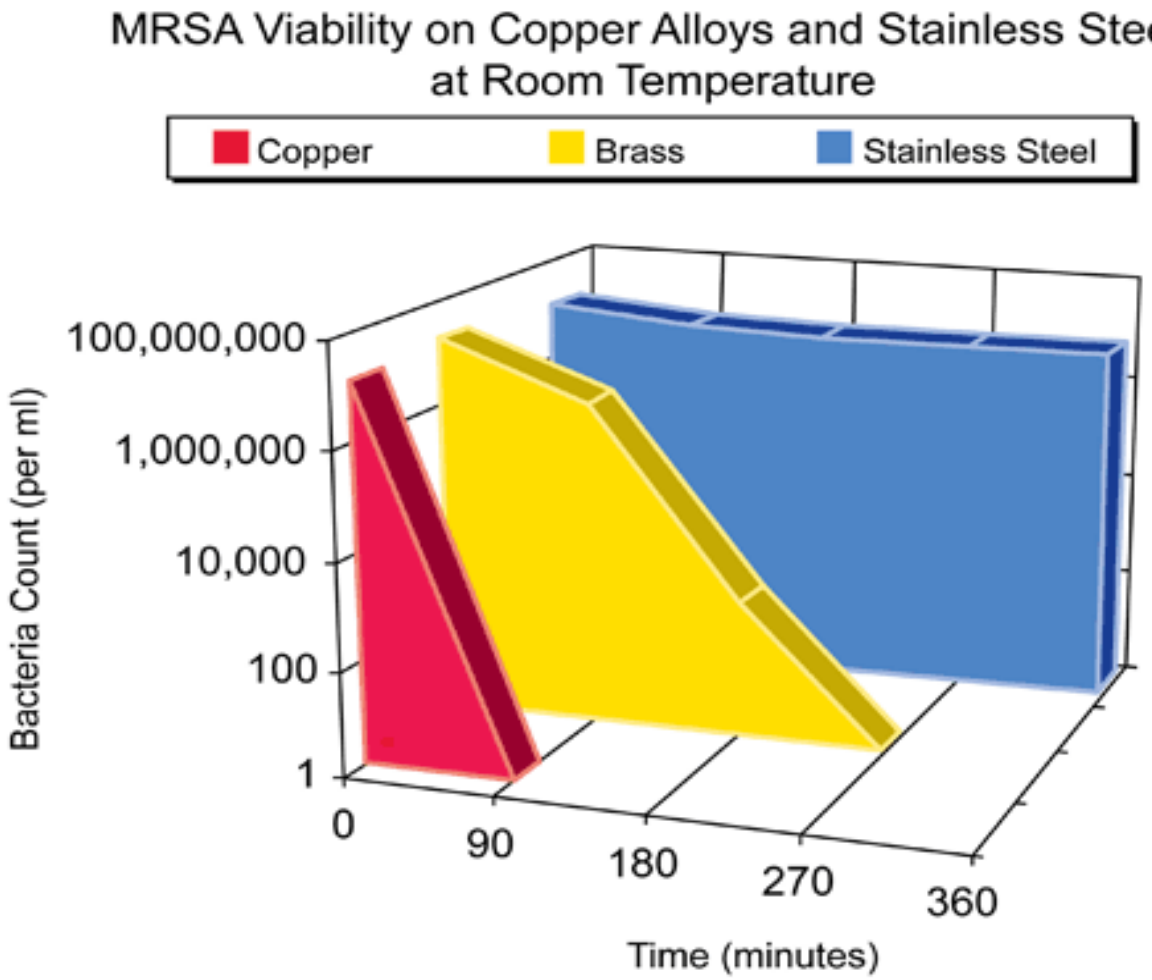
The Borough Council has produced a **leaflet on needle stick and syringe injuries** which can be obtained from our Information Centres.

(For information of the staff from a US hospital)

Spacesaver's **In-room Patient Storage System** can help **reduce the frequency and number of individuals that need to enter a patient's room** — thus reducing the transfer of hospital acquired infections.



Antibacterial elevator handrail, handle, lift button



Methicillin-resistant Staphylococcus aureus (**MRSA**) bacteria thrive on stainless steel (**blue**) **but die off quickly on copper** (**red**) **and brass** (**yellow**) **surfaces**.

Occupational health regulations and infection control

- **pre-employment and periodic medical examination**
- **personal protective equipment**
- **controlled work-processes**
- **vaccination**
    - **HBV compulsory (in Hungary)**
    - recommended:
        - age-related vaccination boosters
        - HAV, varicella
- **continuing education**

APPROPRIATE ANTIBIOTIC USE

Unified guidelines for the treatment of bacterial infections

- **protocols!!!**
- **specific, directed treatment of pathogens whenever possible**

Reasons for choosing a given antibiotic agent should be addressed in patient documentation

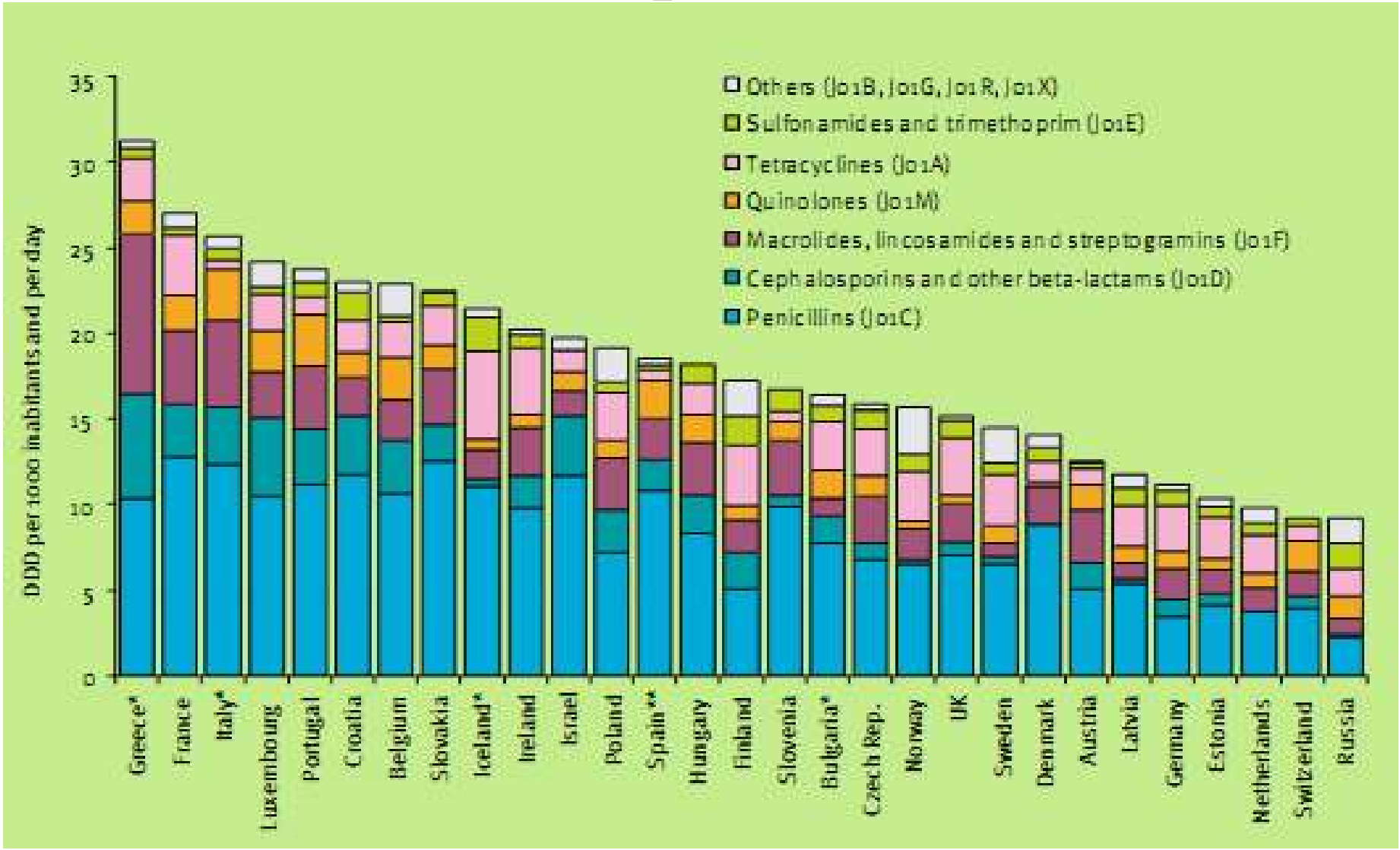
Certain antibiotics only in special cases

- **„reserve" antibiotics**

Antibiotic committee in health care institutions

Ongoing surveillance of antibiotic-resistance in microbes

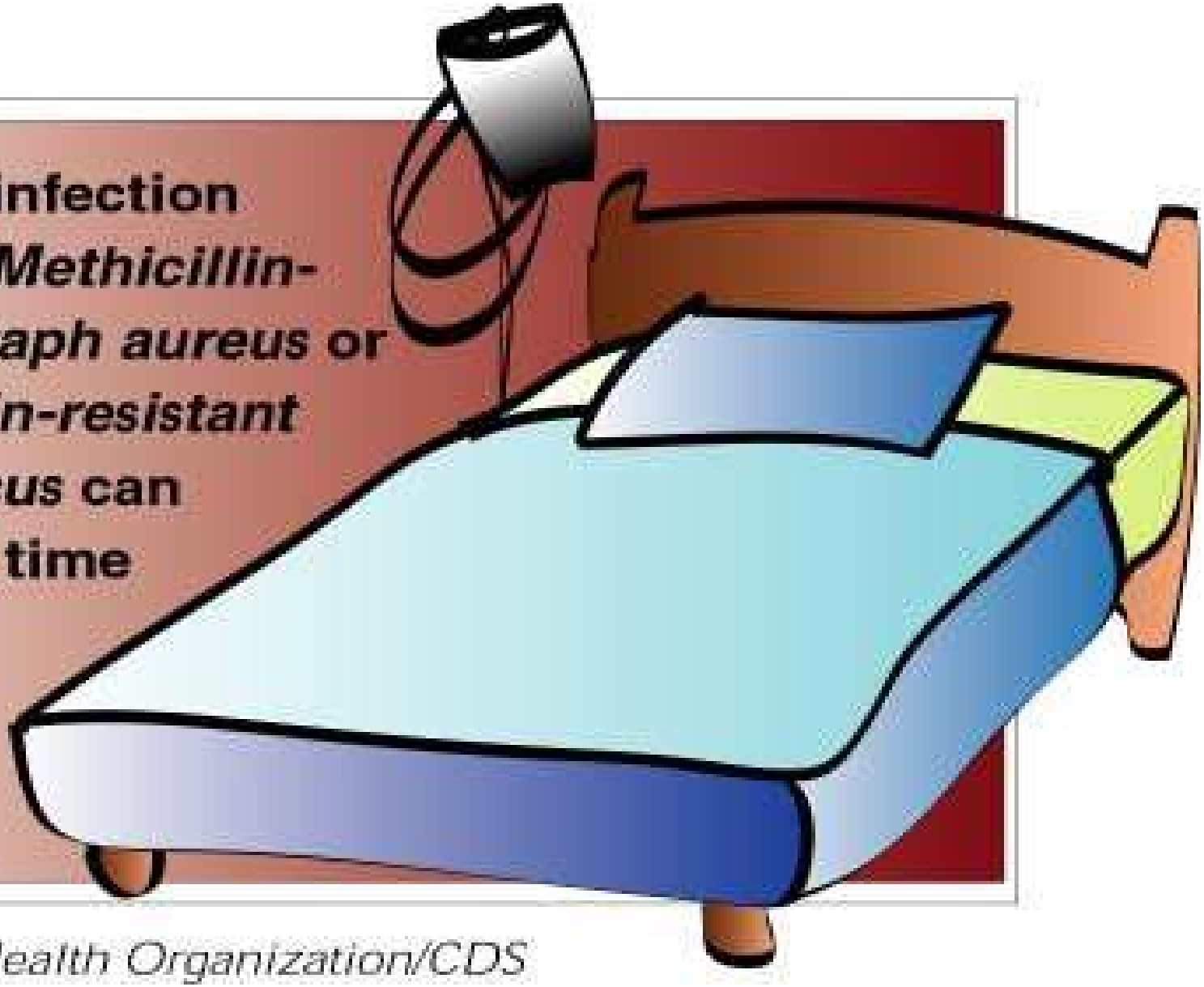
Antibiotic consumption in the EU, 2004, outpatient care



Impact of Antibiotic Resistance

- Increased rates of treatment failure
- Poor patient outcomes
- Increased mortality
- Increased need for combination therapy
- Increased cost of treatment

A hospital infection caused by *Methicillin-resistant Staph aureus* or *Vancomycin-resistant Enterococcus* can double the time a patient stays in hospital



Source: World Health Organization/CDS

Hygienic / disinfecting cleaning

- only „wet” cleaning
- only with licensed substances
- color-coded for various areas
- cleaning protocol for institutions

Disinfecting washing

- collection of potentially contaminated textiles at site of use
- handling of potentially contaminated textiles with appropriate personal protective equipment (gown, glove…)
- textiles used by infectious patients: collection in **yellow (biohazard) bags** or special water-soluble bags

Medical doctor tasks in case of a communicable diseases

Medical doctor tasks in case of a communicable diseases

patient	contacts
- reporting (notification) - isolation - lab tests - disinfection - vaccination - epidemiological supervision	- epidemiological supervision (quarantine) - lab tests - disinfection - vaccination - chemoprophylaxis

Reporting/notification of communicable diseases

who?	Doctor, who observes the case
to whom?	Local public health authorities
what?	Officially listed diseases (manifest and suspected cases)
how?	Various, depends on national regulations (written form, phone, fax, electronic, courier)
when?	As soon as possible
Special cases?	**immediately:** avian influenza, cholera, diphtheria, hemorrhagic fevers, lyssa, leprosy, malleus, plague, polio, relapsing fever, SARS, smallpox, typhoid fever, typhus exanthematicus, yellow fever

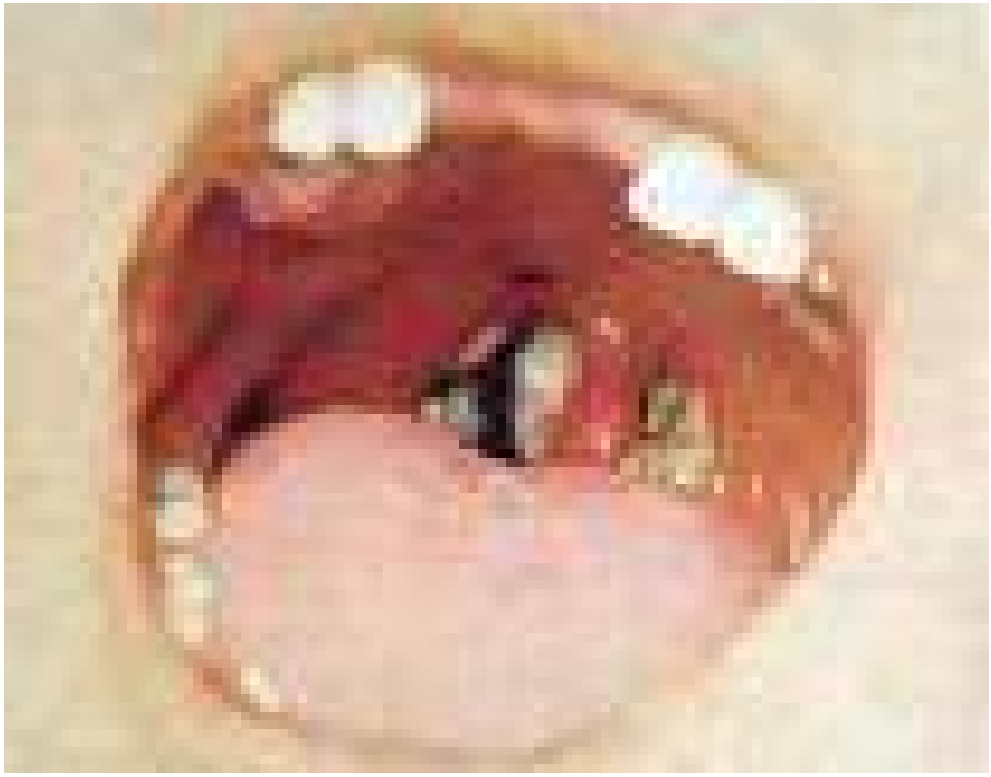
Measures at enteric infectious disease of unknown origin /in Hungary/

- **reporting** as „enteric infection” /enteritis infectiosa/
- **isolation** of the diseased person
- **stool sample** to the laboratory compulsory
- measures **with certain contacts**:
  7-days epidemic supervision if they work in some sensitive occupation or visit certain communities and prohibition to work in or visit them until negativ stool culture

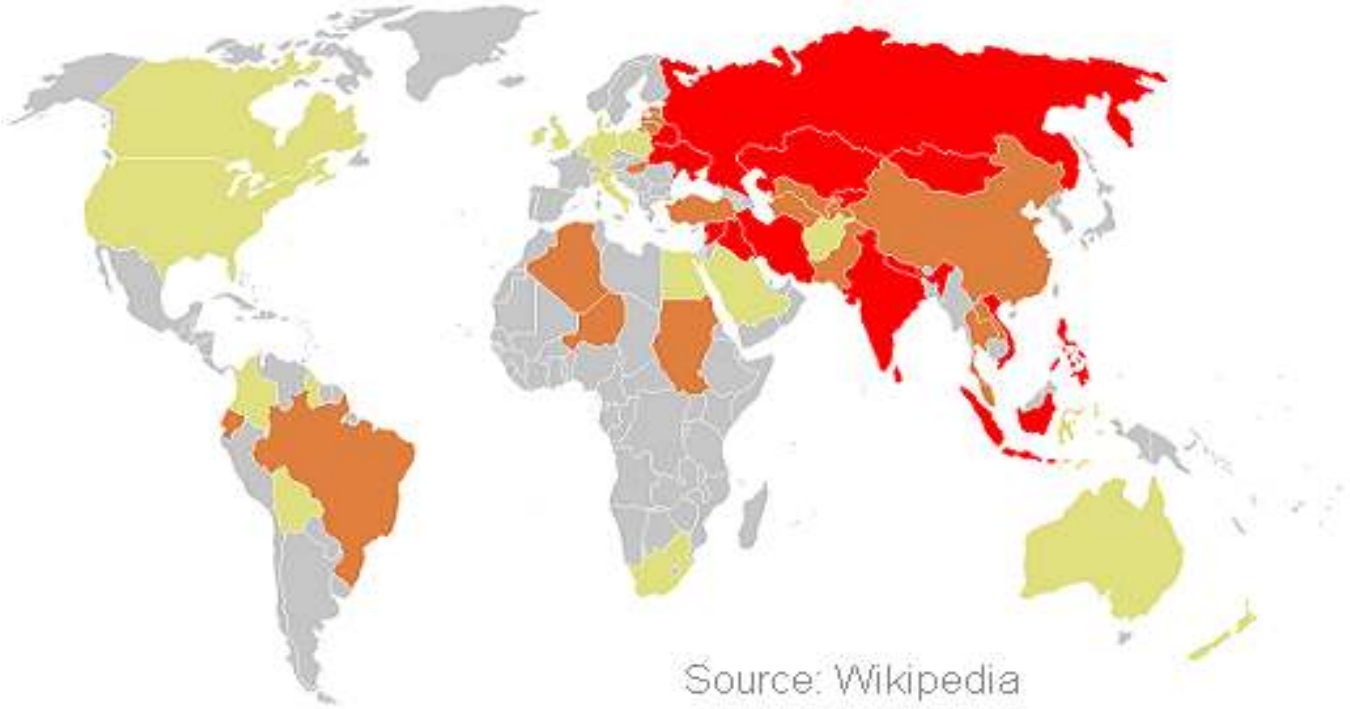
The following slide show examples for communicable diseases which in Hungary must be reported

Immediately to the public health authorities

Diphtheria

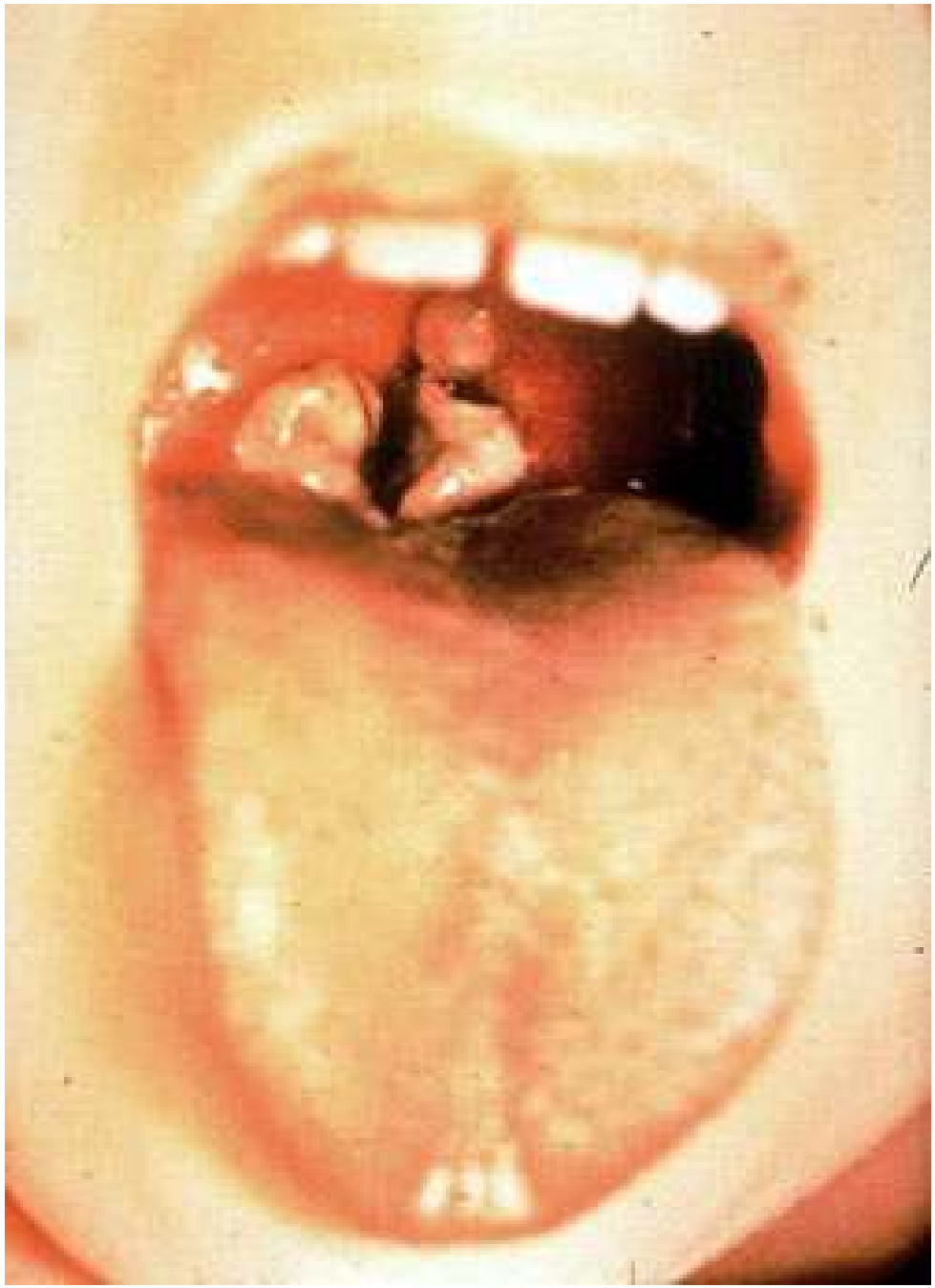


Bull neck



Diphtheria cases reported to the WHO between 1997 and 2006.

- Over 100 reported cases red
- Between 50 and 100 reported cases brown
- 1-49 reported cases green
- No cases reported grey



(Museum of Medical History, Budapest)

Cholera

- Vibrio cholerae O1 / classical and El Tor biotypes/ Vibrio cholerae O139
- incubation: from a few hours to 5 days
- profuse painless watery stools /"rice-water"/, vomiting without nausea, rapid dehydration

  reservoirs: humans /diseased and carriers but environmental reservoirs also exists in brackish water or estuaries/
- prevention: water and food hygiene, environmental hygiene, vaccination possibilities /when?/

Cholera

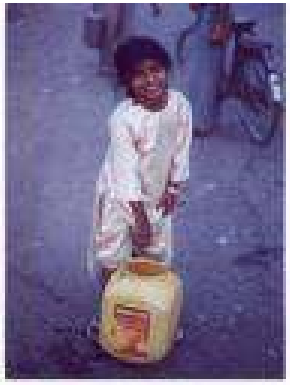
The horror of cholera in Bangladesh in the 1970s. However, the disease need not be a killer if simple prevention and treatment measures are taken.

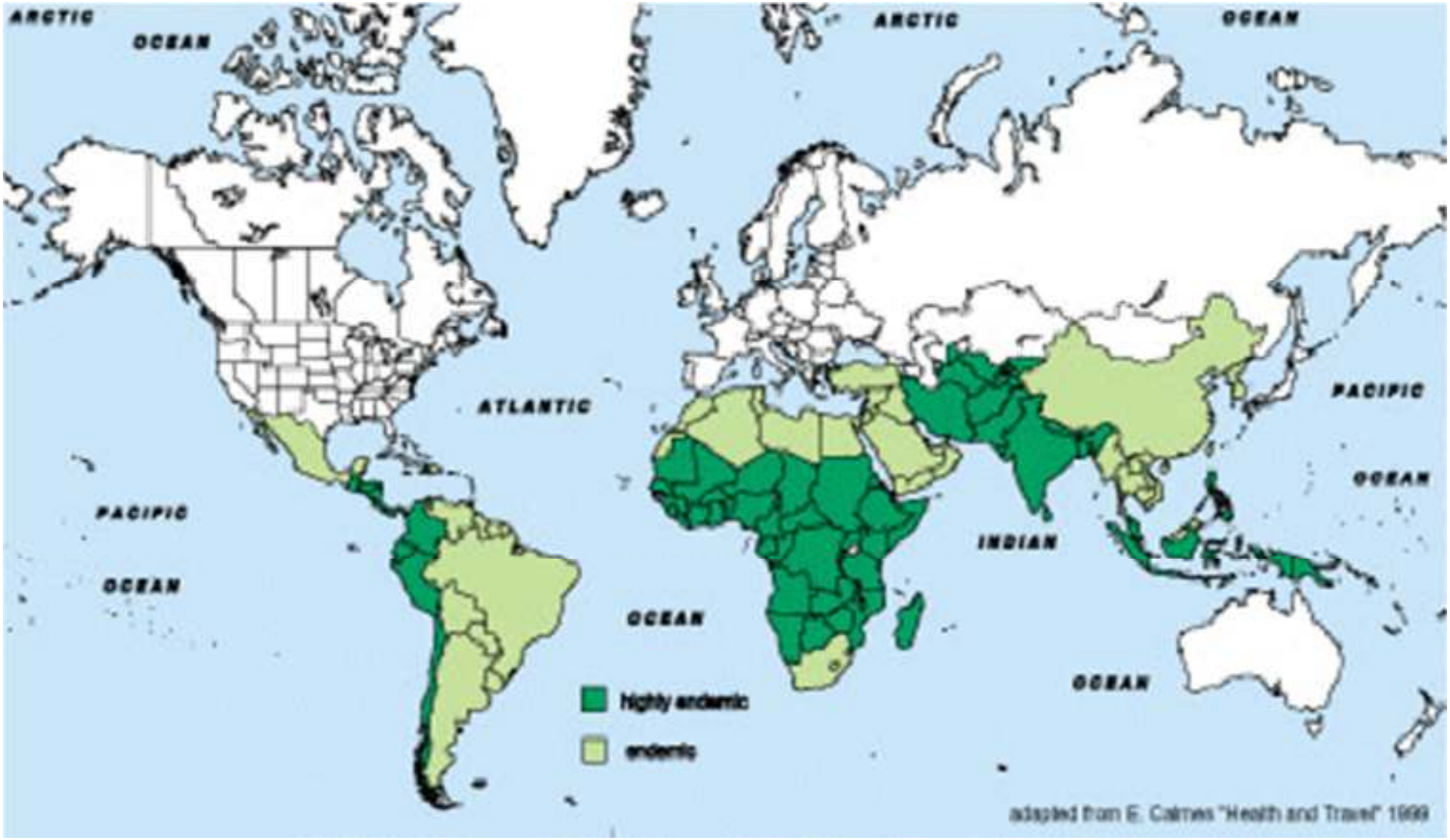
Mark Edwards/Still Pictures

Cholera

An oral cholera vaccine. Large phase three trial initiated in 1985 showed that the vaccine provided about 85% short term protection and about 60% protection over three years (protection among children under five lasted only about one year, suggesting booster doses may be needed for these children).

Typhoid fever





Typhoid fever

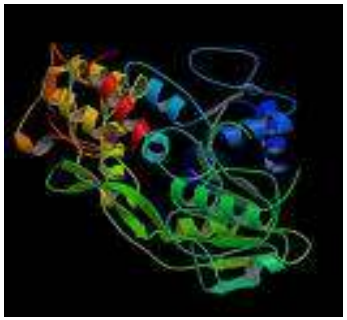
Typhoid Mary in a 1909 newspaper illustration

Mary Mallon (1869 –1938), also known as **Typhoid Mary**, was the first person in the United States to be identified as a **healthy carrier of typhoid**. (It is an example for carrier surveillance at that time.)

Over the course of her career as a cook, she infected 47 people, three of whom died from the disease. Her fame is in part due to her vehement denial of her

own role in causing the disease, together with her refusal to cease working as a cook. **She was forcibly quarantined twice by public health authorities and died in quarantine.**

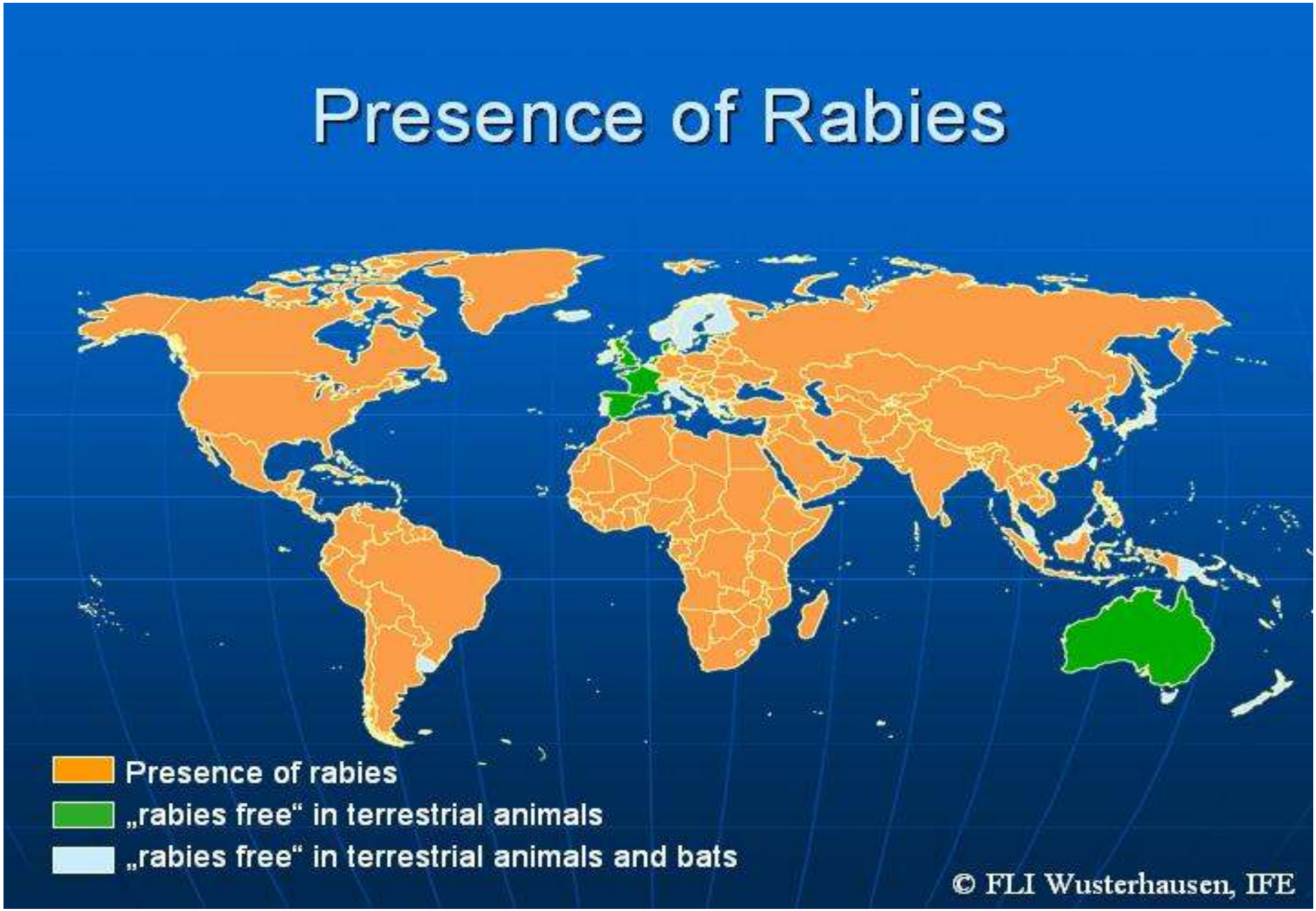
Yellow fever



Yellow fever-endemic zones

Yellow fever: 25 carat fancy yellow pear shape diamond

Typhus exanthematicus
(epidemic louse-borne typhus fever)


Presence of Rabies
Presence of rabies
„rabies free“ in terrestrial animals
„rabies free“ in terrestrial animals and bats
© FLI Wusterhausen, IFE

Green = no risk

Yellow = low risk

Brown = medium risk

Red = high risk

Poliomyelitis

Poliomyelitis, acute /Infantile paralysis/

- Poliovirus, type 1, 2 and 3

- transmission: principally through the fecal-oral route
  but also with pharingeal spread

- targeted with eradication, strategies:

  1. high routine infant immunization coverage with OPV

  2. supplemental mass immunization /National Immunization Days/

  3. epidemiologic and laboratory surveillance for Acut Flaccid Paralysis

  4. „mopping-up” immunization

Why are used in HUNGARY already only IPV?

Plague

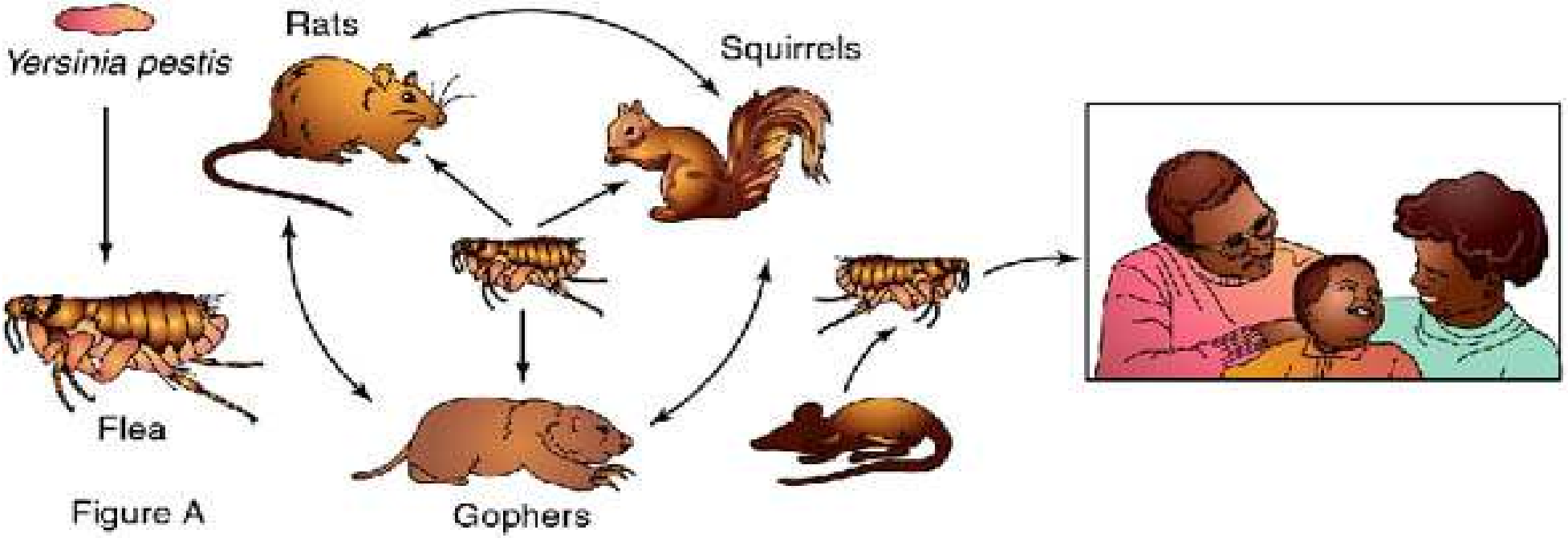
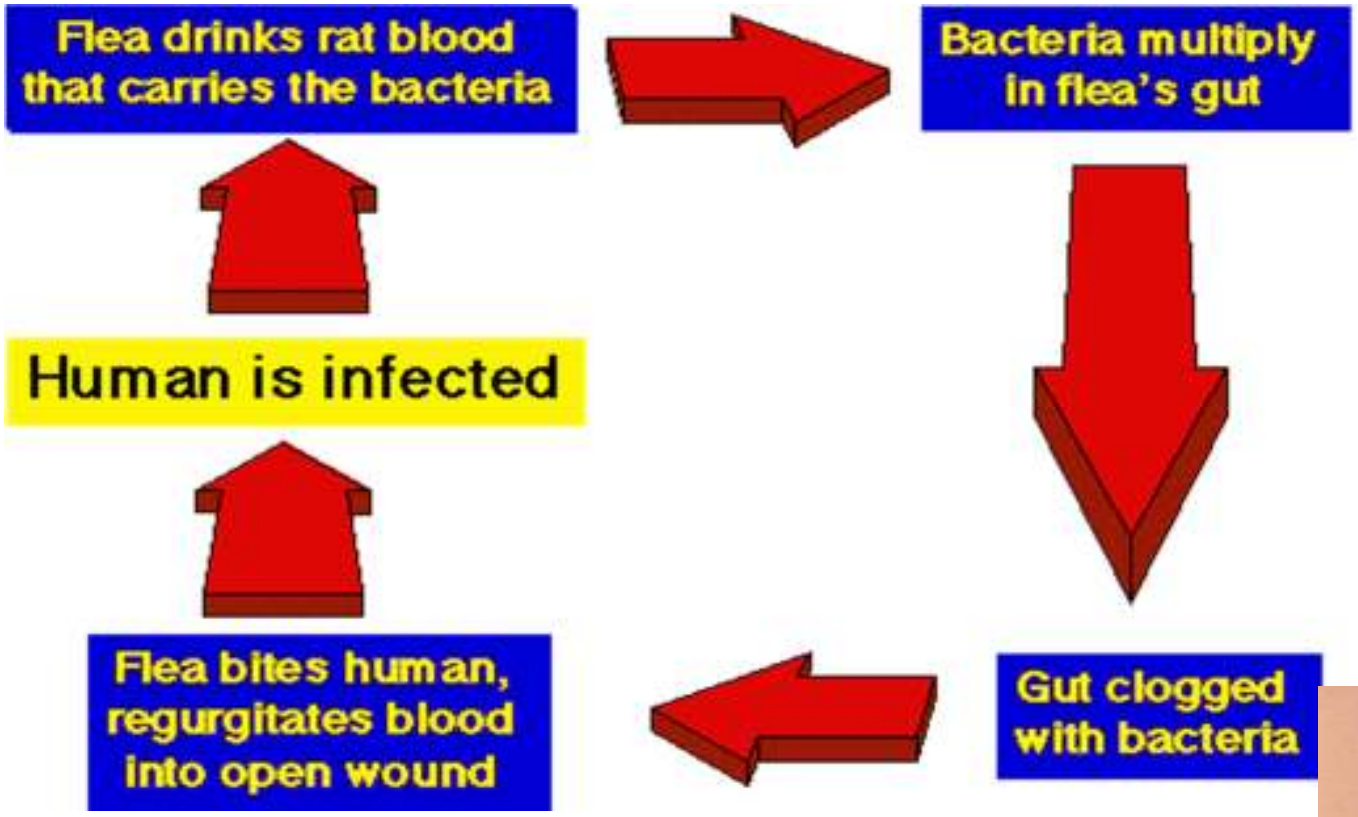
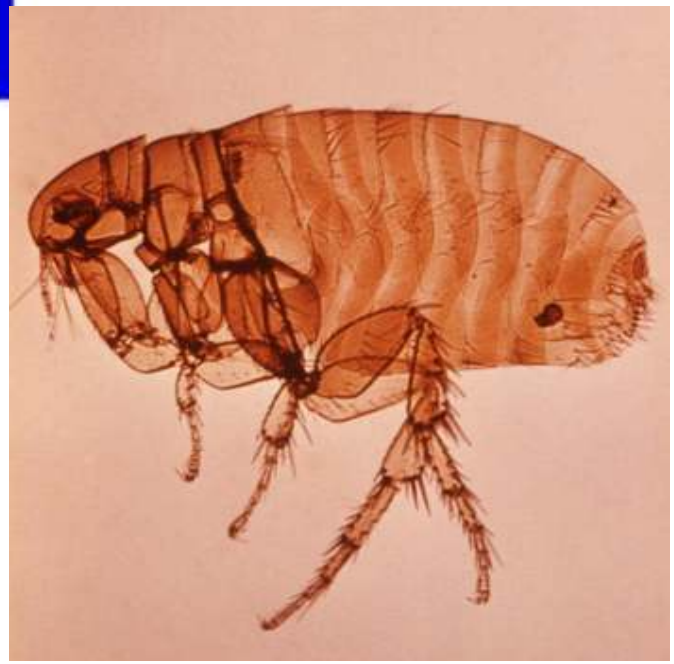


Figure A

Figure B

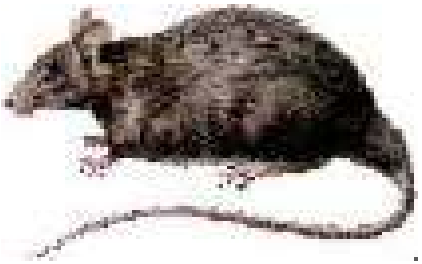
Figure C

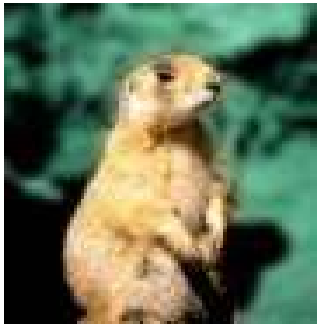

Flea drinks rat blood that carries the bacteria
Bacteria multiply in flea's gut
Human is infected
Flea bites human, regurgitates blood into open wound
Gut clogged with bacteria



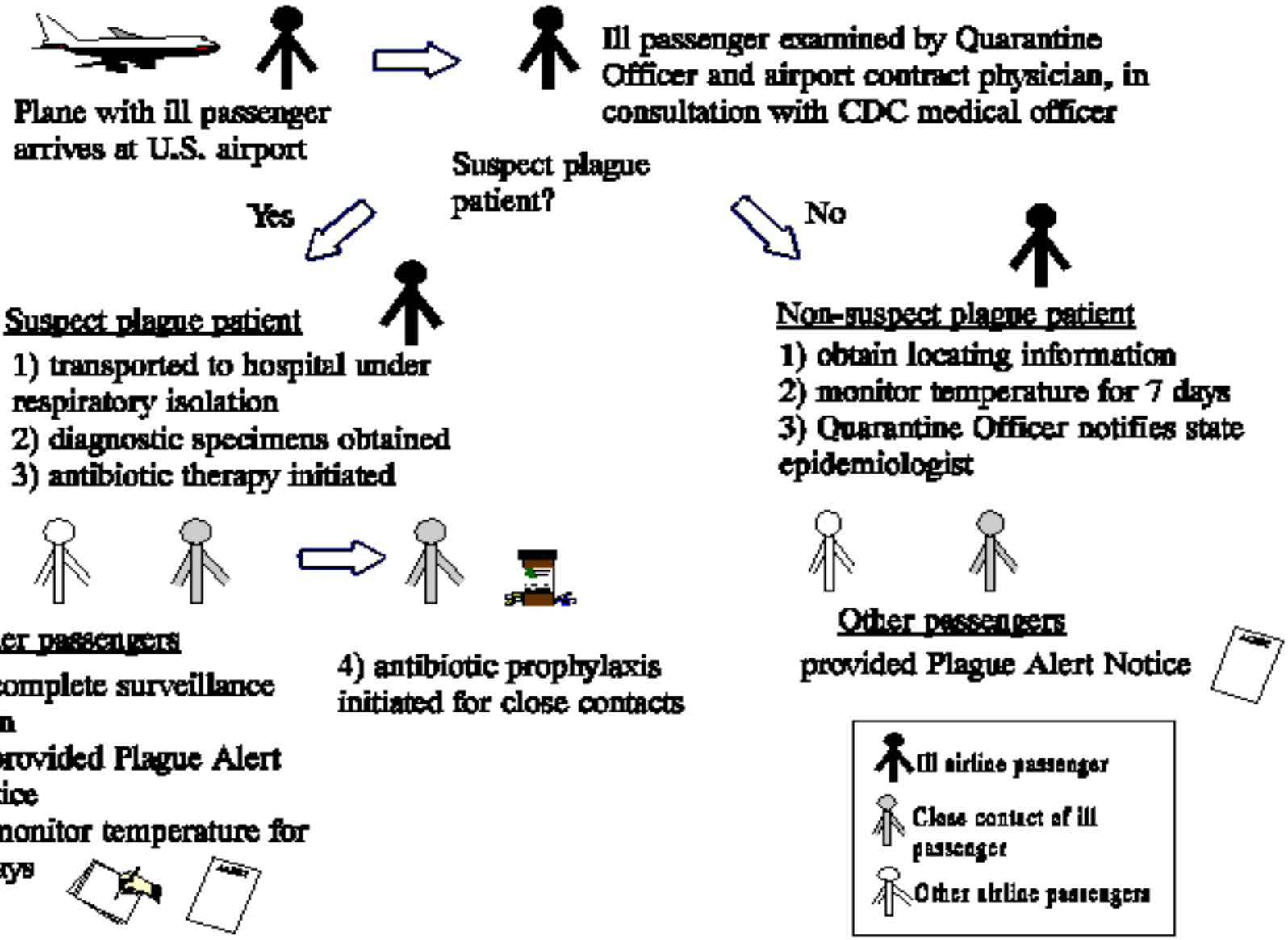
Plague

Plague



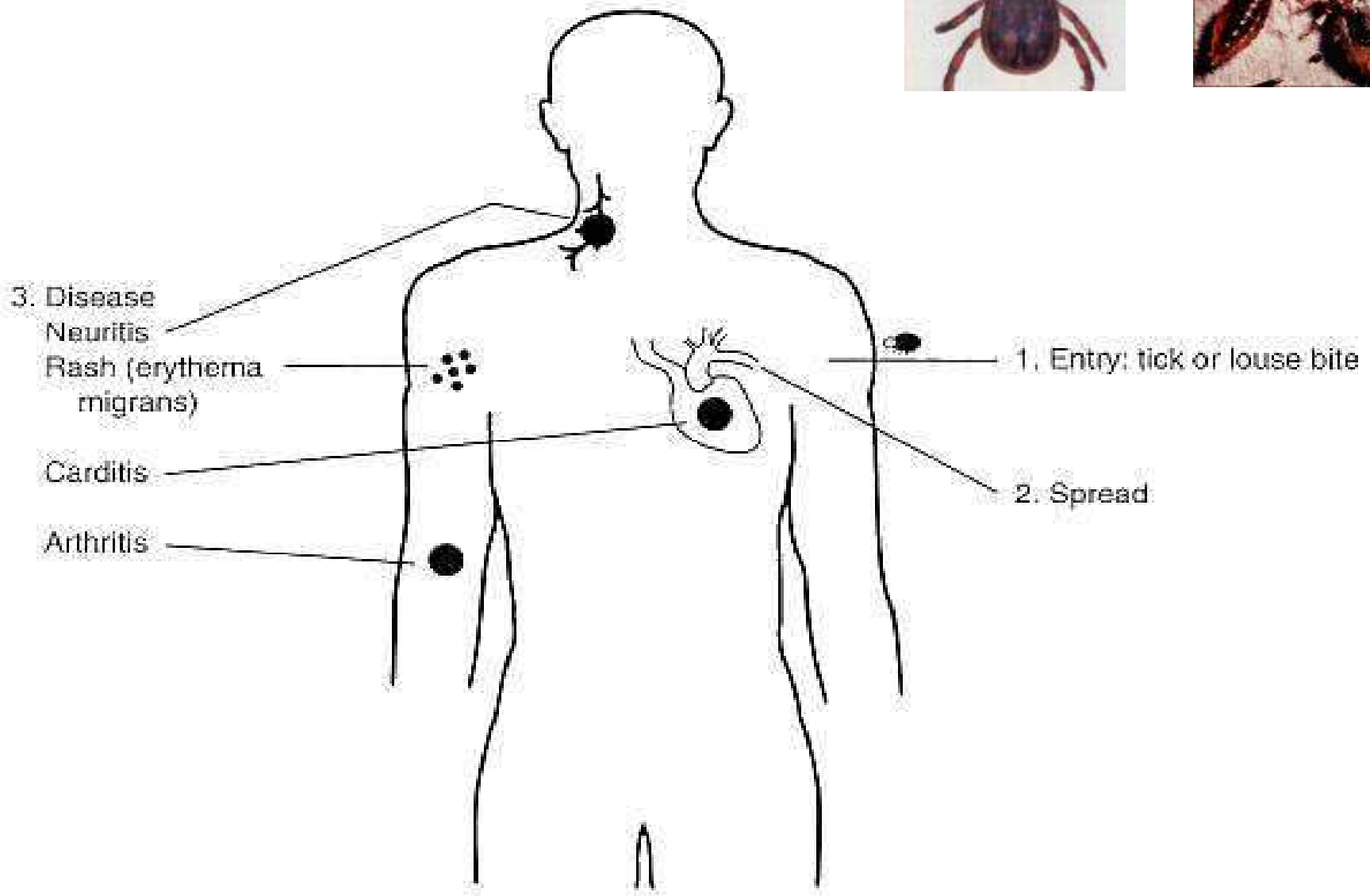


Cat

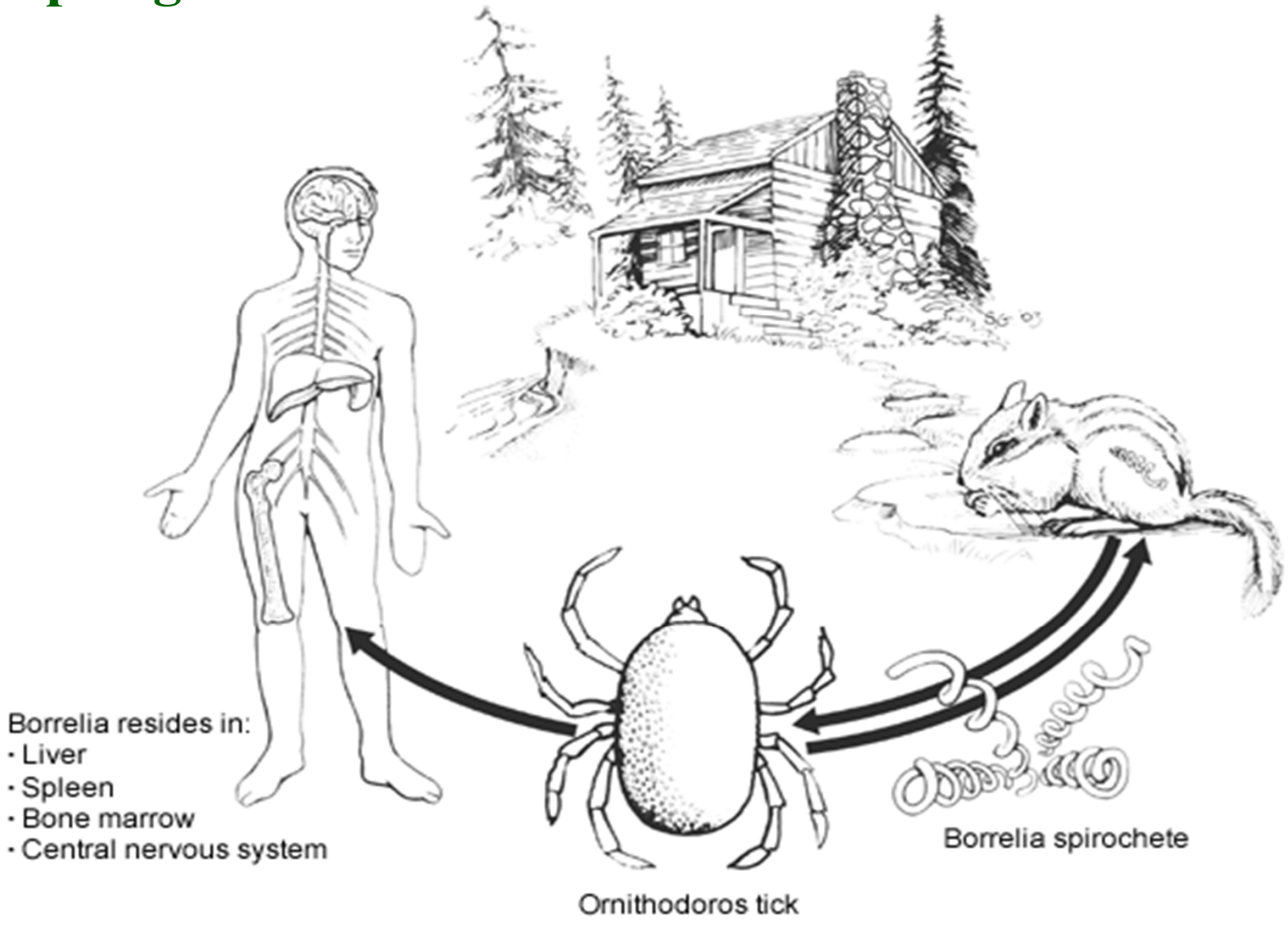


Active surveillance system: patient with suspected plague identified on arrival at U.S. international airport.

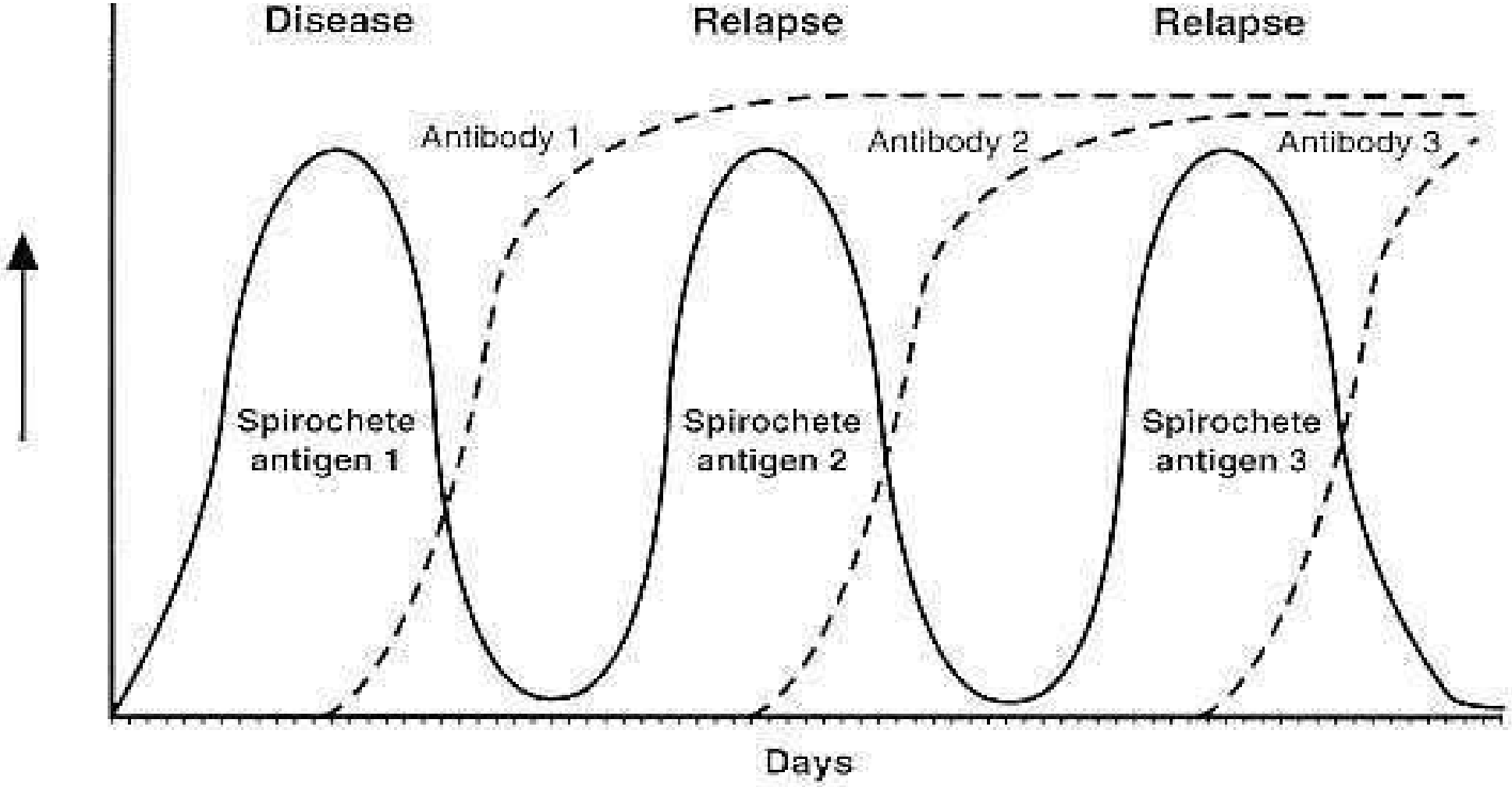
Relapsing fever



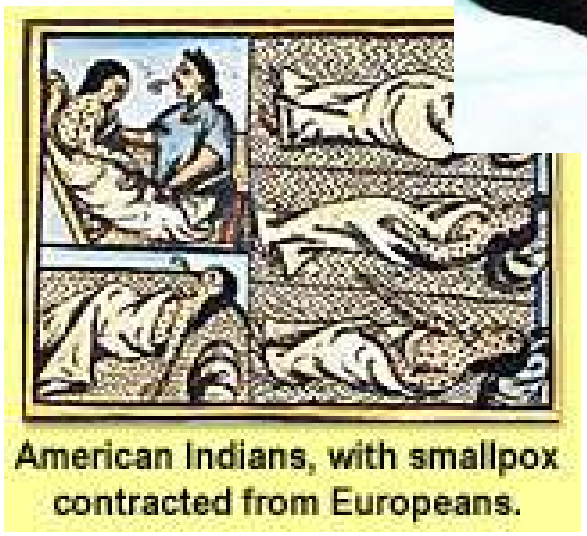
Relapsing fever



Relapsing fever

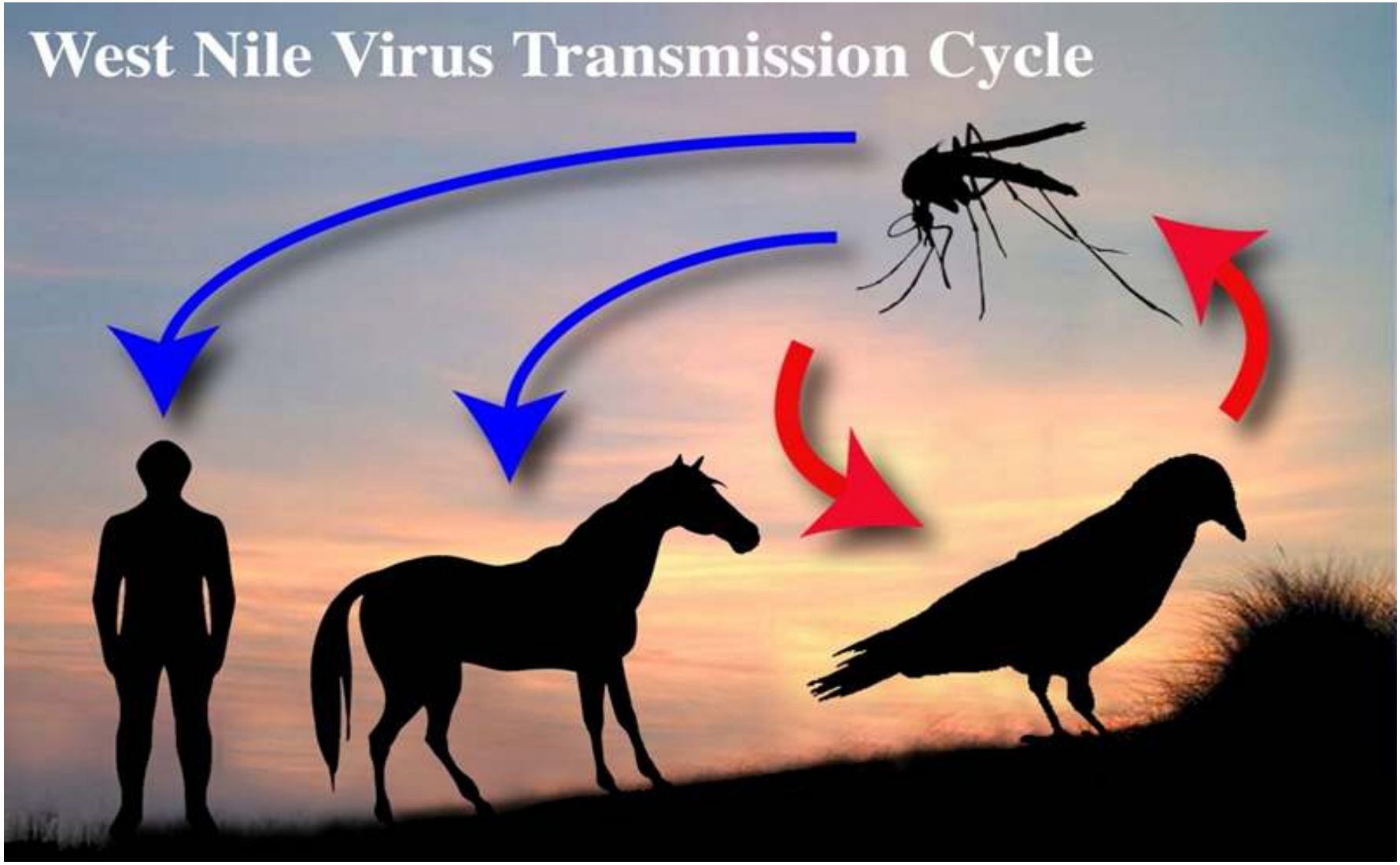


Smallpox

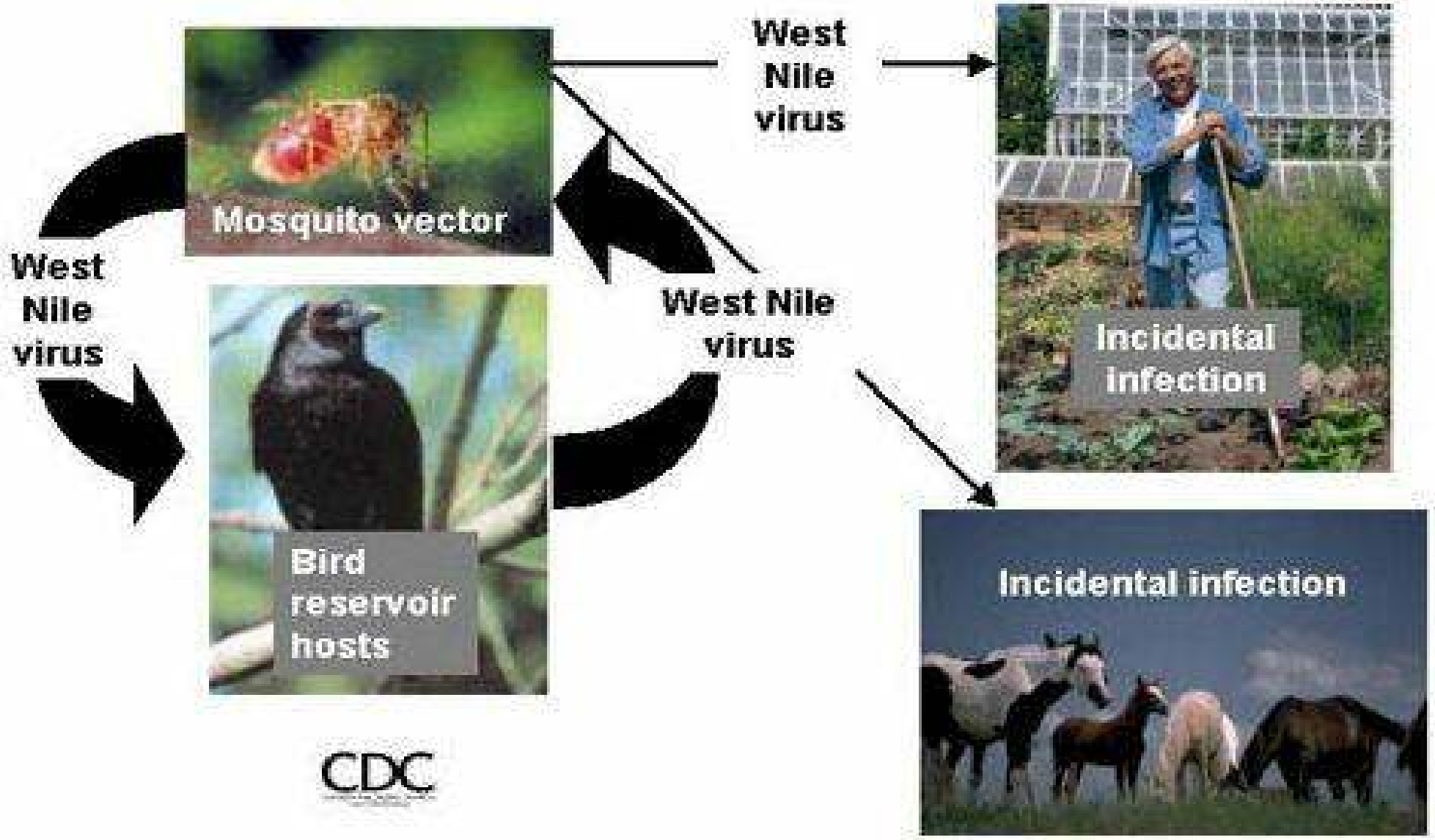


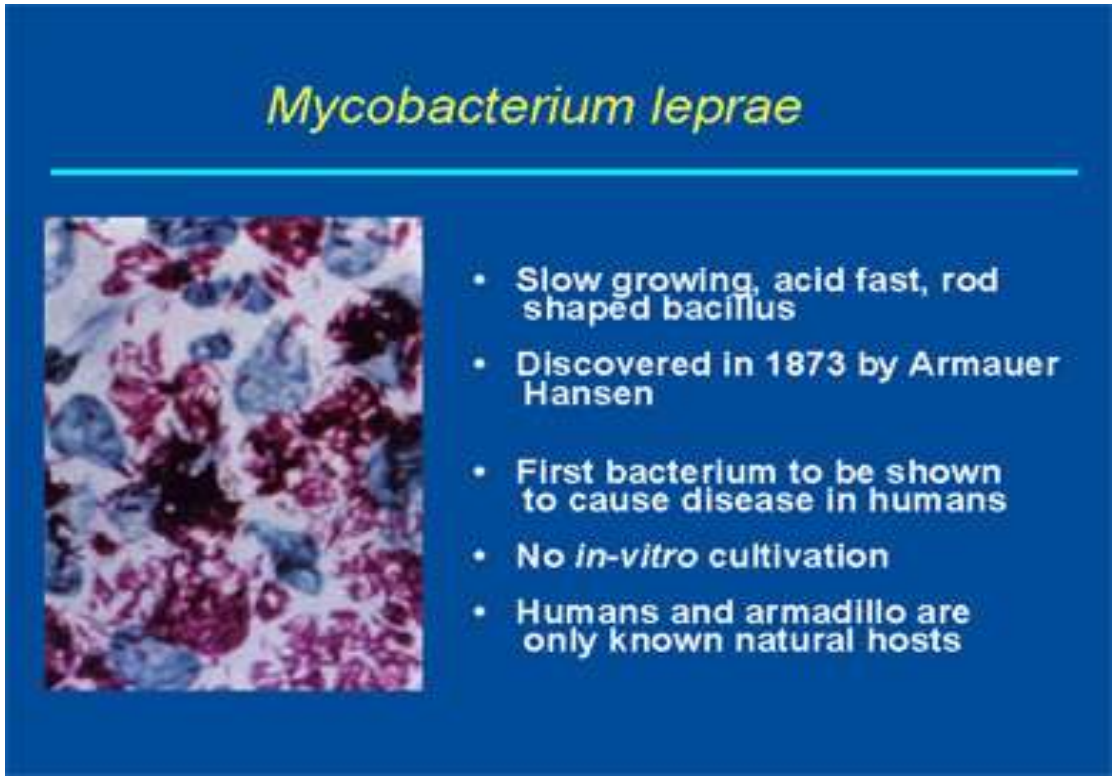
American Indians, with smallpox contracted from Europeans.

Case fatality rates for **Ebola hemorrhagic fever** are high, ranging from 50% to 90%, with death usually occurring from shock rather than blood loss. **The virus is transmitted through direct contact with blood or other body fluids of infected persons or animals**, and even close contact with a deceased Ebola-infected body.Ebola viruses belong to a family of viruses termed *Filoviridae*, which are characterized by a long filamentous structure.


West Nile Virus Transmission Cycle

West Nile Virus Transmission Cycle





Leprosy is a chronic human infectious disease caused by *Mycobacterium leprae,* a slow-growing intracellular parasite mainly of cells belonging to the monocyte-macrophage lineage.
In 2000, there were an estimated 1.3 million cases worldwide, mainly in India, Brazil and countries of South-East Asia and Africa.

The registered global prevalence in the beginnig of 2006 was 219 826 cases.

Peripheral nerve involvement (thickening) is characteristic

of tuberculoid leprosy. Presentation of numbness is also a clue for the clinical diagnosis.

Leprosy is a chronic disease caused by bacterium Mycobacterium leprae. It mainly affects skin, mucus membranes and peripheral nerves.

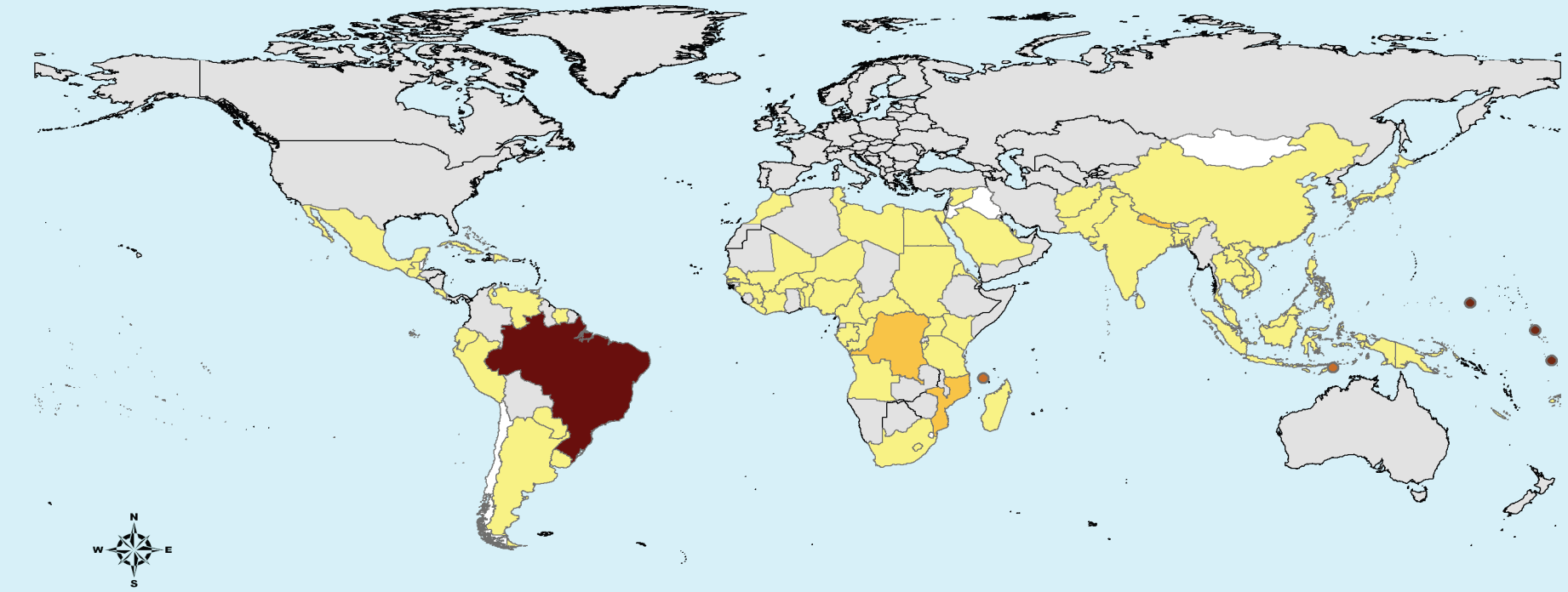
Leprosy, Leonine facies

Lepromatous leprosy

Leprosy, Ethiopia

Most patients with leprosy can be cured with multi-drug therapy in just six months as shown in this image. WHO

Leprosy: prevalence rates, beginning of 2007



N
W E
S

0 15 30 60 Decimal Degrees

The boundaries and names shown and the discriptions used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimination of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

Prevalence rates (per 10 000 population)

- 0 (no cases reported)
- less than 1
- 1.0 - 1.5
- 1.5 - 2.0
- 2 and above
- No data

World Health Organization

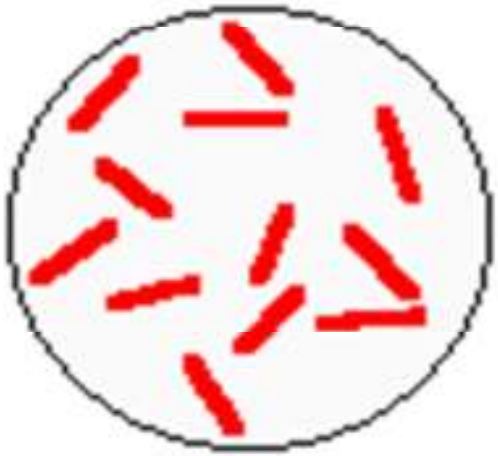
The global registered prevalence of leprosy at the beginning of 2006 was 219,826 cases.

Glanders (Malleus)

Burkholderia (Pseudomonas) mallei

Glanders / Pseudoglanders

Easy to diagnose and
treat -- if you think of it.



Pseudomonas mallei and
Pseudomonas pseudomallei,
acquired from horses, donkeys,
and/or soil in the poor nations
(notably Southeast Asia),
resist most, but not all,
of today's antibiotics.

Eye, skin, node &/or lung
involvement, often years
after the original exposure.

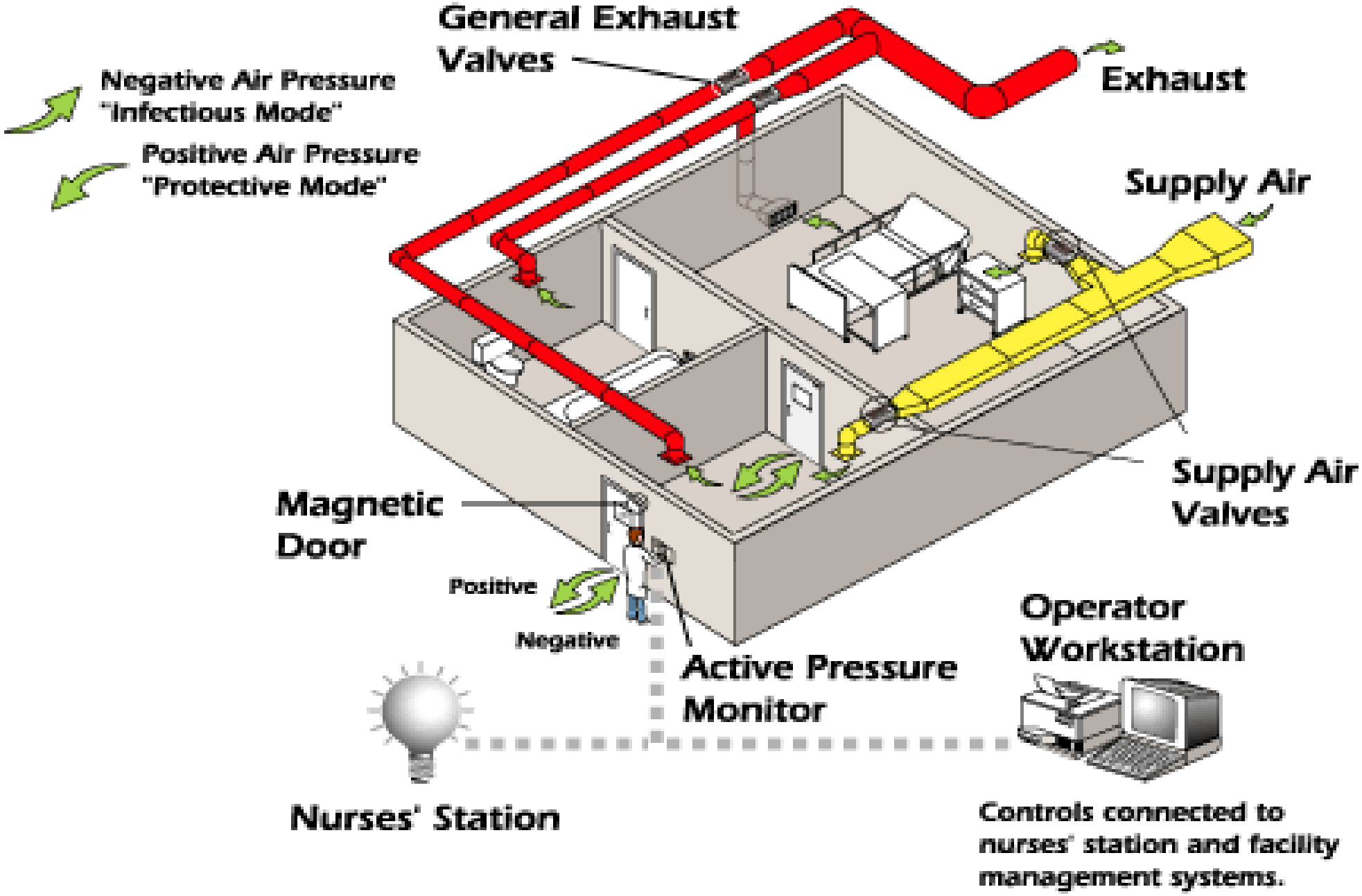
Typhus fever (epidemic louse-borne typhus)

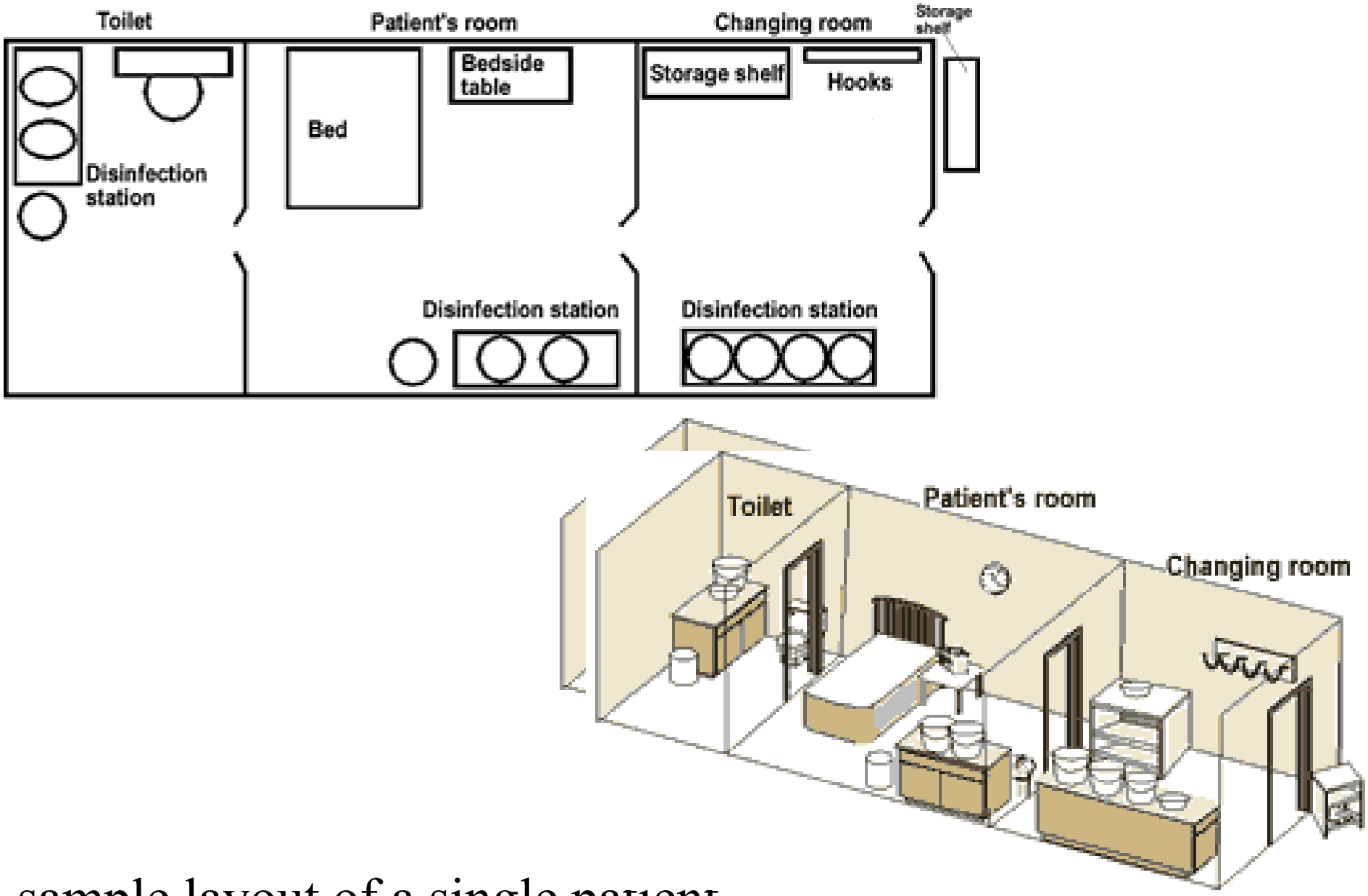
Isolation
(refers to patients!)

- **at home (as the rules allowed it AND if conditions are suitable)**
- **infectious department** (infectious disease hospital)
- **any hospital**

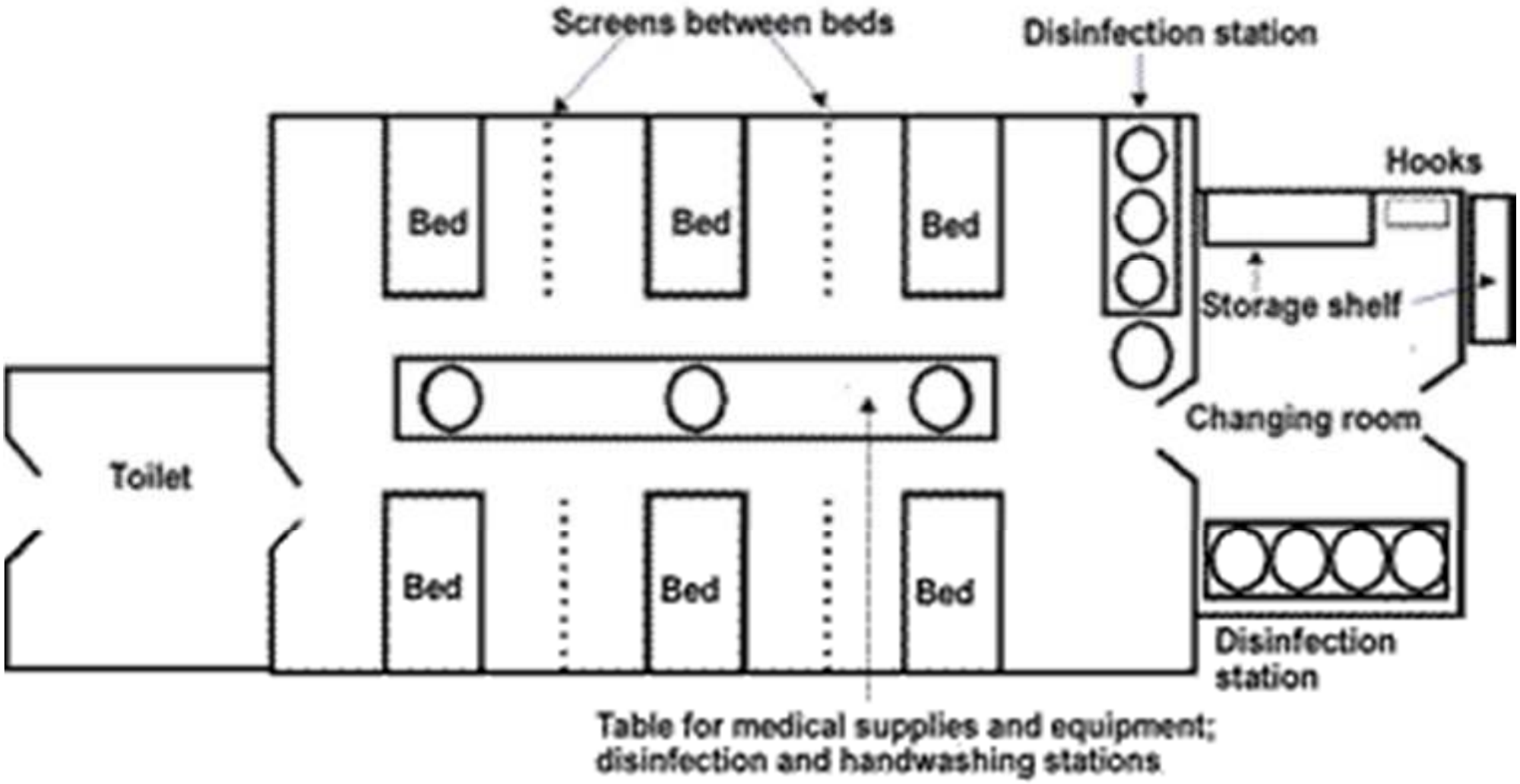
  (specific national rules apply!)

To minimize cross infections, a nurse in the patient isolation room communicates with a colleague through a glass wall – a common sight in the Intensive Care Unit. (Singapore, 2006)


General Exhaust Valves
Exhaust
Negative Air Pressure "Infectious Mode"
Positive Air Pressure "Protective Mode"
Supply Air
Supply Air Valves
Magnetic Door
Positive
Negative
Active Pressure Monitor
Operator Workstation
Nurses' Station
Controls connected to nurses' station and facility management systems.



A sample layout of a single patient



A sample layout for several patients

There are about 14,000 cases of TB in the U.S. every year.
But there have been only 49 cases of **extensively drug-resistant TB** reported between 1993 and 2006.

Portable solution for temporary medical isolation facilities during a suspected or confirmed pandemic infectious disease event.

Isolation categories

1. **Universal** precautions
2. **Strict** isolation
3. **Contact** isolation
4. **Respiratory** isolation
5. **Tuberculosis** (AFB) isolation
6. **Enteric precautions**
7. **Drainage/secretion precautions**

Laboratory tests

Goal:

- **diagnostic** test
- **screening** test
- **control** test

Organization:

- **mandatory**
- **not-mandatory**

There are special laboratories to perform tests in case of communicable diseases.

Quarantine measures

(refers to asymptomatic **contact persons**!)

Restriction of asymptomatic contact persons (or animals) who (that) may be in the incubation phase of an infectious disease for the duration of the maximal incubation period

1. **Absolute quarantine** (absolute limitation of contact)
2. **Modified quarantine** (restriction on activities):
   - **personal surveillance** (close observation)
   - **segregation** (separation of part of a group)

* Special case: carrier surveillance (similar to personal)

In the USA the **list of quarantinable diseases** is contained in an Executive Order of the President and includes **cholera, infectious tuberculosis, plague, smallpox, yellow fever, viral hemorrhagic fevers** (**such as Marburg, Ebola, and Congo-Crimean**), and **SARS**.

An amendment t to the Executive Order of the President was added in 2005 to include **influenza that is causing or has the potential to cause a pandemic**.

Modern quarantine lasts only as long as necessary to protect the public by

(1) providing public health care (such as immunization or drug treatment, as required) and

(2) ensuring that quarantined persons do not infect others if they have been exposed to a contagious disease.

Restriction on professional activities in health care

Regulations vary in different countries, but usually a Health Care Staff member, who is

- **HIV positive,**
- **HBV infective positive, or**
- **HCV infective positive**

is banned from certain medical activities

(invasive procedures).

International Health Regulations (WHO) I.

Notification of cases:

WHO Member States are obliged to notify WHO for a single case of cholera, plague or yellow fever, occurring in humans in their territories, and give further notification **when an area is free from infection and all events that may constitute a public health emergency of international concern**.

These notifications are reported in the WHO's *Weekly Epidemiological Record*.

International Health Regulations (WHO) II.

Health-related rules for international trade and travel. Health measures:

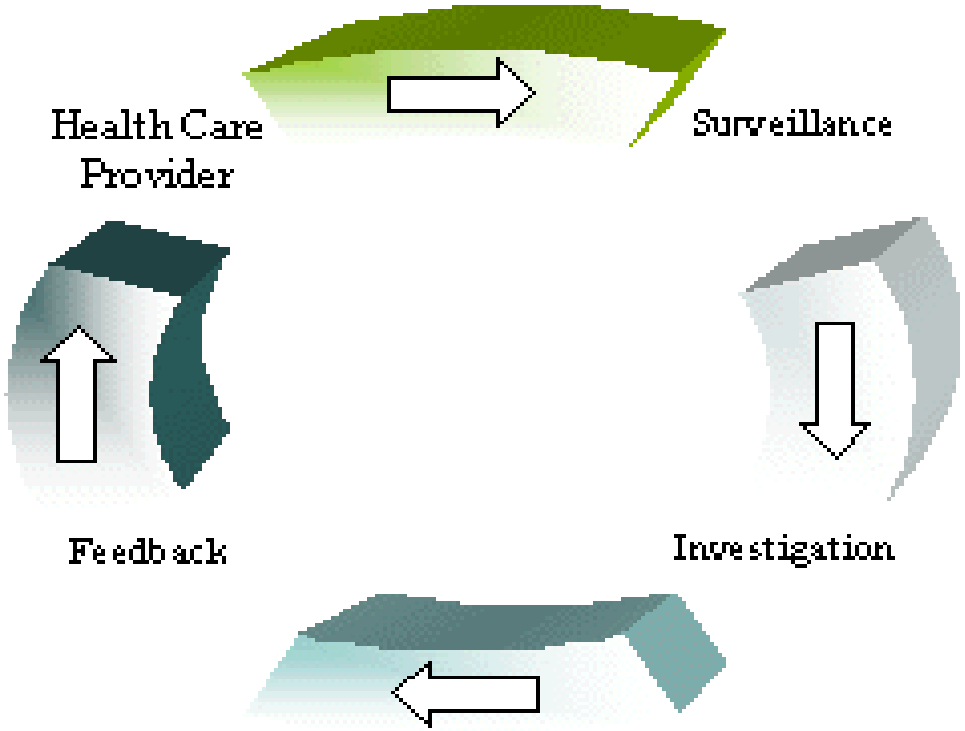
measures for **deratting**, **disinfecting**, and **disinsecting international conveyances** (ships, aircraft, etc.) are to be implemented at points of arrival and departure (ports, airports and frontier posts). The health measures called for are the maximum measures that a state may apply for the protection of its territory against cholera, plague and yellow fever.

Health documents required:

requirements are included for health and vaccination certificates for travellers from infected to non-infected areas (*yellow fever and meningococcal diseases*); deratting/deratting exemption certificates; health declarations- Maritime Declaration of Health; Aircraft General Declaration.

Disease surveillance

Surveillance is defined as "*the ongoing* ***systematic collection, analysis,and interpretation of outcome-specific data*** *for use in planning, evaluation and implementation into public health practice.*"



Communicable disease surveillance

- **morbidity** and **mortality** reports
- reports **about epidemics and individual cases**
- **identification of infectious agents** by laboratories
- **serologic surveillance**, information about the immunity level of segments of the population
- data about the **use and antoward effects of vaccines and toxoids, immune globulins, insecticides and other substances** used in control
- other relevant epidemiological data

DATA COLLECTION - EVALUATION - INFORMATION, NEEDED (possible) MEASURES

Further reading

- **Heymann DL. Control of Communicable Diseases Manual (CCDM). APHA/WHO 2004.**
- **Specific website content (see previous slides)**
- **CDC. *Guidelines for Infection Control in Health Care Personnel*, 1998. (http://www.cdc.gov/ncidod/dhqp/gl_hcpersonnel.html)**
- **WHO. *Prevention of hospital-acquired infections: A practical guide*. 2nd edition, 2002. (http://www.who.int/csr/resources/publications/drugresist/WHO_CDS_CSR_EPH_2002_12/en/)**