

NOSOCOMIAL INFECTION

By

Dr. Ameer kadhim Hussein.

M.B.Ch.B. FICMS (Community Medicine).

DEFINITION

A nosocomial infection also called “**hospital acquired infection HAI**” can be defined as an infection acquired in hospital by a patient who was admitted for a reason other than that infection.

DEFINITION

It is infection occurring in a patient in a hospital or other health care facility in whom the infection was not present or incubating at the time of admission.

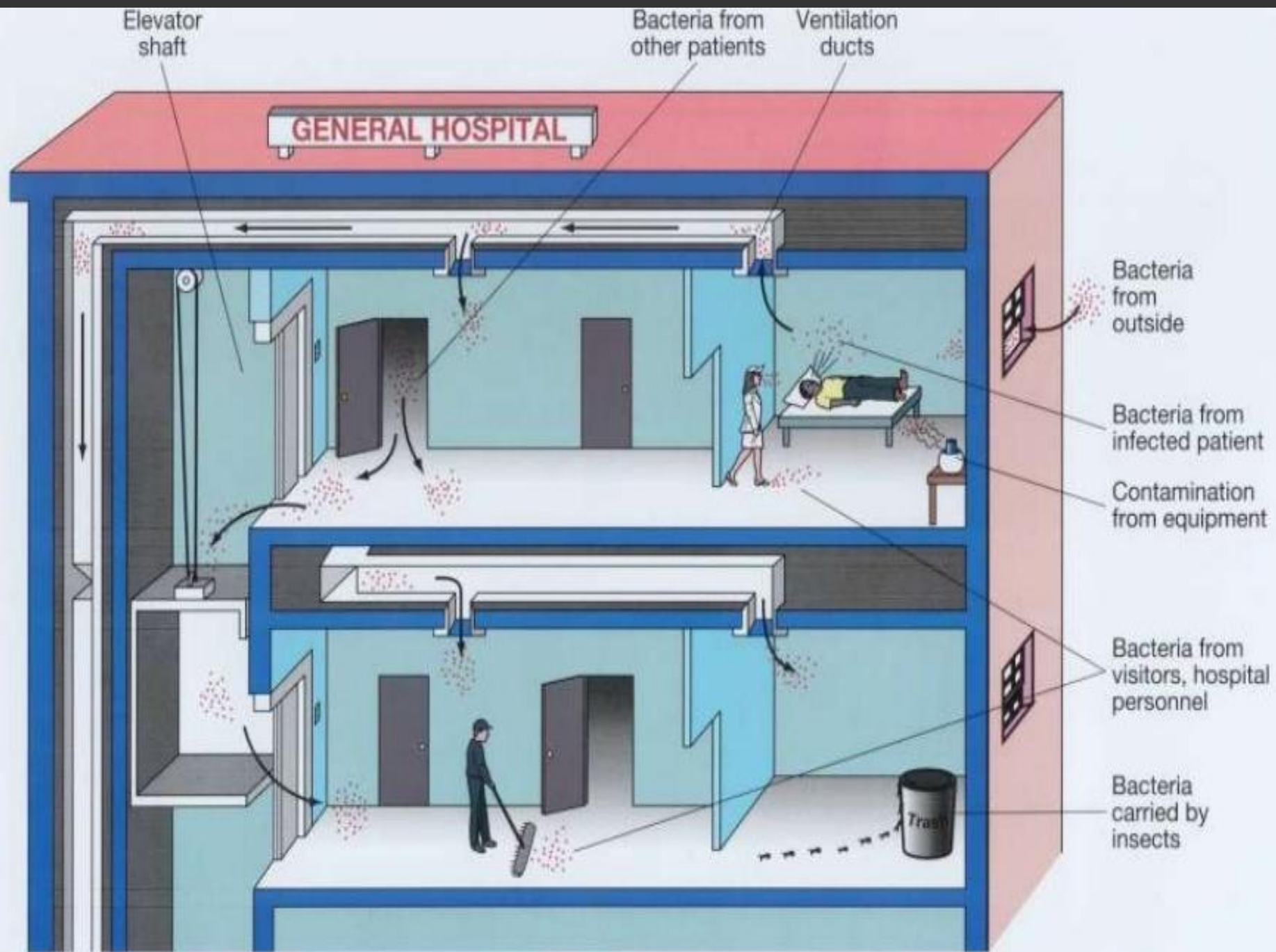
This includes infections acquired in the hospital but appearing after discharge, and also occupational infections among staff of the facility.

**Presence of
microorganisms in
hospital environment**

**Immunocompromised
patients**

**Nosocomial
infection**

**Transmission of
pathogens between
staff and patients
and among patients**



FREQUENCY OF INFECTION

- ❑ Nosocomial infections occur worldwide and affect both developed and resource-poor countries. Infections acquired in health care settings are among the major causes of death and increased morbidity among hospitalized patients.
- ❑ They are a significant burden both for the patient and for public health.
- ❑ A prevalence survey conducted by WHO in 55 hospitals of 14 countries representing 4 WHO Regions (Europe, Eastern Mediterranean, South-East Asia and Western Pacific) showed an average of 8.7% of hospital patients had nosocomial infections.

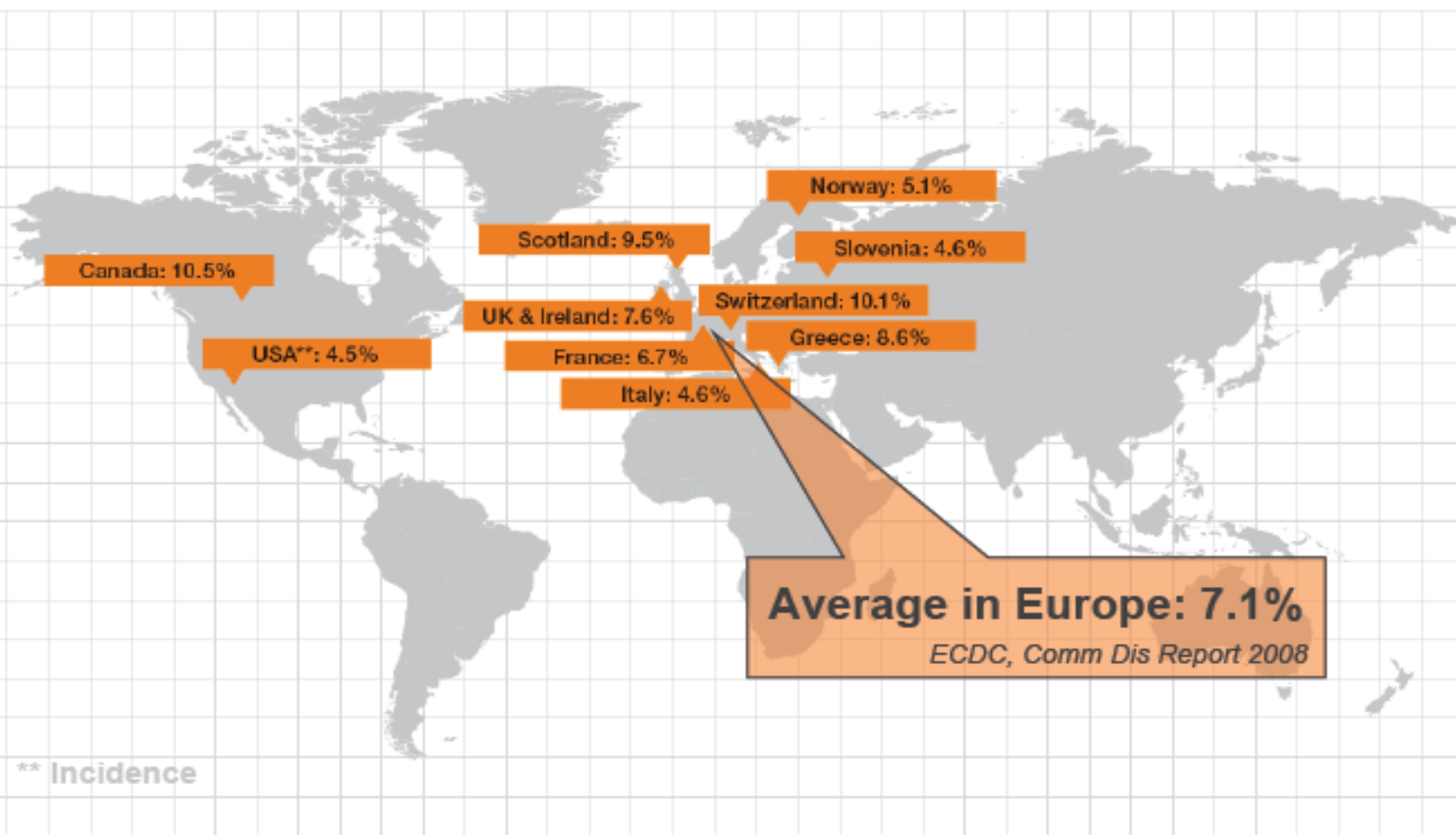
FREQUENCY OF INFECTION

- The most frequent nosocomial infections are infections of surgical wounds, urinary tract infections and lower respiratory tract infections.
- The WHO study has shown that the highest prevalence of nosocomial infections occurs in intensive care units and in acute surgical and orthopaedic wards.
- Infection rates are higher among patients with increased susceptibility because of old age, underlying disease, or chemotherapy.

HAI BURDEN IN USA

- ❑ 1,7 million affected patients.
- ❑ Urinary Tract Infection: 36%; 561,667 episodes, 13,088 deaths.
- ❑ Surgical Site Infection: 20%; 274,098 episodes.
- ❑ Catheter Related Bloodstream Infections: 11%; 250,000 episodes, 28,000 deaths.
- ❑ Ventilator Associated Pneumonia: 11%.
- ❑ Attributable mortality: 3.6%, approximately 99,000 deaths.
- ❑ Annual economic impact: about US\$ 4,5 billion.

Prevalence of HAI in developed countries



World Health
Organization

Patient Safety

A World Alliance for Safer Health Care

SAVE LIVES
Clean Your Hands

FACTS ABOUT HEALTH-CARE ASSOCIATED INFECTION IN DEVELOPING COUNTRIES

- The risk of infection is 2-20 times higher than in developed countries, and the proportion of patients infected can exceed 25%.
- Unsafe blood transfusion causes every year:
- 16 million hepatitis B infections, 5 million hepatitis C infections, and 160 000 cases of HIV.

FACTS ABOUT HEALTH-CARE ASSOCIATED INFECTION IN DEVELOPING COUNTRIES

- Reuse of contaminated syringes caused in 2000:
- 21 million hepatitis B infections , 2 million hepatitis C infections 260 000 HIV infections.
- Unsafe waste disposal: in 22 developing countries, the proportion of facilities using inappropriate waste disposal methods ranges from 18% to 64%.

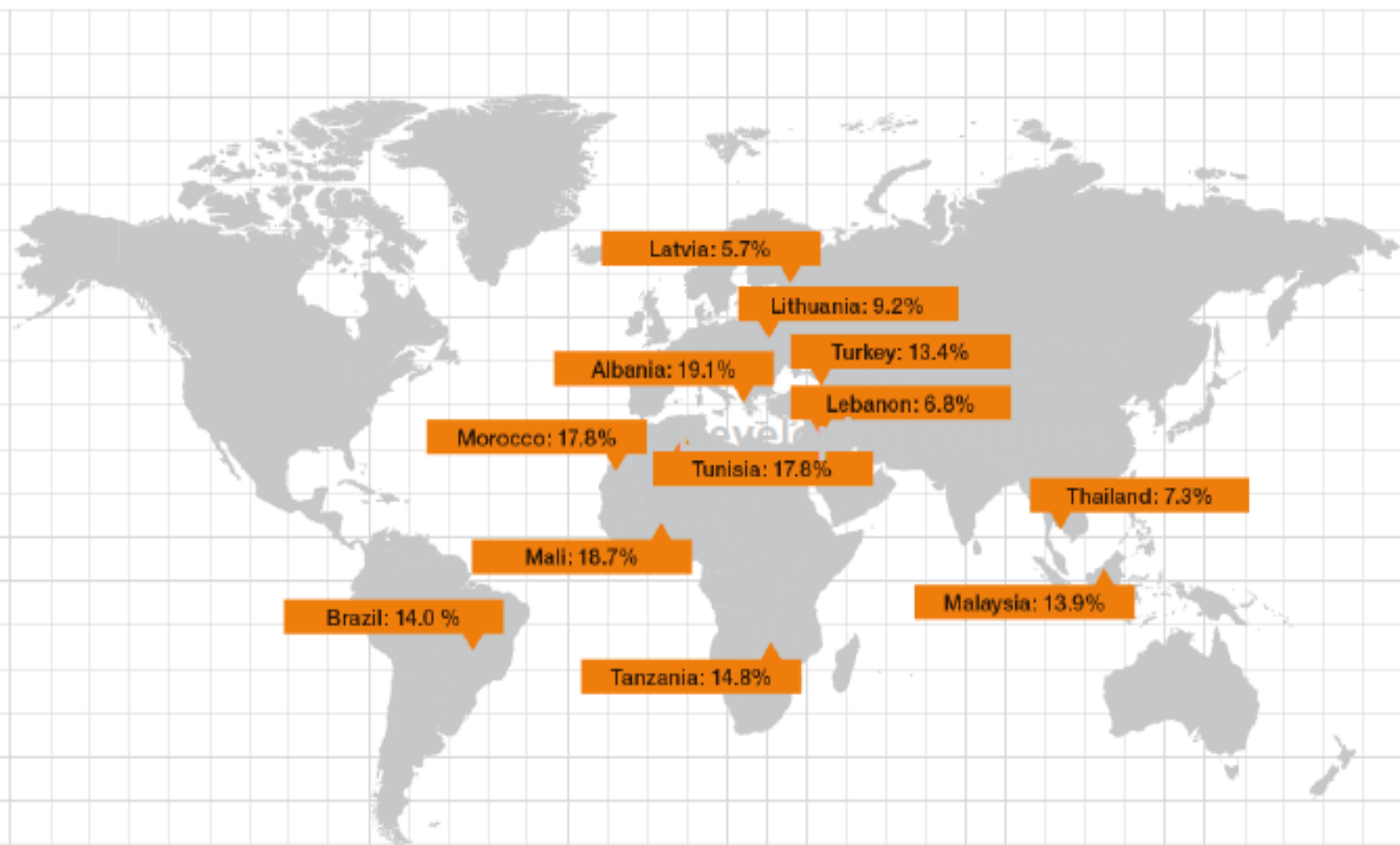
CONDITIONS LEADING TO HIGHER HAI BURDEN IN DEVELOPING COUNTRIES

- ❖ Inadequate hygiene conditions.
- ❖ Poor infrastructure and Inadequate or insufficient equipment.
- ❖ Lack of microbiological information.
- ❖ Understaffing.
- ❖ Overcrowding.
- ❖ Lack of knowledge and low staff preparedness.

CONDITIONS LEADING TO HIGHER HAI BURDEN IN DEVELOPING COUNTRIES

- ❖ Inappropriate use of antibiotics.
- ❖ More diseased population and unfavorable social background.
- ❖ Lack of national policies and programs.
- ❖ Costs falling on individual patients.

Prevalence of HAI in developing countries



Systematic review of the literature conducted by WHO

IMPACT OF NOSOCOMIAL INFECTIONS

- HCAI can cause:
 1. More serious illness.
 2. Prolongation of stay in a health-care facility.
 3. Long-term disability.
 4. Excess deaths.
 5. High additional financial burden.
 6. High personal costs on patients and their families.

FACTORS INFLUENCING THE DEVELOPMENT OF NOSOCOMIAL INFECTIONS

A . The microbial agent:

- Many different bacteria, viruses, fungi and parasites may cause nosocomial infections.
- Infections may be caused by a microorganism acquired from another person in the hospital (**cross-infection**) or may be

FACTORS INFLUENCING THE DEVELOPMENT OF NOSOCOMIAL INFECTIONS

- caused by the patient's own flora (**endogenous infection**).
- Some organisms may be acquired from an inanimate object or substances recently contaminated from another human source (**environmental infection**).

FACTORS INFLUENCING THE DEVELOPMENT OF NOSOCOMIAL INFECTIONS

B. Patient susceptibility

- ❑ 1. **Age:** infancy and old age associated with a decreased resistance to infection.
- ❑ 2. **Underlying disease and immune status:** Patients with chronic disease such as malignant tumours, diabetes mellitus, renal failure have an increased susceptibility to infections.

FACTORS INFLUENCING THE DEVELOPMENT OF NOSOCOMIAL INFECTIONS

□ 3. Diagnostic and therapeutic interventions:

Many modern diagnostic and therapeutic procedures, such as biopsies, endoscopic examinations increase the risk of infection.

FACTORS INFLUENCING THE DEVELOPMENT OF NOSOCOMIAL INFECTIONS

C. Environmental conditions:

The following factors related to hospital environment contribute to the development of nosocomial infections:

1. Crowded conditions within the hospital.
2. Frequent transfers of patients from one unit to another.
3. Concentration of patients highly susceptible to infection in one area (e.g. newborn babies, burn patients).

FACTORS INFLUENCING THE DEVELOPMENT OF NOSOCOMIAL INFECTIONS

D. Bacterial resistance:

- Many strains of pneumococci, staphylococci, enterococci and tuberculosis are currently resistant to most or all antimicrobials which were once effective. Multi resistant *Klebsiella* and *Pseudomonas aeruginosa* are prevalent in many hospitals.
- This problem is particularly critical in developing countries where more expensive second-line antibiotics may not be available or affordable.

TABLE I. Differential nosocomial infection risk by patient and interventions

Risk of infection	Type of patients	Type of procedures
1 Minimal	Not immunocompromised; no significant underlying disease	Non-invasive No exposure to biological fluids *
2 Medium	Infected patients, or patients with some risk factors (age, neoplasm)	Exposure to biological fluids or Invasive non-surgical procedure (e.g. peripheral venous catheter, introduction of urinary catheter)
3 High	Severely immunocompromised patients, (<500 WBC per ml); multiple trauma, severe burns, organ transplant	Surgery or High-risk invasive procedures (e.g. central venous catheter, endotracheal intubation)

* Biological fluids include blood, urine, faeces, CSF, fluid from body cavities.

PREVENTION OF NOSOCOMIAL INFECTION

Prevention of nosocomial infections requires an integrated and monitored programme which includes the following key components:

1. limiting transmission of organisms between patients in direct patient care through adequate hand washing and glove use, and appropriate aseptic practice, isolation strategies, sterilization and disinfection practices.
2. Controlling environmental risks for infection.
3. Protecting patients with appropriate use of prophylactic antimicrobials, nutrition and vaccinations.

PREVENTION OF NOSOCOMIAL INFECTION

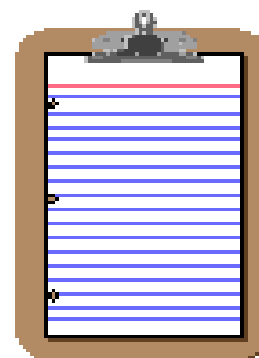
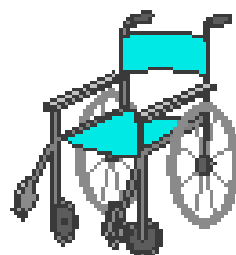
4. Limiting the risk of endogenous infections by minimizing invasive procedures and promoting optimal antimicrobial use.
5. Surveillance of infections, identifying and controlling outbreaks.
6. Prevention of infection in staff members.
7. Enhancing staff patient care practices, and continuing staff education.

PREVENTION OF NOSOCOMIAL INFECTION

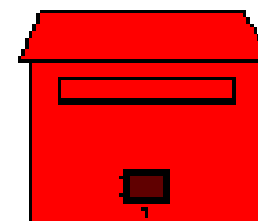
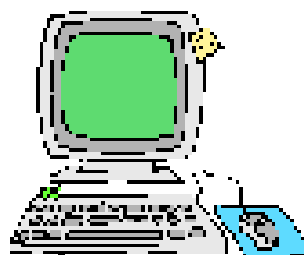
Infection control is the responsibility of all health care members including:

doctors, nurses, therapists, pharmacists, engineers and others.

**Remember: everything you touch
has been touched by someone else**

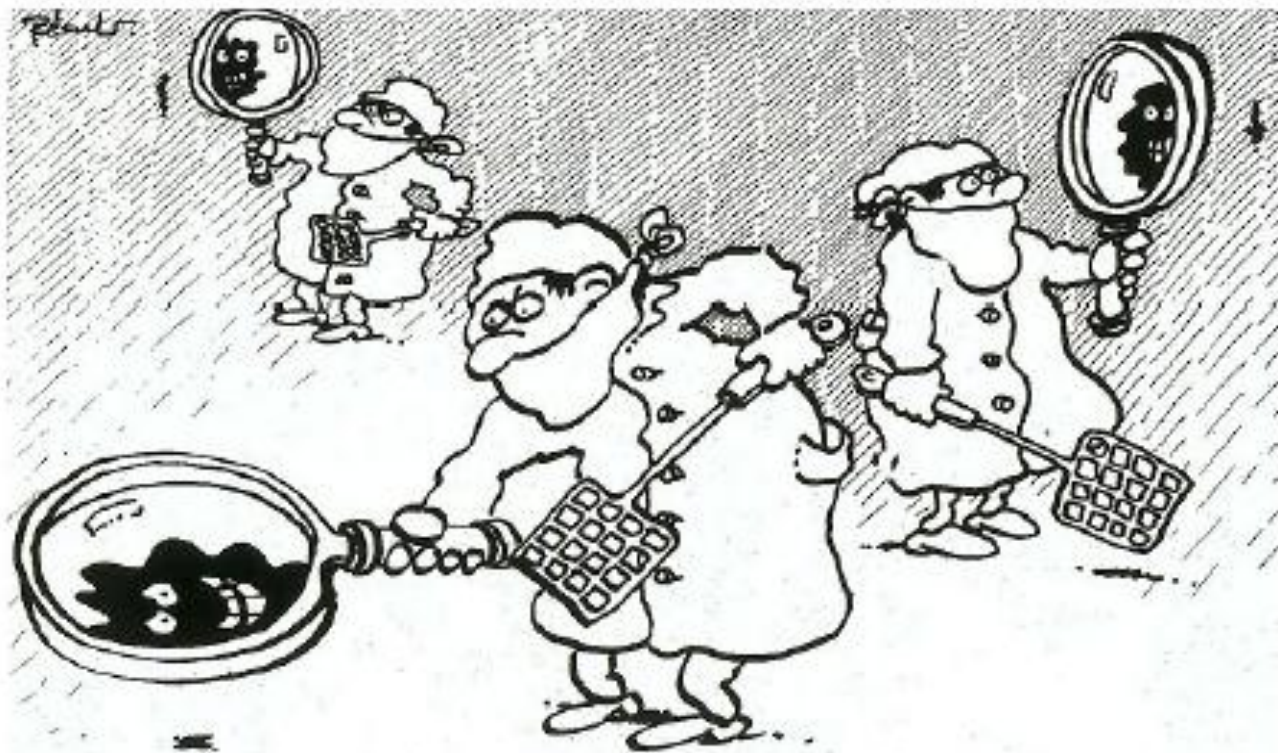


**Thanks for washing
your hands**





Estimates of the global burden of health care-associated infection are hampered by limited availability of reliable data



First Challenge area of work on the
burden of health care-associated infection



Thank you