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ACCÈS À LA CHIRURGIE EN ZONES TROPICALES

CONFÉRENCE NATIONALE VIETNAMIENNE DE CANCÉROLOGIE  
ACTUALITÉS EN ONCOLOGIE



**HAIPHONG**  
8-10 NOV 2017

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# The surgical site infection risk in developing countries

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# Surgical site infections

- Health-care-associated infections occurring within 30 days after surgery, or within one year if prosthesis or implant placement has been performed
- Main post-operative complications
- First cause of mortality and morbidity in surgery
- They extend the length of hospitalization and generate significant additional costs
- direct quality markers for surgical care



# Pathogenesis

Risk factors of SSI: the Altemeier equation

Number of contaminating bacteria  $\times$  Virulence of bacteria

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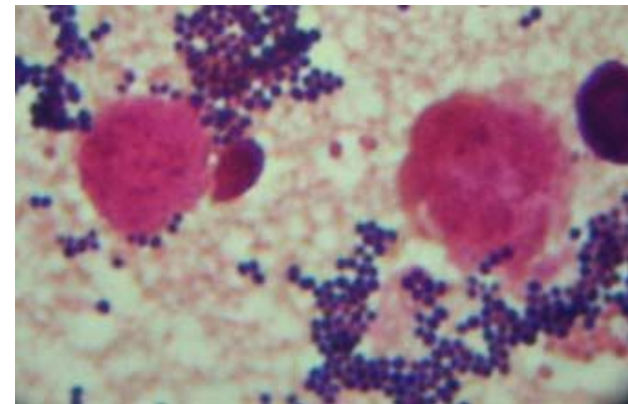
Résistance de l'hôte à infection

**Contamination** ▶ 90% endogenous: patient's flora, bacteremia  
▶ 10% exogenous: surgical team, materials, air, water

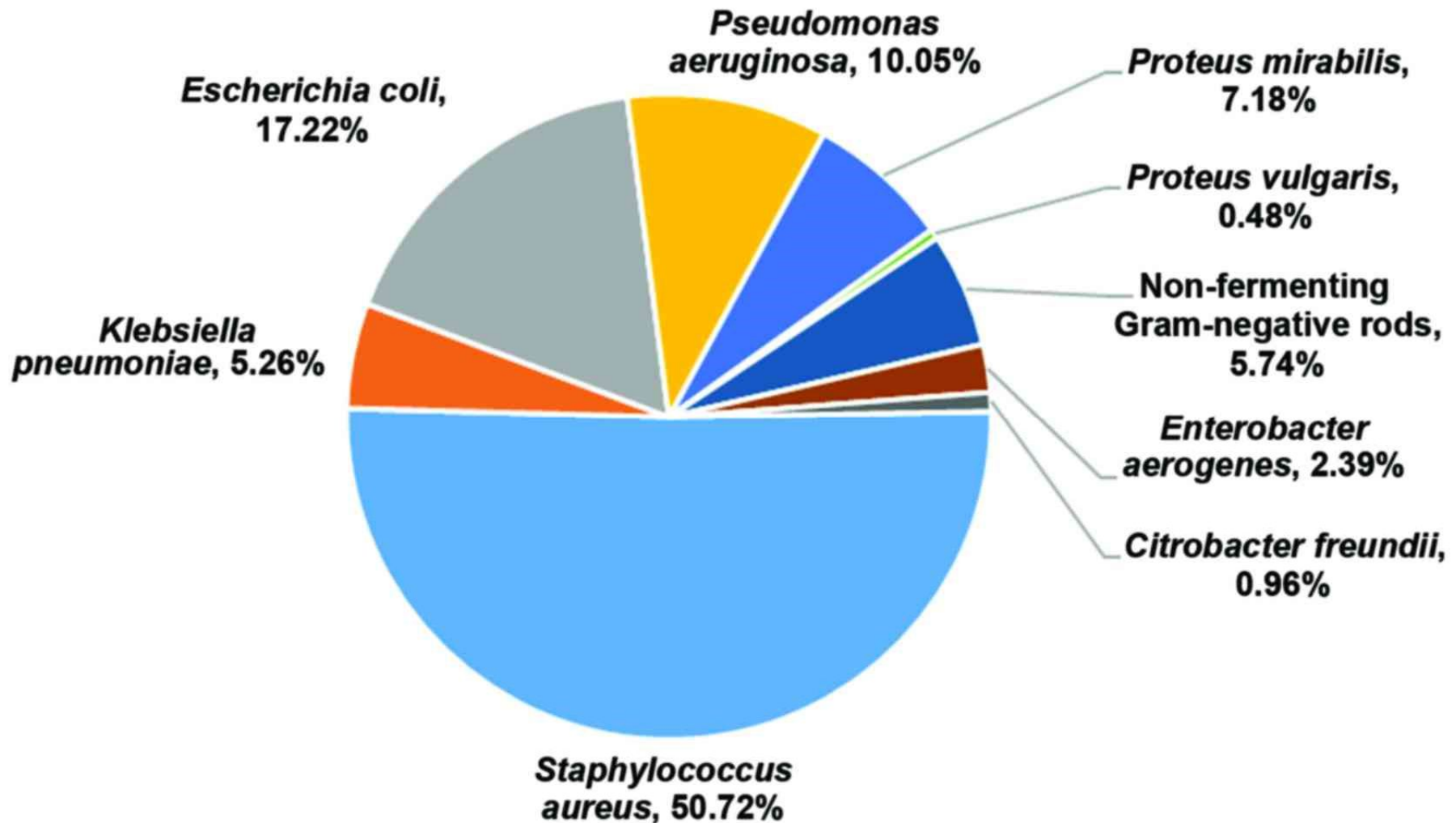
↓  
**Colonization**

↓  
**Multiplication**

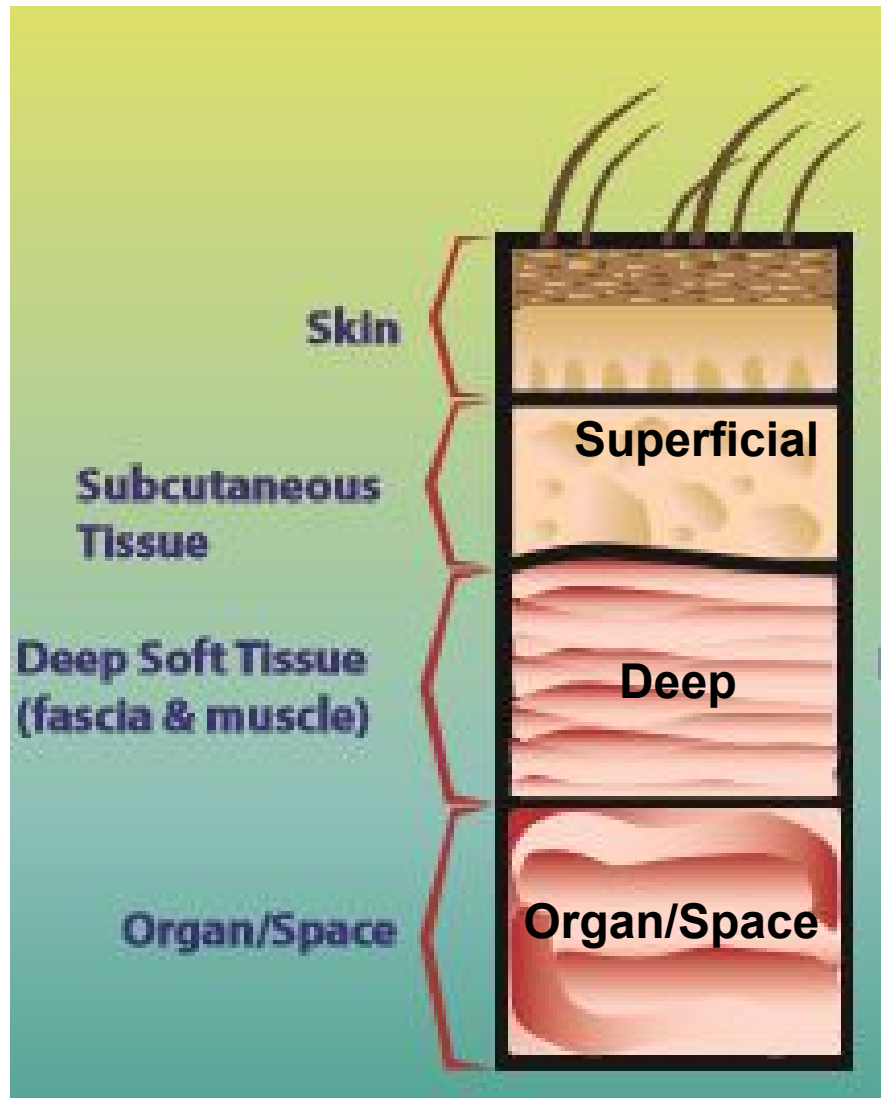
↓  
**Surgical site infection**



# Microorganisms isolated from SSIs



# Definition of SSIs according to their superficial or deep site



## Superficial incisional SSI

1. Purulent drainage from incision
2. Cultures+ from aseptically obtained fluid or tissues in incision
3. Incision opened by a surgeon : signs of infection ± cultures+
- 4 - Diagnosis of SSI by surgeon

## Deep incisional SSI

1. Purulent drainage from incision
2. Dehiscence or opening by surgeon + signs of infection and cultures+
3. Intraoperative diagnosis of deep SSI, or by pathologist ou by imaging

## Organ/Space SSI

1. Purulent drainage from the organ/space
2. Cultures+ from organ/space sample
3. Intraoperative diagnosis of deep SSI, or by pathologist ou by imaging

# Assessment of the risk of SSI (1)

## Wound contamination classes (Altemeier)

Classes	Chirurgie	Critères
1	Clean	<ul style="list-style-type: none"><li>• no opening of hollow viscera</li><li>• non-traumatic, no acute inflammation</li><li>• no break in technique</li></ul>
2	Clean-contaminated	<ul style="list-style-type: none"><li>• elective opening of respiratory, gastrointestinal, biliary or genitourinary tract with minimal spillage</li><li>• minor technique break</li></ul>
3	Contaminated	<ul style="list-style-type: none"><li>• gross spillage from gastrointestinal tract</li><li>• penetrating trauma &lt;4 hours old</li><li>• presence of infected bile or urine</li><li>• major break in technique</li></ul>
4	Dirty or infected	<ul style="list-style-type: none"><li>• penetrating trauma &gt;4 hours old ± retained devitalised tissue</li><li>• preoperative perforation of respiratory, gastrointestinal, biliary or genitourinary tract</li><li>• Purulent inflammation</li></ul>

# Assessment of the risk of SSI (2)

Physical status classification according to the American Society of Anesthesiology (ASA)

ASA score	Definition
1	normally healthy patient
2	patient with mild systemic disease
3	patient with severe systemic disease that is not incapacitating
4	Patient with an incapacitating systemic disease that is a constant threat to life
5	moribund patient who is not expected to survive for 24 hours with or without operation

# Assessment of the risk of SSI (3)

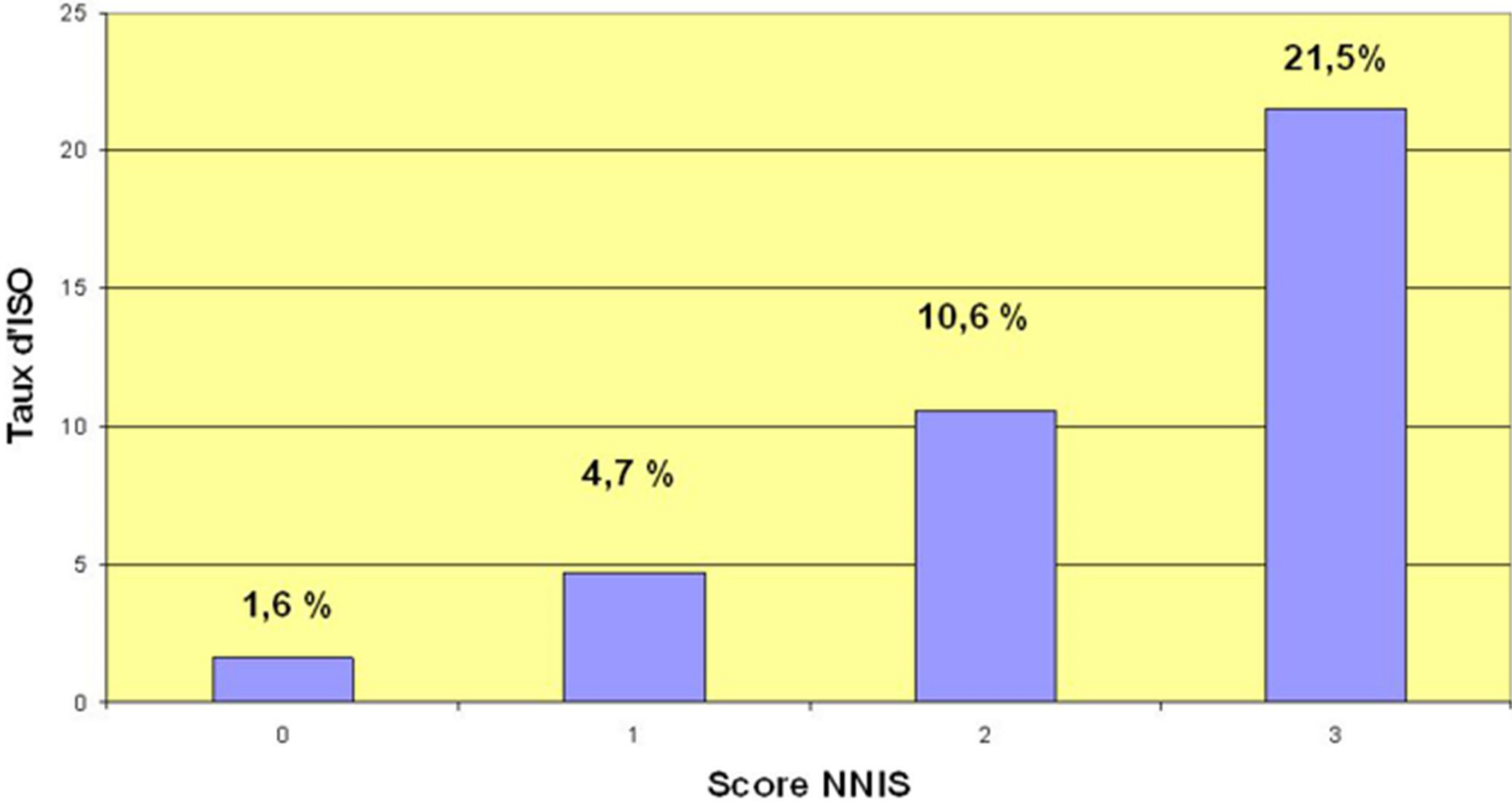
National Nosocomial Infections Surveillance (NNIS score)

	Variables	Code
Wound contamination Classes Altemeier	1. Clean 2. Clean contaminated	0
	3. Contaminated 4. Dirty or infected	1
ASA score	1. Healthy patient 2. Mild systemic disease	0
	3. Severe systemic disease 4. Incapacitating systemic disease 5. Moribund patient	1
Duration operative procedure	< 75 <sup>ème</sup> percentile for procedure	0
	> 75 <sup>ème</sup> percentile for procedure	1

**NNIS risk index: total = 0 à 3**

# Incidence of SSIs according to the NNIS index

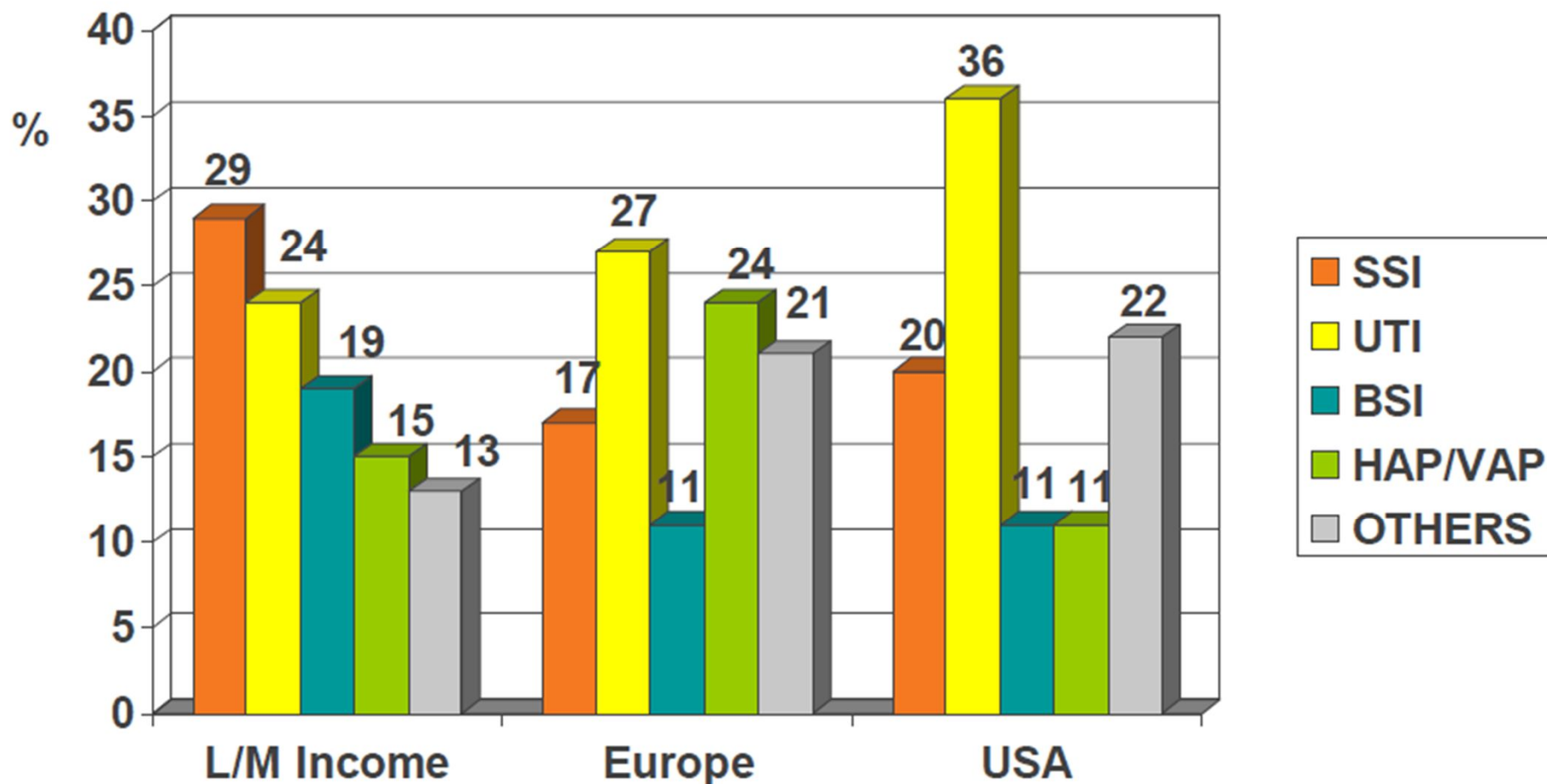
French network INCISO (1997-2000)



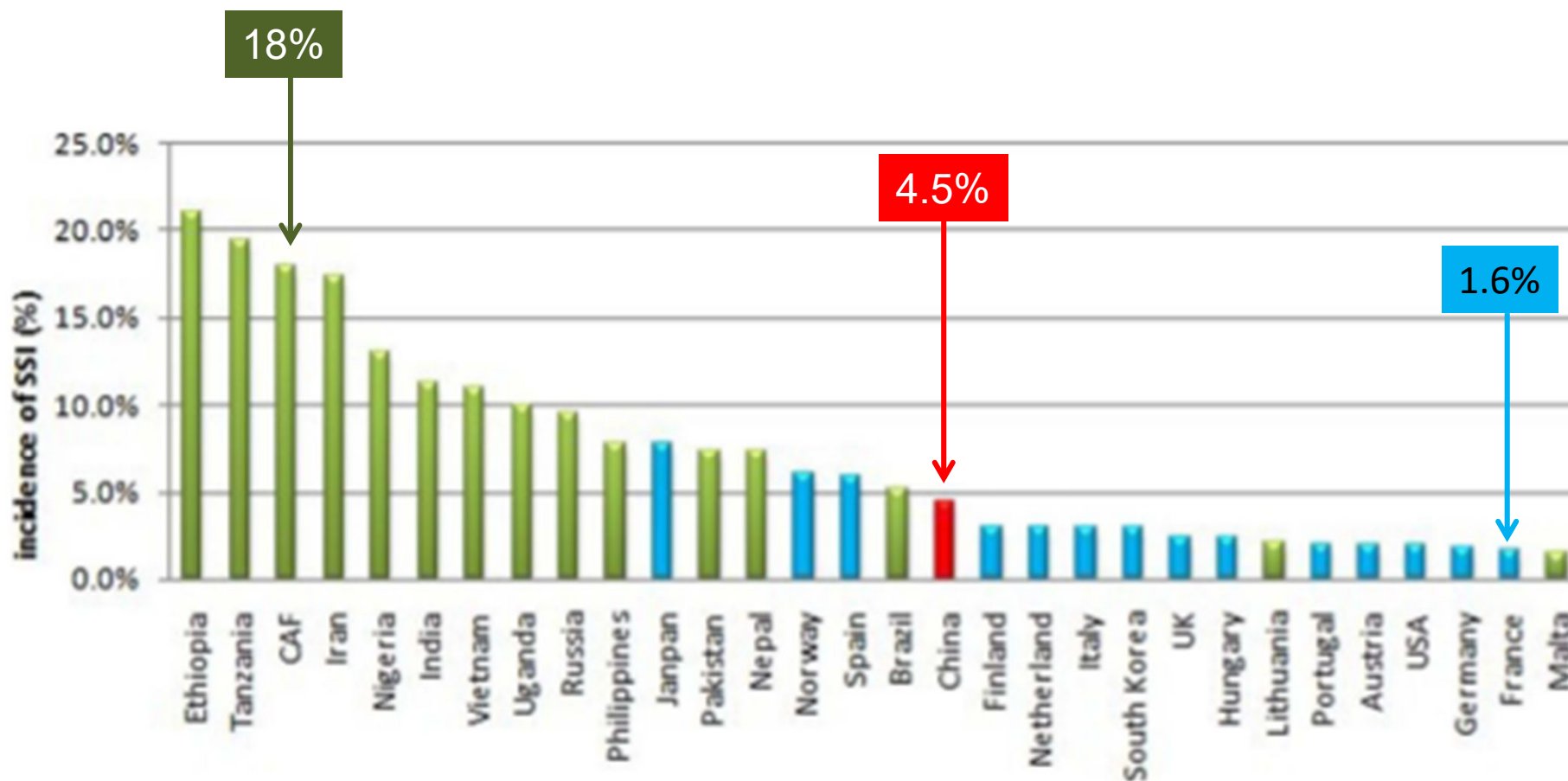
# Ranking SSIs among health-care-associated infections

SSI: surgical site infections  
UTI: urinary tract infections  
BSI: bloodstream infections

HAP: hospital acquired pneumonia  
VAP: ventilator associated pneumonia



# Incidence of SSI in several countries around the world



From Fan Y et al. *Scientific Reports* 2014

# Surveillance of SSIs

The **SENIC** (Study on the Efficacy of Nosocomial Infection Control)

▶ surveillance programs including data collection, analysis and feedback to surgeons ⇒ significant reduction in rates of SSIs

(Haley R et al, *Am J Epidemiol.* 1980)

## Surveillance indicators:

- incidence rate of SSIs / 100 operations (patients NNIS index category 0)
- standardized incidence ratio: number of SSIs divided by the number of patients included, stratified by the NNIS risk index category
- ▶ national and international networks (ECDC)

## Active surveillance of SSIs allows to:

- know the risk of SSIs by service, specialty, type of intervention
- analyze evolutionary trends
- determine the causes of SSIs
- improve quality of care and risk management
- compare services of the same specialty, types of intervention ...

## Temporal trends of SSI rates after surveillance in selected networks

Country (name of network)	Duration of surveillance (years)	Change in SSI rate (%)
<b>England*</b> (SSISSF)	5	-64 à -69
<b>France</b> (ISO-RAISIN)	8	-30
<b>Germany</b> (KISS)	4	-25
<b>The Netherlands</b> (PREZIES)	5	-57
<b>Switzerland</b> (régional network)	13	-3 à -22
<b>USA</b> (SENIC)	5	-35

\* Orthopaedic only

# Prevalence and risk factors of SSIs At Viet-Tiep Hospital, Haiphong

Dr Pham Van Tan

Institut de la Francophonie pour la Médecine Tropicale, 2003

- **One-day point prevalence survey:**  
of 112 operated patients → 17 SSI (15%)
  
- **Risk factors:**
  - ASA score > 2
  - NNIS index > 1
  - pre-operative hospital stay > 2 days
  - surgical drainage
  
- **Inadequate antibiotic prophylaxis:**
  - prolonged > 48 hours in 100% of patients
  - post-operative administration of the 1<sup>st</sup> dose in 65.5%
  - aminoglycosides (43.7%) and 3<sup>rd</sup> generation cephalosporins (41.4%)

# **Incidence of SSIs in the surgical wards of four central hospitals in Laos**

Dr Bounta XAYAVONG

Institut de la Francophonie pour la Médecine Tropicale, 2013

- **Incidence survey, in gastroenterology, urology and traumatology:** of 247 operated patients → 16 SSI (6.5%)
- **Risk factors:**
  - NNIS index > 1
  - pre-operative hospital stay > 2 days
  - number of beds per room > 5
- **Inadequate antibiotic prophylaxis:**
  - per-operative administration of the 1<sup>st</sup> dose for 81.4% of patients
  - prolonged > 48 h in 100% of patients (5 to 7 days)
  - ceftriaxone (64,4%), gentamicin (16,6%), metronidazole (9%)
  - monotherapy (64%), dual therapy (25.5%), triple therapy (10.5%)

# WHO guidelines

- ▶ 29 ways to avoid SSIs and spread of antimicrobial multiresistance
  - 13 pre-operative recommendations
  - + 16 per- and post-operative recommendations

November 3<sup>rd</sup>  
2016

GLOBAL GUIDELINES  
FOR THE PREVENTION OF  
SURGICAL SITE INFECTION



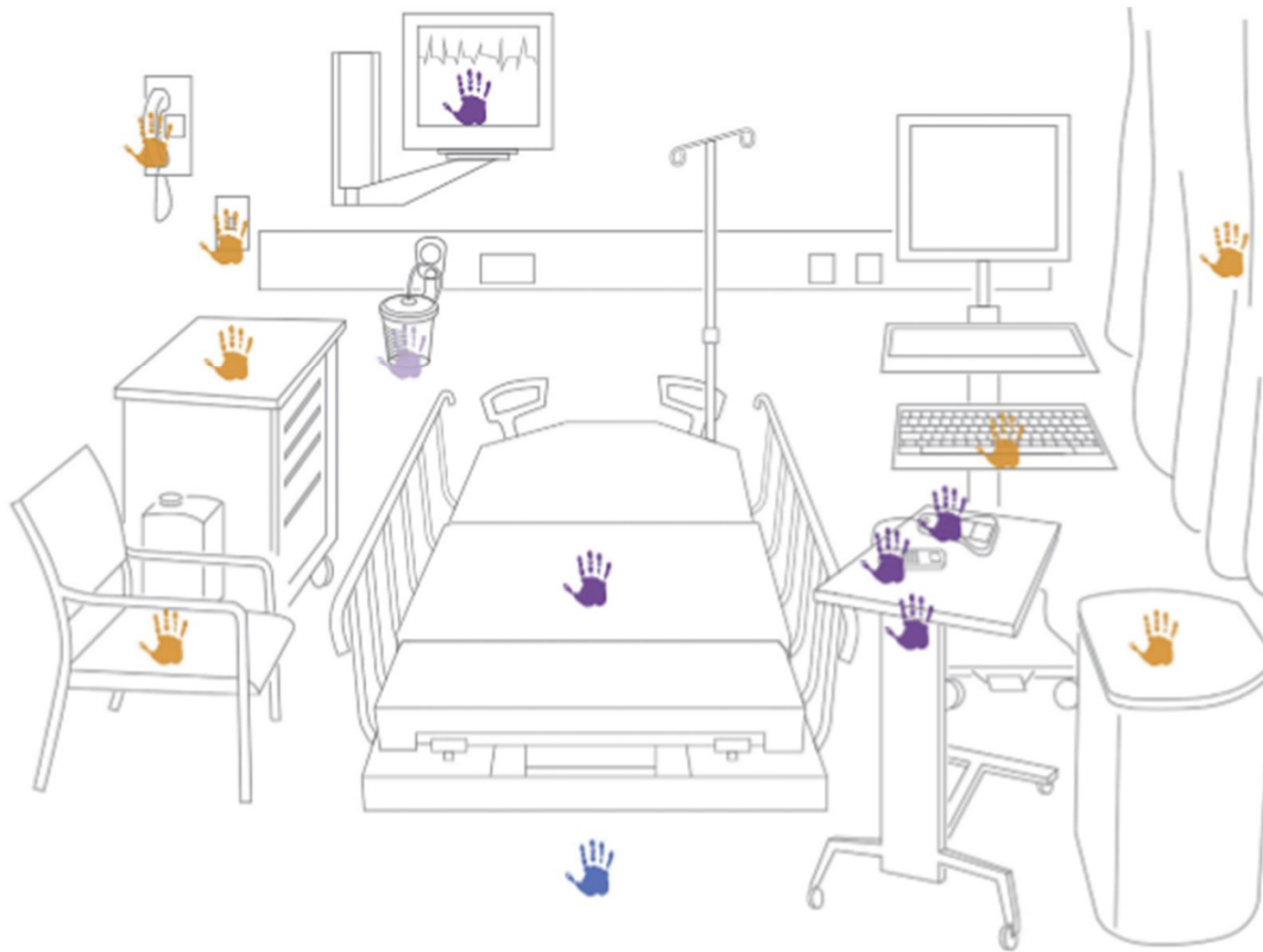
## Global

- evidence-based
- applicable in any country

## Key points:

- pre-operative preparation: must always include a bath or a shower, but no shaving
- **antibiotics:** should only be used for the prevention of infection *before and during* the operation, not after

# Cleaning requirements for various surface types in the operating room (Spruce L et al, *AORN J* 2014)



Every patient



Every patient, if used



Enhanced



If soiled

# Antibiotic prophylaxis

Recommandations Formalisées d'Experts



Actualisation de recommandations

Antibioprophylaxie en chirurgie et médecine interventionnelle. (patients adultes)

2017

**Objective:** preventing the bacterial proliferation to reduce the risk of postoperative infection

**Principle:** administering an antibiotic before exposure to contamination related to the operation

- **Which classes of Altemeier?** Some class 1 interventions and all class 2 interventions
- **What antibiotics?** Those whose spectrum of action includes the bacteria most frequently involved in SSI
- **When?** Before the intervention (about 30 minutes)
- **How long?** From anesthetic induction to surgical wound closure (single or 2 IV doses), sometimes 24 hours, always <48 h

# Consequences of misuse of antibiotics in surgery

## Inappropriate antibiotic prophylaxis

- too early or too late
- too long
- insufficient or excessive doses
- broad spectrum antibiotics
- wrongful combinations

Loss of effectiveness  
for ISO prevention

↗ resistances  
↗ costs

↗ 400,000 days of hospitalization and  
↗ 10 billion USD / year in the USA

- 1, Anesthetists must have written and validated protocols of antibiotic prophylaxis, adapted to their sector of activity
2. These protocols need to be regularly updated
3. Parallel surveillance of ISO rates and bacterial resistances is necessary

# Conclusion

- Any surgery may result in an infection of the operative site (SSI)
- SSI is the most common post-operative complication
- SSI is the most common health care-associated infection in low- and middle-income countries
- SSI is the easiest health-care-associated infection to avoid
- The 2016 WHO international guidelines for the prevention of SSIs are the first evidence-based recommendations applicable in all countries



Existence of recommendations is not enough to change the practices

- ▶ **traceability and quality assurance in the operating room:**  
operative program, **antibiotic prophylaxis**, cutaneous preparation, team, NNIS index, materials, implants, cleaning procedures, chronology ...

*If you know  
you can do better,  
then do better*

