Suggestions for a better use of antibiotic prophylaxis in surgery at Bach Mai Hospital

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IMPORTANCE OF SURGICAL SITE INFECTIONS IN VIETNAM

Incidence and predictors of surgical-site infections in Vietnam (2001).

- 2 hospitals in Hanoï : 3 months period of observation
- 697 patients with 10.9% SSI rate:
  - 8.3% for clean wounds,
  - 8.6% for clean-contaminated,
  - 12.2% for contaminated
  - 43.9% for dirty wounds.
- The lowest rate of SSI (2.4%) in obstetric-gynecologic procedures and the highest rate (33.3%) in cardiothoracic operations.
- All patients were treated with prolonged courses of perioperative antibiotics.
- Overall infection control practices were poor as a result of deficient facilities, limited surgical instruments, and a lack of proper supplies for wound care and personal hygiene

Infect Control Hosp Epidemiol. 2001 Aug;22(8):485-92.
Nguyen D, MacLeod WB, Phung DC

Microbiology of surgical site infections and associated antimicrobial use among Vietnamese orthopedic and neurosurgical patient

Cho Ray Hospital. 5-week study period.

702 surgical patients, 80 (11.4%) SSI

- among orthopedic patients 15.2%
- among neurosurgical patients it was 8.3%

Postoperative bacterial cultures performed for 55 (68.8%) of the 80 patients with SSI;. Of 78 cultures, 60 (76.9%) were positive for a pathogen, and 15 (25%) yielded multiple pathogens.

The most frequently isolated pathogens

- *Pseudomonas aeruginosa* (29.5% of isolates),
- *Staphylococcus aureus* (11.5% of isolates),
- *Escherichia coli* (10.3% of isolates).

90% *S. aureus* methicillin resistant,

91% *P. aeruginosa* ceftazidime resistant

38% *E. coli* cefotaxime resistant.

Infect Control Hosp Epidemiol. 2006 Aug;27(8):855-62, Le Tha et coll

Surgical site infections in Vietnamese hospitals: incidence, pathogens and risk factor (2009)

- 7 hospitals in Vietnam: 3 months period of observation
- 4,413 patients; SSI incidence of 5.5%.
- Risk factors independently associated with SSIs:
  age ≥ 30 yrs (OR:1.9),
  - clean-contaminated wound (OR: 1.7),
  - contaminated wound (OR: 1.8),
  - dirty wound (OR: 3.2),
  - duration of surgery > 120 minutes (OR:1.9),
  - small bowel surgery (OR: 4.0).
- most commonly identified pathogen:
  - *Escherichia coli* (38.7%)
  - *Klebsiella pneumoniae*(16.*1*%)

Hung et al. BMC Proceedings 2011, 5

Prevention of surgical site infections

- ***The patient has to be prepared as well as possible:***
  - good nutrition
  - infections healed
  - as short pre-operative hospital stay as possible
  - no antibiotic before intervention
  - pre operative shower
  - no shaving on the incision site
- ***And antibiotic prophylaxis***

Surgical site infection (SSI) antibiotic prophylaxis: objectives

- To prevent implantation of bacteria in the operated tissues during the intervention
  - Need for antibiotic presence at the incision time
  - No need for antibiotic before or after intervention

- SSI prophylaxis is **NOT** a treatment for infection

Origin of surgical site infections

Environment plays a minor role in surgical wounds infection as

the bacteria causing infections are originated

- **from the patient: 90%**
- **from the surgical staff: > 5 %**
- **from the environment (air, water): < 5 %**

Surgical site infection (SSI) antibiotic prophylaxis: indications

1. Clean Surgery

   = No traumatic wounds, no inflammation, no technical or septic errors during surgery, and the gastrointestinal, respiratory, and uro-genital tracts are intact.

→*No prophylaxis is indicated for clean surgery, as infections occur in less than 2% of cases*.

Surgical site infection (SSI) antibiotic prophylaxis: indications

2. Clean contaminated surgery

   = the intervention has had minor technical or septic errors. A minor rupture of the respiratory or uro-genital tract has not resulted in any significant leakage. Absence of any surgical trauma.

   → *prophylaxis is recommended during clean contaminated surgery , since infections occur in up to 10% of cases*.

Surgical site infection (SSI) antibiotic prophylaxis: indications

3. Contaminated surgery

   = Following severe surgical trauma, or related to significant technical and septic errors, or when gastrointestinal tract, bile duct, or urinary tract has ruptured, or there has been an incision in inflamed, non-purulent tissue.

   → Prophylaxis is advised during contaminated surgery, since such infections occur in 20% of patients.

Surgical site infection (SSI) antibiotic prophylaxis: indications

4. Dirty surgery

   = on an infected or long-standing sore or human/animal bite or with the presence of a foreign body, necrotic tissue, pus, a rupture in the intestine, or fracture at the site of the infection.

   →Treatment with antibiotics (not merely prophylaxis) is indicated in the case of dirty surgery

   Prophylaxis is also indicated upon the surgical insertion of a foreign device when the consequences of infection are subject to extremely serious complications.

Timing of antibiotic administration

- Need to obtain effective concentrations in the tissues from incision to closure of the site
- First dose between 1h and 30 min before incision (never > 2 h).
- Most of the time:
  - unique dosis
  - additionnal dosis: if intervention > 3h or huge blood losses
- Stop antibiotics when surgical wound is closed
- Catheters or drains are not an indication to continue antibiotics

Ideal prophylactic antibiotic

- Narrow spectrum but effective on expected bacteria
- Proved clinical efficacy
- Few secondary effects
- Adapted pharmacocinetiks
- Easy delivery
- Not resistance inducter
- Low cost

Surgical site infection (SSI) antibiotic prophylaxis:

Surgical Service	Routine Pre-op Antibiotic	Penicillin or Cephalosporin Allergy
Burns	Cefazolin	Clindamycin
Cardiac	Cefazolin **Plus** Vancomycin	Vancomycin **OR** Clindamycin **Plus** Gentamicin
Thoracic	Cefuroxime	Vancomycin **OR** Clindamycin
Colorectal	Cefazolin **Plus** Metronidazole Or Ertapenem	Gentamicin **Plus** Clindamycin
Otolaryngology	Cefazolin **Plus or Minus** Metronidazole	Clindamycin **Plus or Minus** Ciprofloxacin
General Surgery/Endocrine	Cefazolin	Clindamycin **Plus or Minus** Gentamicin
GU	Cefazolin	Ciprofloxacin **Plus or Minus** Vancomycin
Hepatobiliary (complicated)	Cefazolin	Tobramycin **Plus** Vancomycin
Neurosurgery	Cefazolin **Plus** Vancomycin (craniotomy or implantation of a device)	Vancomycin

Surgical site infection (SSI) antibiotic prophylaxis

Surgical Service	Routine Pre-op Antibiotic	Penicillin or Cephalosporin Allergy
Oncology	Cefazolin **Plus** Metronidazole (GI and pelvic cases only)	Clindamycin (clean surgeries) Gentamicin **Plus** Clindamycin (GI and pelvic) **OR** Vancomycin (clean surgeries) Ciprofloxacin (GI and pelvic)
Oral/Maxillofacial	Cefazolin	Clindamycin
Orthopedic	Cefazolin **Plus** Vancomycin (Arthroplasties only)	Vancomycin **OR** Clindamycin
Orthopedic-Spine	Cefazolin	Vancomycin **OR** Clindamycin
Obstetrics	Cefazolin	Clindamycin **OR** Vancomycin (if allergic to Clindamycin)
Gynecology	Cefazolin	Clindamycin
Plastics, Reconstructive & Hand Surgery	Cefazolin	Clindamycin **OR** Vancomycin
Vascular	Cefazolin **Plus** Vancomycin (synthetic graft only)	Vancomycin

Preoperative Dosing of Antibiotics

	≤80 kg	81–160 kg
Cefazolin	1 g	2 g
Cefuroxime	1.5 g	3 g
Ciprofloxacin	400 mg	600 mg
Clindamycin	600 mg	900 mg
Gentamicin*	4 mg/kg	4 mg/kg (max 420 mg)
Metronidazole	500 mg	1000 mg
Vancomycin†	20 mg/kg	20 mg/kg (max 2500 mg)

Preventive antibiotic use in surgery at Bach Maï hospital

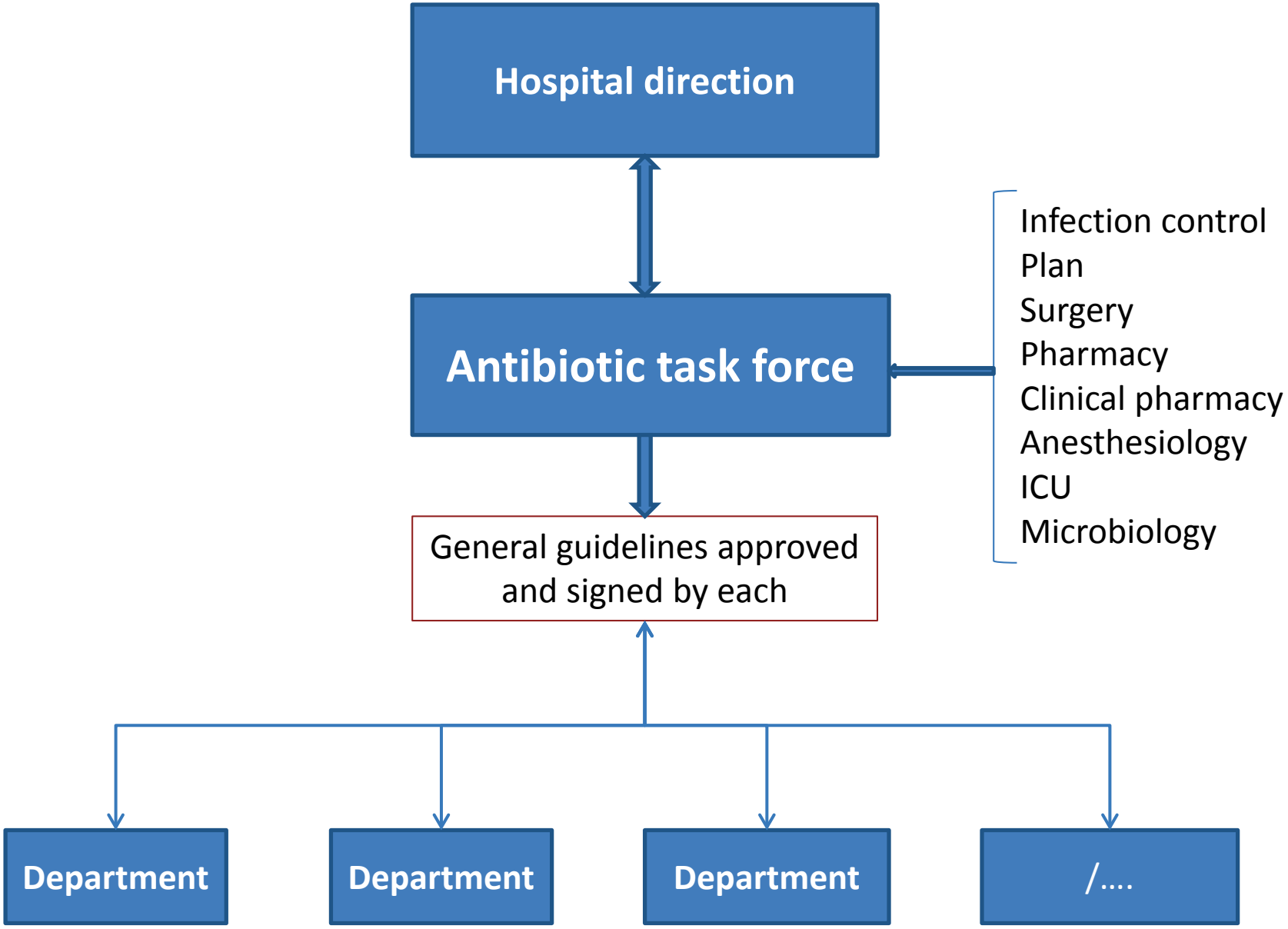
Surgical prophylaxis

- 1st generation cephalosporines
- ≤ 48 h
- Few side effects, low selective pressure
- Short IV infusion duration
- Low costs
- If infection, not hidden

- Evidence based
- Few benefits for pharmaceutical companies

Post surgical treatment

- 3d generation cephalosporines + amikacin
- ≥ 5 days
- Renal toxicity, high selective pressure
- Long IV infusion duration
- High costs
- Many infections should appear after discharge
- Empiric based
- High benefits for pharmaceutical companies


Hospital direction
Antibiotic task force
Infection control
Plan
Surgery
Pharmacy
Clinical pharmacy
Anesthesiology
ICU
Microbiology
General guidelines approved and signed by each
Department
Department
Department
/….

Goals of the task force

- Rationalize the use antibiotics
- Decrease misuse and overuse of antibiotics
- 1st target:

prevention of surgical site infection

Activities of the task force

- Setting-up of guidelines
- Follow-up of the guidelines
  - Implementation
  - education
  - monitoring
  - Feed back
  - Working load
- Antibiotic consumption
- Surveillance of surgical site infections
- Economic/financial incentives ?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