

# PRACTIC GUIDELINES for APPROPRIATE ANTIBIOTICS USE

**Global Alliance for Infection in Surgery  
World Society of Emergency Surgery (WSES)**



**Antibiotics in Surgery** ...and not only!!



# Aims - 1

- Rationalize the risk of antibiotics overuse to reduce costs, to avoid the risk of develop of some emerging infections (such as *Clostridium difficile*) and antimicrobial resistance (**AMR**).
- Appropriate use of antimicrobials is an integral part of good clinical practice.
- Clinicians should be aware of their role and responsibility for maintaining the effectiveness of current and future antibiotics.

# Aims - 2

The World Health Organization (WHO) endorsed a global action plan to tackle antimicrobial resistance. It sets out five strategic objectives:

- To improve awareness and understanding of antimicrobial resistance
- To strengthen knowledge through surveillance and research
- To reduce the incidence of infection
- To optimize the use of antimicrobial agents
- To develop the economic case for sustainable investment that takes account of the needs of all countries, and increase investment in new medicines, diagnostic tools, vaccines and other interventions.

# What can we do?



- ✓ Enhance infection prevention and control
- ✓ Control the source of infection when it is needed
- ✓ Prescribe antibiotics only when they are truly required
- ✓ Prescribe appropriate antibiotic(s) with adequate dosages to treat the infections
- ✓ Use the shortest duration of antibiotics based on evidence of guidelines
- ✓ Educate the communities in which we work of the need to use antibiotics wisely

# Antibiotic PROPHYLAXIS

- ✓ Reduce the rate of surgical site infections
- ✓ Perioperative surgical AP should be recommended for operative procedures that have a **high rate of postoperative wound infection** or when **foreign material is implanted**
- ✓ Therapeutic concentrations of antibiotics should be present in the tissue throughout the all period that the wound is open.





# Antibiotic THERAPY

When a **treatable infection has been recognized** or when there is a **high degree of suspicion for infection**:

- **EMPIRIC** therapy should be performed based on:

1. presumed pathogens involved and risk factors for major resistance patterns
  2. clinical patient's severity
  3. presumed/identified source of infection
- ✓ Knowledge of local rates of resistance and the risk factors that suggest resistant bacteria should be involved as essential components of the clinical decision-making process when deciding on which antibiotic regimen to use for empiric treatment of infection
  - ✓ The timing, regimen, dose and duration of antimicrobial therapy should be always optimised.

# INTRA- ABDOMINAL INFECTIONS



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# NON-CRITICALLY ILL + CA-IAIs.

Normal renal function



If beta-lactam ALLERGY



In case of risk for infection  
with CA ESBL-producing  
Enterobacteriaceae

**Amoxicillin/clavulanate**  
1.2-2.2 g 6-hourly

**Ciprofloxacin** 400 mg 8-  
hourly + **Metronidazole**  
500 mg 6- hourly

**Ertapenem** 1 g 24  
hourly

**Ceftriazone** 2 g 24-  
hourly + **Metronidazole**  
500 mg 6-hourly

**Moxifloxacin** 400 24-  
hourly

**Tigecycline** 100 mg  
initial dose, then 50 mg  
12-hourly

**Cefotaxime** 2g 8-hourly  
+ **Metronidazole** 500  
mg 6-hourly



# CRITICALLY ILL\* + CA IAIs.

Normal renal function



**+**  
**IF risk for ESBL**

**+**  
**IF high risk of Enterococci**  
(immunocompromised or recent antibiotic exposure)

**Piperacillin/Tazobactam**  
4.5 g 6-hourly

**Meropenem** 1 g 8-hourly

**Cefepime** 2 g 8-hourly +  
**Metronidazole** 500 mg 6-hourly

**Doripenem** 500 mg 8-hourly

**Ampicillin 2 g 6-hourly** if the patients are not being treated with PIPE/TAZO or IMIPENEM/CILASTIN

**Imipenem/Cilastin** 1 g 8-hourly

**Ceftolozane /Tazobactam** 1.5 g 8-hourly + **Metronidazole** 500 mg 6-hourly → **IN CARBAPENEM-SPARING REGIMEN**



**If beta-lactam ALLERGY: consider as in non critically ill patients**

\*an increase of 2 points or more in the Sequential Organ Failure Assessment (SOFA) score

# NON-CRITICALLY ILL + HA IAIs

Normal renal function



If beta-lactam  
**ALLERGY**



**In patients at risk for MDROs**

(including recent antibiotic exposure, patient living in a nursing home or long-stay care with an indwelling catheter, or post-operative IAI)

**+/-**

**In risk for  
INVASIVE  
CANDIDIASIS**

**Piperacillin/  
Tazobactam**  
4.5 g 6-  
hourly

**Amikacin** 15–20  
mg/kg 24-hourly  
+  
**Metronidazole**  
500 mg 6-hourly

**Meropenem** 1 g 8-hourly +/-  
**Ampicillin** 2 g 6-hourly

**Fluconazole** 800  
mg LD then 400  
mg 24-hourly

**Doripenem** 500 mg 8-hourly +/-  
**Ampicillin** 2 g 6-hourly

**Imipenem/Cilastatin** 1 g 8-hourly

**Pipe/Tazobactam** 4.5 g 6-hourly +  
**Tigecycline** 100 mg initial dose, then  
50 mg 12-hourly  
→ **IN A CARBAPENEM-SPARING  
REGIMEN**

1

# CRITICALLY ILL\* + HA IAIs

Normal renal function



**Meropenem** 1 g 8-hourly

**Doripenem** 500 mg 8-hourly

**Imipenem/Cilastin** 1 g 8-hourly

**Ceftolozane /Tazobactam** 1.5 g 8-hourly + **Metronidazole** 500 mg 6-hourly

**Ceftazidime/Avibactam** 2.5 g 8-hourly + **Metronidazole** 500 mg 6-hourly

If beta-lactam ALLERGY



**Amikacin** 15–20 mg/kg 24-hourly + + **Metronidazole** 500 mg 6-hourly

IN A CARBAPENEM-SPARING REGIMEN

+ **Vancomycin** 25–30 mg/kg loading dose then 15–20 mg/kg/dose 8-hourly

Or

+ **Teicoplanin** 12 mg/kg 12-hourly times 3 loading dose then 12 mg/kg 24-hourly

\*an increase of 2 points or more in the Sequential Organ Failure Assessment (SOFA) score

# CRITICALLY ILL\* + HA IAIs

Normal renal function

+/-

## In risk for VRE

(previous enterococcal infection or colonization, immunocompromised patients, patients with long ICU stay, or recent Vancomycin exposure)

**Linezolid** 600 mg 12-hourly

Also in allergic pts



## In SUSPECTED or PROVEN infection from KPC

Consider use of antibiotics combination with **Ceftazidime/Avibactam**

## In SUSPECTED or PROVEN infection from Pseudomonas aeruginosa MDR

Consider use of antibiotics combination with **Ceftolozane /Tazobactam**

**Daptomycin** 6 mg/kg 24-hourly

Also in allergic pts



## +/- In risk for INVASIVE CANDIDIASIS

### Echinocandins:

**Caspofungin** (70 mg LD, then 50 mg daily),

**Anidulafungin** (200 mg LD, then 100 mg daily),

**Micafungin** (100 mg daily)

**Amphotericin B Liposomal** 3 mg/kg/dose 24-hourly

# SKIN and SOFT TISSUES INFECTIONS



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# ERYSIPELAS, CELLULITIS, SUPERFICIAL ABSCESS<sup>°</sup>

Normal renal function



**NO MRSA suspected**

**If beta-lactam ALLERGY**



**Amoxicillin/clavulanate** 1.2-2.2 g  
6-hourly

**Levofloxacin** 500 mg 12/24-  
hourly

**Moxifloxacin** 400 mg 24-hourly

<sup>°</sup>: atb therapy is indicated for localized abscesses in immunocompromised pts, incomplete source control, persistent inflammatory signs, and surrounding cellulitis

# PERIANAL ABSCESS<sup>o</sup>

Normal renal function



**NO MRSA suspected**

**If beta-lactam ALLERGY**



**Amoxicillin/clavulanate** 1.2-2.2 g  
6-hourly

**Ciprofloxacin** 400 mg 8-hourly +  
**Metronidazole** 500 mg 6- hourly

**Ceftriaxone** 2 g 8-hourly +  
**Metronidazole** 500 mg 6-hourly

**Cefotaxime** 2 g 8-hourly +  
**Metronidazole** 500 mg 6-hourly

**Piperacillin/Tazobactam** 4.5 g 6-  
hourly

<sup>o</sup>: atb therapy is indicated for localized abscesses in immunocompromised pts, incomplete source control, persistent inflammatory signs, and surrounding cellulitis

# SURGICAL SITE and SUPERFICIAL INFECTIONS °

Normal renal function



**NO MRSA suspected**

**IN POLYMICROBIAL  
INFECTIONS /HIGH SUSPICION  
for MDR**

**Amoxicillin/clavulanate** 1.2-2.2 g  
6-hourly

**Tigecycline** 100 mg initial dose , then  
50 mg 12-hourly

**Ceftriaxone** 2 g 8-hourly +  
**Metronidazole** 500 mg 6-hourly

**Ceftaroline** 600 mg 12-hourly

**Cefotaxime** 2 g 8-hourly +  
**Metronidazole** 500 mg 6-hourly

**Piperacillin/Tazobactam** 4.5 g 6-  
hourly

°: atb therapy is indicated for localized abscesses in immunocompromised pts, incomplete source control, persistent inflammatory signs, and surrounding cellulitis



# SURGICAL SITE and SUPERFICIAL INFECTIONS °

**MRSA**

Normal renal function



## OUTPATIENTS (oral treatment)

**Minocycline** 100 mg 12-hourly

**Trimethopin+Sulfamethoxazole**  
160/800 mg 12-hourly

**Doxycycline** 100 mg 12-hourly

**Clindamycin** 300-450 mg 6/8-hourly

**Linezolid** 600 mg 12-hourly

**Tedizolid** 200 mg 24-hourly

**If beta-lactam ALLERGY:**

- **Amikacin** 15–20 mg/kg 24-hourly
- **Ciprofloxacin** 400 mg 8-hourly +  
**Metronidazole** 500 mg 6-hourly



## HOSPITALIZED (iv treatment)

**Vancomycin** 15 mg/kg 12-hourly

**Teicoplanin LD** 12 mg/kg 12-hourly for 3  
doses, then 6 mg/kg 12-hourly

**Tigecycline** 100 mg as a single dose, then 50  
mg 12-hourly

**Linezolid** 600 mg 12-hourly

**Daptomicin** 4-6 mg/kg ogni 24-hourly

**Tedizolid** 200 mg 24-hourly

**Ceftaroline** 600 mg 12-hourly

**Dalbavancin** 1000 mg one for week followed  
by 500 mg after another week. OR 1500 mg  
in one dose.



# NECTOTIZING SOFT TISSUE INFECTIONS

Normal renal function



**Linezolid** 600 mg 12-hourly

If beta-lactam ALLERGY:

- Amikacin 15–20 mg/kg 24-hourly
- Ciprofloxacin 400 mg 8-hourly + Metronidazole 500 mg 6-hourly



**Tedizolid** 200 mg 24-hourly +  
**Piperacillin/Tazobactam** 4.5 g 6-hourly

**Daptomycin** 6 mg/kg 24-hourly +  
**Piperacillin/Tazobactam** 4.5 g 6-hourly + **Clyndamycin**  
600 mg 6/8-hourly

# FOURNIER'S GANGRENE

Normal renal function



## NON-CRITICALLY ILL

**Tigecycline** 100 mg as a single dose, then 50 mg 12-hourly + **Clyndamycin** 600 mg 6/8-hourly



## CRITICALLY ILL

**Meropenem** 1 g 6-hourly + **Linezolid** 600 mg 12-hourly

**Tedizolid** 200 mg 24-hourly

# NECROTIZING CELLULITIS and MYOSITIS

Normal renal function



## NON-CRITICALLY ILL

**Amoxicillin/clavulanate** 1.2-2.2 g 8-hourly + **Clyndamycin** 600 mg 6/8-hourly



## CRITICALLY ILL

**Linezolid** 600 mg 12-hourly

**Tedizolid** 200 mg 24-hourly +  
**Piperacillin/Tazobactam** 4.5 g 6-hourly

**Daptomycin** 6 mg/kg 24-hourly +  
**Piperacillin/Tazobactam** 4.5 g 6-hourly + **Clyndamycin** 600 mg 6/8-hourly

# Legend

- ✓ **Pts:** patients
- ✓ **Atb:** antibiotic
- ✓ **AP:** antibiotic prophylaxis
- ✓ **AMR:** antimicrobial resistance
- ✓ **WARNING:** World Coalition to Combat Antimicrobial Resistance in Surgery
- ✓ **IAI:** intra-abdominal infection
- ✓ **ESBL:** extended spectrum beta-lactamase-producing Enterobacteriaceae
- ✓ **MDRO:** Multi-drug resistant organisms
- ✓ **VRE:** vancomycin-resistant enterococci

- ✓ **KPC:** Klebsiella pneumoniae carbapenemase
- ✓ **MDR pseudomonas aeruginosa:** non-metallo-beta-lactamase-producing Pseudomonas aeruginosa
- ✓ **MRSA:** Methicillin-resistant Staphylococcus aureus
- ✓ **SSI:** surgical site infections
- ✓ **LD:** dosloading dose
- ✓ **ICU:** intensive care unit
- ✓ **SOFA:** Sequential [sepsis-related] Organ Failure Assessment
- ✓ **CA:** community acquired
- ✓ **HA:** hospital acquired





# Web site - references

*The World Society of Emergency Surgery*

**wses guidelines**

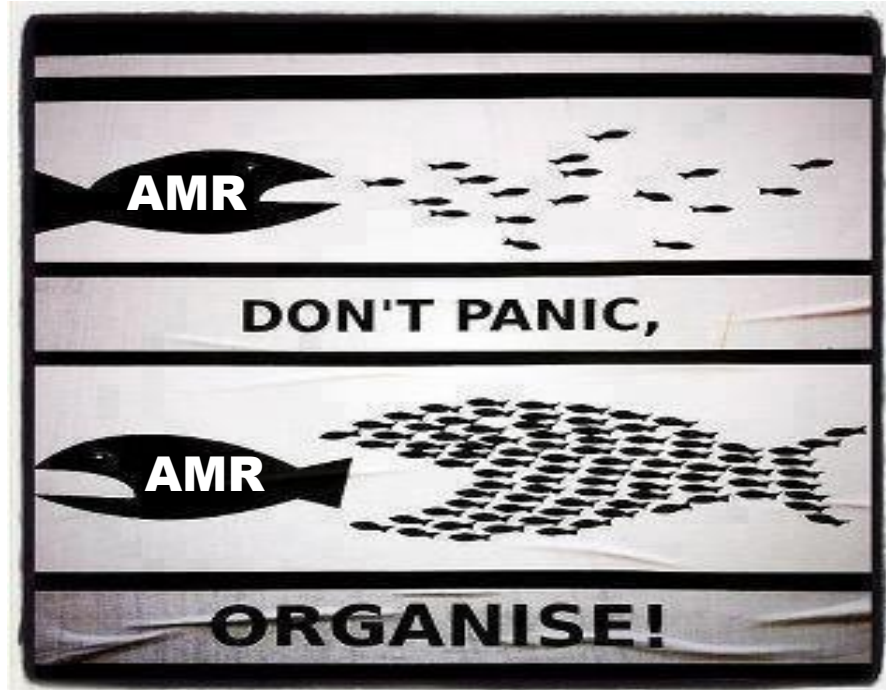
**[www.wses.org.uk](http://www.wses.org.uk)**

**<https://infectionsinsurgery.org/>**



**Global Alliance for  
Infections in Surgery**

**Let's join our forces  
to combat Antimicrobial Resistance in our hospitals**



**Use Antibiotics appropriately**

Prescribe the right antibiotic  
for the right patient  
at the right time  
at the right dose and  
for the right duration



Global Alliance for  
Infections in Surgery



*The World Society of Emergency Surgery*