

## Interactive Case

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## Section 1

Back from the course

## Subsection 1

### The Expert

# The Expert

Coming back from the course to your hospital, you are now :

**The Expert in Antimicrobial Stewardship!**

Therefore, you want to build an AMS team.

## The environment

- Your hospital does not suffer from noticeable outbreaks of multidrug resistant bacteria.
- Low levels of ESKAPE pathogens.
- Antimicrobials consumption is reasonable and not significantly higher than other hospitals of similar size in your country.
- So no big and urgent problems, currently.
- So what to do when there is *no fire*?

## Subsection 2

Before the action

## Where should you start ?

What is the first (and eventually the second) action to have?



Even if (and because) there is no urgent need, you have to convince the senior executives that an Antimicrobial Stewardship (AMS) Program is cost effective and useful.

### Convincing the senior executives

- They control the money, and they are requested to make cost-effective decisions.
- It is easier to estimate the cost of an AMS program than the saving.
- P. Davey et al found that 51/66 (77%) of the studies reviewed (Cochrane database) showed significant improvements in inpatients prescribing, resistance and/or *C. difficile* infections.

# Incentives

- Antimicrobial represent usually  $> 30\%$  of hospital pharmacy budget.
- AMS programs may reduce antimicrobial use by 22-36%.
- Cost savings tend to exceed cost of contracting ID physician and pharmacist.
- Antimicrobial resistance (SARM, VRE. . . ) can impact badly in many wards.
- Antimicrobial resistance costs too (Birgand G. et al CMI 2016).
- In addition to decrease costs, it will increase reputation, thus for some hospitals & countries the revenue.

## AMS programs can be self-supporting.

- Arnold FW et al. JMCP 2004 ; 10(2) : 152-8.
- Carling P et al. ICHE 2003 ; 24(9) : 699-706.
- Davey P et al CID 2009 ; 49(6) : 876-7.
- Dellit TH et al. CID 2007 ; 44(2) : 159-77.
- Fishman N. Am. J of Infect control 2006 ; 34(5S1) : S55-63 ; S4-73.
- Gums JG et al. Pharmacotherapy 1999 ; 19(12) : 1369-77.
- John JF, Jr., Fishman NO. CID 1997 ; 24(3) : 471-85.
- LaRocco A, Jr. CID 2003 ; 37(5) : 742-3.
- Owens RC, Jr. et al. Pharmacotherapy 2004 ; 24(7) : 896-908.
- Davey P, et al. Cochrane Database Syst Rev 2013.
- Ruttimann S et al. CID 2004 ; 38(3) : 348-56.
- Schentag JJ et al. Diagnostic microb. and infect. dis. 1993 ; 16(3) : 255-64.
- [http ://www.cdc.gov/getsmart/healthcare/inpatient-stewardship.html](http://www.cdc.gov/getsmart/healthcare/inpatient-stewardship.html)

# Measure & Compare

You need to to measure...and compare...in order to show that you improved the situation.

## Process & Outcomes when possible

- Process : % of adequate antimicrobial prophylaxis before surgery
- Outcomes : Rate of surgical site infections

## Minimal measures

In addition to specific goals of your program, you may focus on :

- Antimicrobials days of therapy per 1000 patient-days
- Number of patients with drug-resistant microorganisms
- Mortality related to drug-resistant microorganisms
- Length of therapy for patients with CAP, SSTI, sepsis, BSI
- Unplanned hospital readmission within 30 days after discharge for CAP, SSTI, sepsis, BSI

## Metrics & Measures

- Polk, et al. CID 2011 ; 53 (11) : 1100-1110
- Harris AD et al. CID 2004 ; 38(11) : 1586-91.
- Ibrahim OM, Polk RE. Expert review of anti-infective therapy 2012 ; 10(4) : 445-57.
- Morris AM et al. ICHE 2012 ; 33(5) : 500-6.
- Polk RE et al. CID 2007 ; 44(5) : 664-70.
- Polk RE et al. CID 2011 ; 53(11) : 1100-10.
- Schwaber MJ et al. Nature reviews Microbiology 2004 ; 2(12) : 979-83.

## Section 2

# Interventions

# List of interventions

- ▶ Back-end approach
- ▶ Front end approach
- ▶ Education
- ▶ Guidelines
- ▶ Parenteral to oral conversions
- ▶ Antimicrobial cycling
- ▶ Dose optimization
- ▶ Combination therapy



## Back-end approach : Prospective audit

Evaluation of the appropriateness of an antimicrobial prescription, then recommendation of an alternative therapy if inappropriate.

### Advantages

- Prescribers autonomy is maintained
- You can provide education toward the prescriber.
- It is efficient to reduce inappropriate antimicrobial use

### Disadvantages

- Labor intensive and time consuming
- You need to identify the patients with inappropriate use, more or less easily depending on your computer support system
- You need to communicate with prescriber, which is not always easy

## Front end approach : Formulary restriction

Limitation of the availability of certain antimicrobials according to indications, wards, prescribers patient type...

### Advantages

- Very effective to control antimicrobial use.
- Immediate effect on use/cost of the restricted antimicrobial.
- Potential to educate prescribers and identify complex cases.

### Disadvantages

- Loss of autonomy for the prescribers
- You need human resources to make restriction effective
- Delay in antimicrobial administration, waiting for approval
- Potential switch toward another agent, thus more use and resistance

# Education

Wide range of potential actions, from lectures to prescribing audit

## Advantages

- May influence durably prescription and awareness
- You can provide education toward the prescriber.
- It is efficient to reduce inappropriate antimicrobial use

## Disadvantages

- Necessity of active education to go beyond marginal efficiency
- Staff turnover ... need of repetitions

## Guidelines

Implementation of hospital guidelines (clinical pathways) for various situations

### Advantages

- Combination with education
- Local epidemiology can be taken into account.
- Collaboration with other specialities.

### Disadvantages

- Variable adherence (depending on speciality ...)

## Parenteral to oral conversions

Usually the first to be implemented, because very straightforward!  
Antimicrobial with high bioavailability : fluoroquinolones, metronidazole, fluconazole, CTX, clindamycin

### Advantages

- Decrease length of stay
- Decrease antimicrobial cost.
- Reduction of complication due to parenteral access.

### Disadvantages

- Need to identify patients

## Dose optimization

Using PK/PD. Prolonged infusion of  $\beta$ -lactams...

### Advantages

- May decrease antimicrobial resistance

### Disadvantages

- Request good IV access
- Labor intensive for nurses

## Antimicrobial cycling

Supposed to limit antimicrobial resistance.  
Limited number of studies... that suggest the contrary  
Very restrictive  
Not recommended.

## Combination therapy

May limit antimicrobial resistance.  
But benefits probably limited to specific patients  
Controversial



## Conclusions

- Science (and experience) suggests that a bundle of measures are necessary (cf. Pulcini et al JAC 2008)
- But you need to adapt to the specific situation
- When no urgent and major problem, prefer audit and education instead of restriction



Figure: Questions ?