Antimicrobial stewardship

Magali Dodemont, Pharm.

with the support of
Wallonie-Bruxelles International

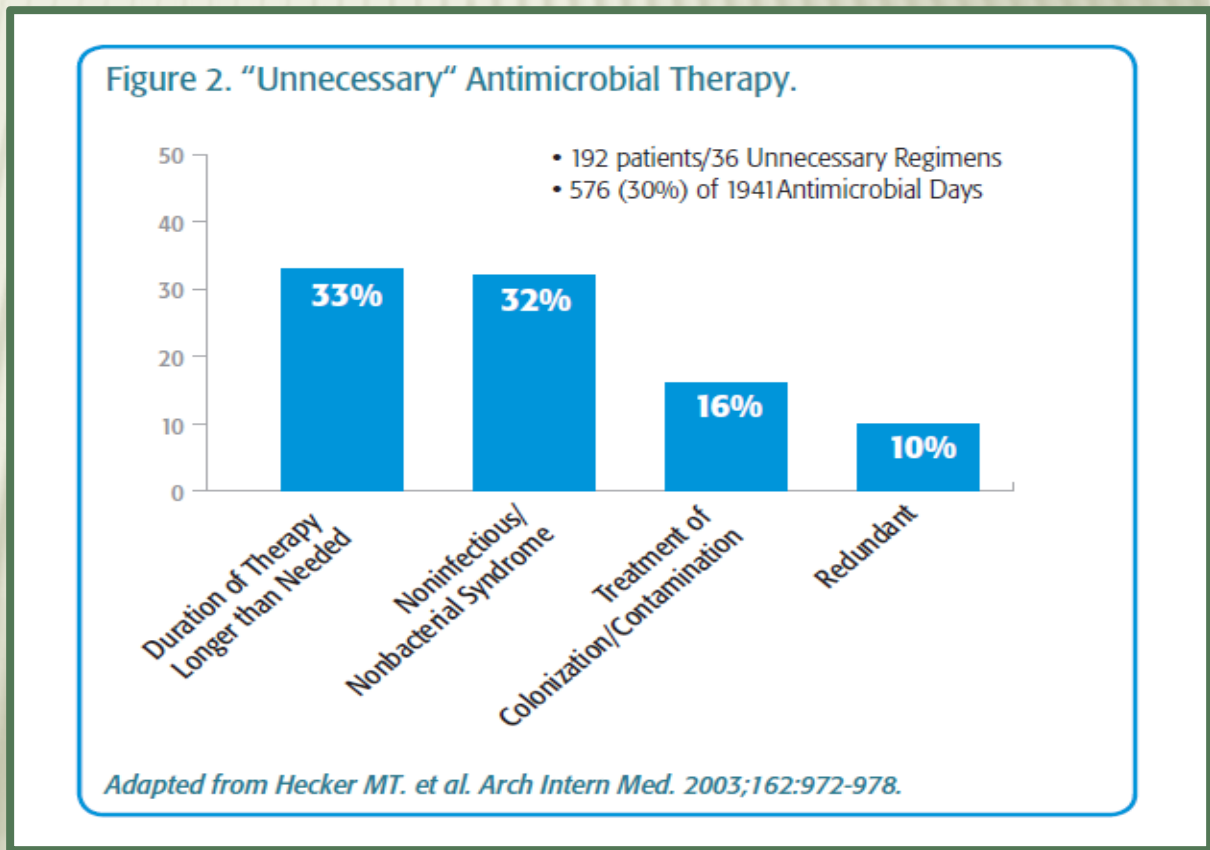
WHY IMPLEMENT ANTIMICROBIAL STEWARDSHIP IN HOSPITALS?

- Optimization of antimicrobial use
  - To limit the misuse and over-use of antibiotics
    - In hospitals, up to 50% of AB use is inappropriate (Dellit et al.,2007)
  - To combat antimicrobial resistance
    - Lack of new AB in the devlopment pipeline
    - Infections caused by MDR pathogens becoming untretable

« UNNECESSARY » ANTIMICROBIAL THERAPY

Increase:

- mortality and morbidity of the patients
- Healthcare costs
- Resistant strains



COMBATING ANTIMICROBIAL RESISTANCE

- Three-pillar approach
  - Optimise the use of antimicrobial agents
    - Dose, duration, type of antibiotics
  - Prevent the transmission of MDR organisms
    - Hand hygiene, epidemiology, outbreak investigation, active surveillance…
  - Improve environmental decontamination

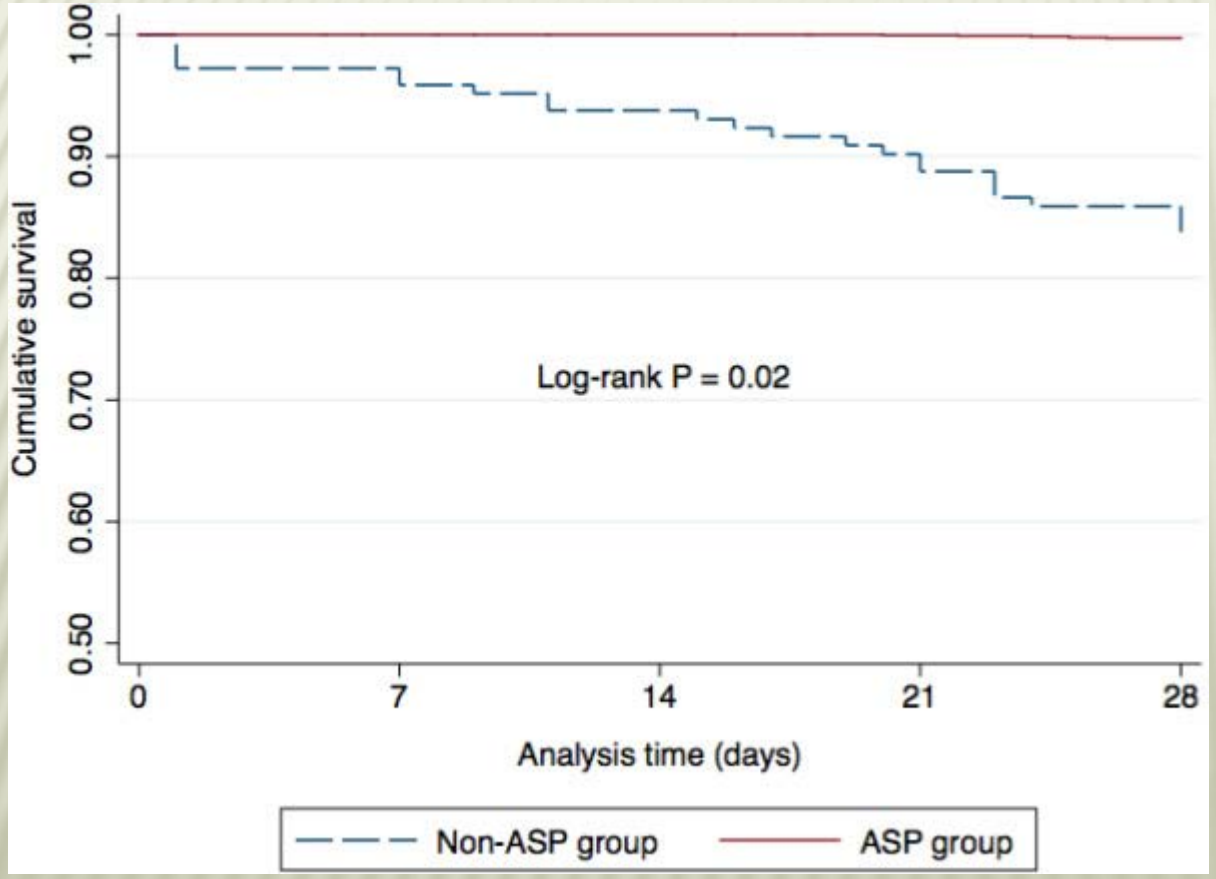
DEFINITION OF ANTIMICROBIAL STEWARDSHIP

- An **inter-professiona**l effort, accros the continuum of care
- Involes timely and optimal selection, dose and duration of an antimicrobial
- For the best clinical outcomes for the treatment or prevention of infection
- With minimal toxicity for the patient
- With minimal impact on resistance

Nathwani et al., 2012

GOAL OF ANTIMICROBIAL STEWARDSHIP

- Improve patient outcome

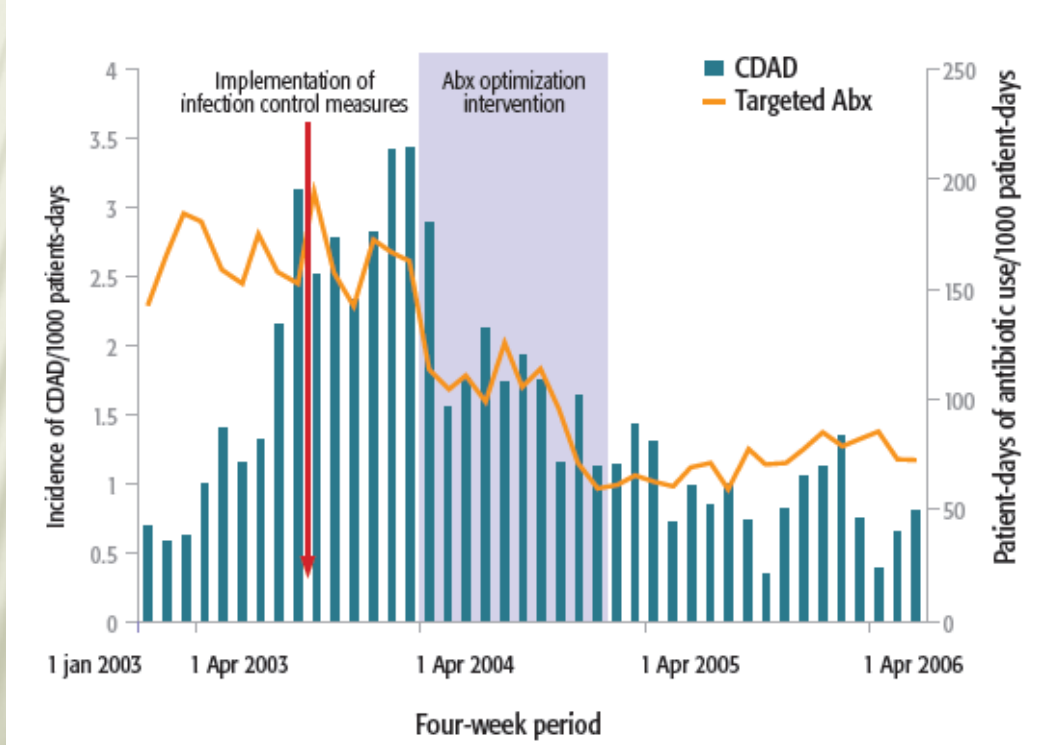


The 28-day mortality rate was significantly lower in patients who were treated according to the ASP recommendations compared with the non-ASP group

Kaplan–Meier curves of 28-day mortality according adherence to ASP after propensity score weighting. Rosa *et al. BMC Infectious Diseases* 2014 **14**:286

GOAL OF ANTIMICROBIAL STEWARDSHIP

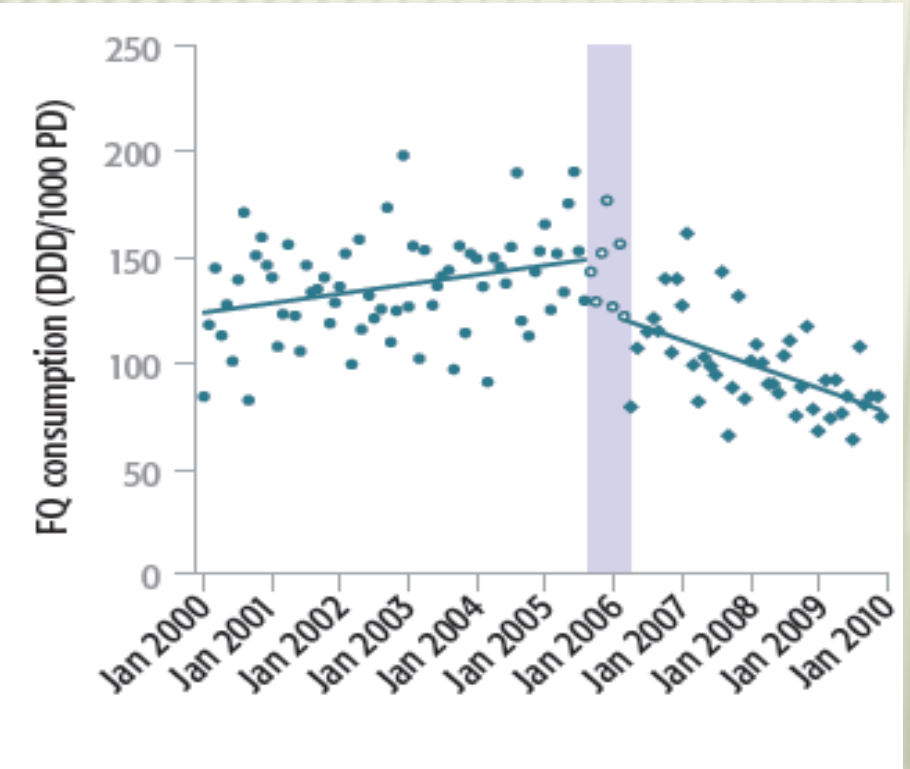
- Improve patient safety
  - E.g. Reduce *C. difficile* colonization or infection by controlling the use of 'high risk' antibiotics

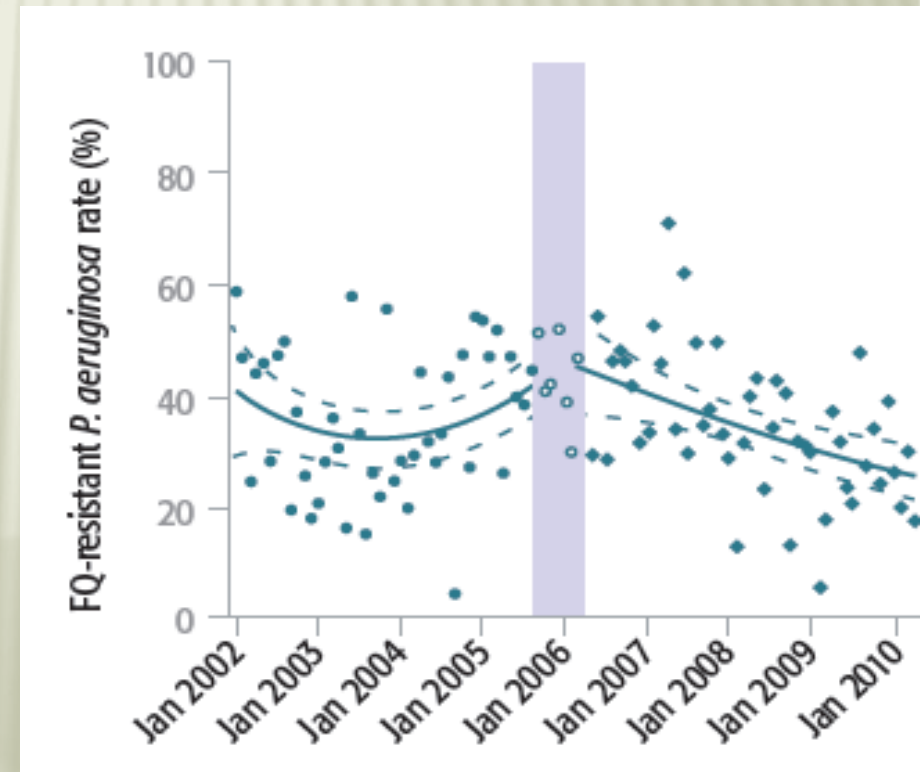


Adapted from Valiquette L et al., Clin. Infect. Dis. 2007;45:S112-121.

GOAL OF ANTIMICROBIAL STEWARDSHIP

- Reduce resistance
  - E.g. reduction of FQ-resistant *P. aeruginosa* by a reduction of FQ use





GOAL OF ANTIMICROBIAL STEWARDSHIP

- Reduce healthcare costs

TABLE 1. Summary of Annual Savings Associated with the Implementation of the Center for Antimicrobial Utilization Stewardship and Epidemiology, Determined Using an Inflation Rate Based on the US Consumer Price Index for Medical Care Commodities (Method A) and an Anti-Infective-Specific Index (Method B)

Year	Method A	Method B
2000[a]	158,161	229,076
2001	548,002	1,267,638
2002	806,393	1,446,883
2003	473,174	1,354,129
2004	244,160	1,555,048
2005	419,613	2,005,202
2006	983,690	2,172,756
2007	675,036	1,990,967
2008	817,503	2,557,972
2009	1,278,301	2,782,519
2010	2,175,927	3,456,373
2011[b]	1,770,827	2,406,399
Yearly average	920,070	2,064,441
Total savings	10,350,787	23,224,961

NOTE. Data are US dollars.
[a] April–December 2000.
[b] January–June 2011.

Beardsley J et al. Inf. Control. Hosp. Epidemio., 2012, 33:398-400

IMPLEMENTATION OF ANTIMICROBIAL STEWARSHIP PROGRAMS

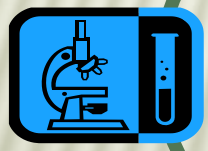
- Analyse your situation and the problems you want to address
- Define where you are and where you want to go
- Engage administrative and clinical leadership
- Bring disciplines together to improve communication and collaboration
  - Infectious disease expert, microbiologist, pharmacist, intensivists, emergency department physicians, hospitalist, nurse…

IMPLEMENTATION OF ANTIMICROBIAL STEWARSHIP PROGRAMS

- Set up structure and organisation
  - + Dedicated resources
  - + Create a multidisciplinary AS team

Infectious disease MD

Clinical pharmacist



Microbiologist

Pharmacist

MD from departments using AB

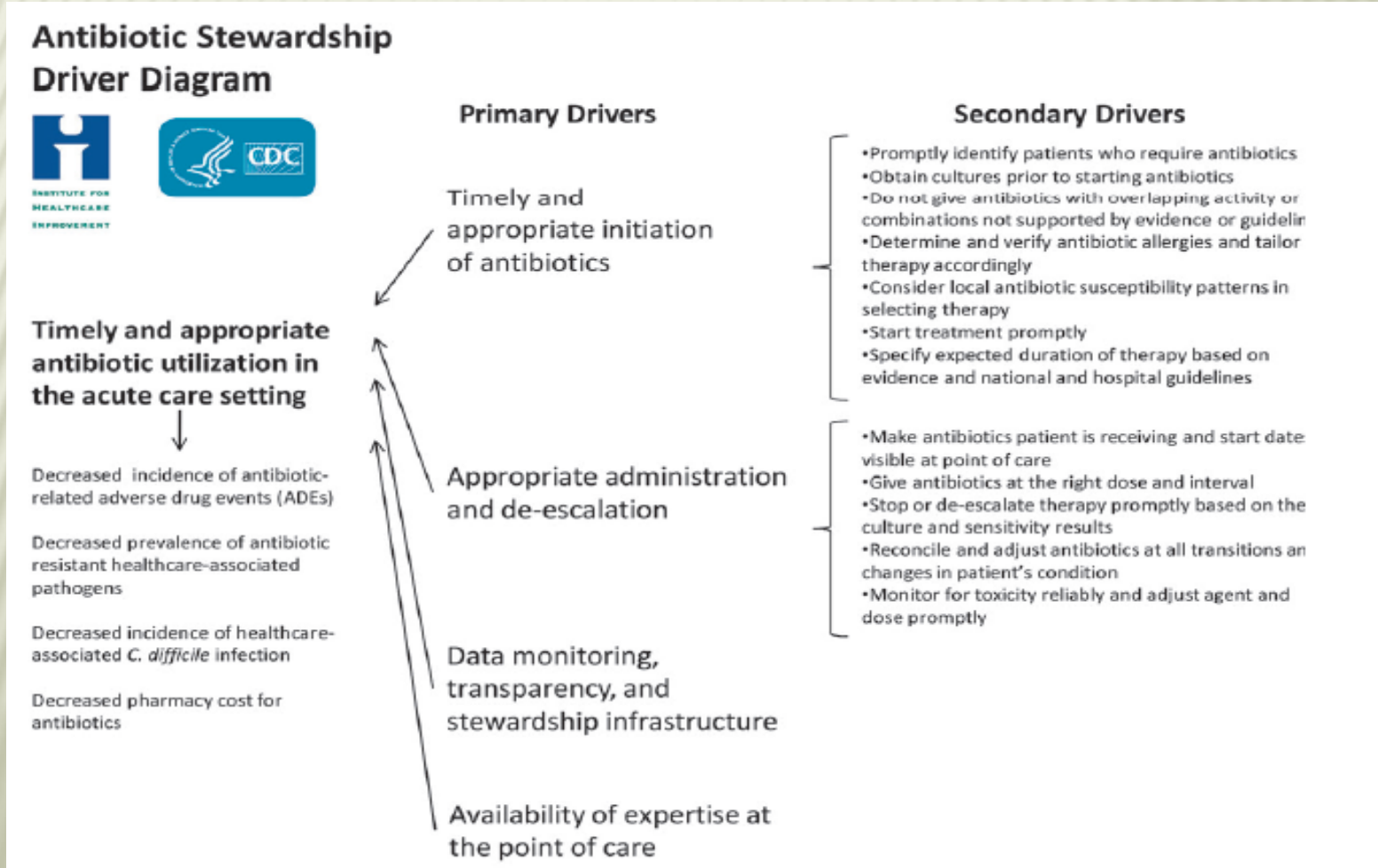
Hygienist

IMPLEMENTATION OF ANTIMICROBIAL STEWARSHIP PROGRAMS

- Define priorities and how to mesure progress and success
  - Creat **Driver Diagram** with primary and secondary goals
    - Indicate the factor needed to achieved these goals
    - Show how the factor are connected

IMPLEMENTATION OF ANTIMICROBIAL STEWARSHIP PROGRAMS

- Driver Diagram



IMPLEMENTATION OF ANTIMICROBIAL STEWARSHIP PROGRAMS

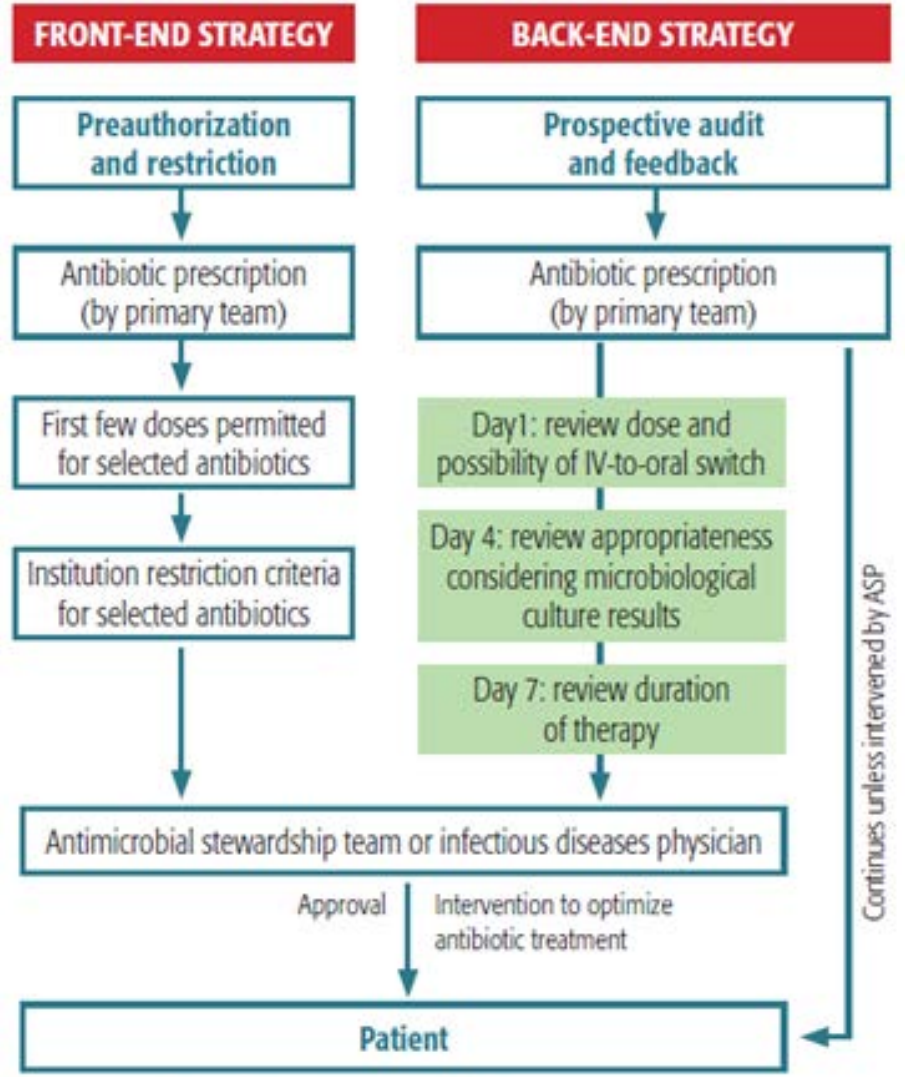
- Identify effective interventions for your setting
  - **Start with the core strategies** (before adding some supplemental strategies)
    - « **Front-end strategies** » : AB are available through an approval process (formulary restriction)

      → immediate reduction in use of restricted AB

    - « Back-end » strategies: AB are reviewed after antimicrobial therapy has been initiated

      → timely de-escalation of antibiotics, reduction in inappropriate use

FRONT- AND BACK-END ANTIMICROBIAL STEWARDSHIP STRATEGY



Adapted from Chung GW et al. Virulence 2013; 4:1-7.

FRONT END STRATEGIES

- Establish antimicrobial prescribing policy
  - Therapeutic formulary
    - Locale procedure for microbiological samples
    - List of available antimicrobials (unrestricted and restricted)
    - Regimens for treatment of common infections (treatment, prophylaxis, rules to switch from IV to per os…)
      - Depend on local burden and epidemiology
  - Formulary restriction/approval systems
    - List of restricted antimicrobial agents (broad spectrum and later generation antimicrobials)
    - Criteria for their use combined with an approval system

THE GOLDEN RULES OF ANTIMICROBIAL PRESCRIBING

- **M** Microbiology guides therapy wherever possible
- **I** Indications should be evidence based
- **N** Narrowest spectrum required
- **D** Dosage appropriate to the site and type of infection
- **M** Minimise duration of therapy
- **E** ensure monotherapy in moste cases

Adapted from Antibiotic Expert group. Therapeutic guideline: antibiotic. Version 14. Melbourne: Therapeutic Guideline Limited; 2010.

BACK-END STRATEGIES

- Antimicrobial review methods
  - Review indication for antibiotic
  - Review the appropriateness of antibiotic choice, dose, route, planned duration…
  - Review of therapy based on culture and susceptibility test results
  - Potential for conversion from IV to per os
  - Review requirement for Therapeutic Drug Monitoring
  - Review any antibiotic related adverse events

Johannsson B. et al. Inf. Control. Hosp. Epidemiol. 2011;32:367-374

BACK-END STRATEGIES

- Audit and direct feedback to prescribers
  - by infectious diseases specialist or clinical pharmasist
  - About
    - Appropriate use of guidelines
    - Interpretation of microbiology with a view of de-escalation or stopping therapy
    - …
  - Thank to point prevalence surveys

→ **Opportunity to educate clinical staff** on appropriate prescribing

BACK-END STRATEGIES

- Use of diagnostic tools
  - + Develop rapid diagnostic tests
    - Provide fast and accurate identification and AST

→ better clinical outcomes and streamlining/de-escalating of empiric broad-spectrum AB

E.g.: - Near-patient rapid test : to identify patient with bacterial versus viral infection (influenza, strept A)

- Molecular diagnosis

IMPLEMENTATION OF ANTIMICROBIAL STEWARSHIP PROGRAMS

- Identify key measurements for improvement
  - What to measure, which frequency, how data will be collected and communicated

    - Surveillance of AB use and resistance
    - Evaluate + and – consequences of interventions
    - Collect data for quality improvement

SURVEILLANCE OF ANTIMICROBIAL USE AND RESISTANCE

- Monitoring the trends within the hospital
- Identify small changes in a single unit

  - Adapt empiric treatment to local resistance
  - Demonstrate change in practice over time
  - Idenfify wards with high AB use

HOW DATA ARE COLLECTED AND ANALYSED?

- Antimicrobial use (DDD)
  - Hospital pharmacy (computer systems)
  - At patient, ward and hospital level
- Antimicrobial resistance
  - Microbiology laboratory (computer systems)

EDUCATE AND TRAIN

- Prescriber, healthcare staff
- Basic knowledge of infection management, basic microbiology, administration and monitoring of AB, …
- Passive educational measures:
  - Educational sessions, workshop, local conference
- Active interventions:
  - Clinical round discussing case
  - Reassessment of AB prescription
- Use training assessment tool
  - Attendance forms, questionaires, tests…

COMMUNICATE

- Communication should be **clear** and **simple**
- **Core** clinical **message**
- Show the vision and the **benefit**

IN CONCLUSION

- In Erasme Hospital (Brussels, Belgium)
  - Monthly meetings (9-10 / year)