Antimicrobial stewardship
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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 development pipeline
    - Infections caused by MDR pathogens becoming untreatable
« UNNECESSARY » ANTIMICROBIAL THERAPY

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

Figure 2. “Unnecessary” Antimicrobial Therapy.

- 192 patients/36 Unnecessary Regimens
- 576 (30%) of 1941 Antimicrobial Days

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
An inter-professional effort, across the continuum of care

Involves 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
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

![Graph showing the impact of infection control measures on CDAD incidence and antibiotic use.](chart.png)

*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

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<th>Year</th>
<th>Method A</th>
<th>Method B</th>
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<td>Yearly average</td>
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<td>Total savings</td>
<td><strong>10,350,787</strong></td>
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**NOTE.** Data are US dollars.


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
IMPLEMENTATION OF ANTIMICROBIAL STEWARSHIP PROGRAMS

- Define priorities and how to measure progress and success
  - Create **Driver Diagram** with primary and secondary goals
    - Indicate the factor needed to achieve these goals
    - Show how the factor are connected
IMPLEMENTATION OF ANTIMICROBIAL STEWARSHIP PROGRAMS

- Driver Diagram

**Antibiotic Stewardship Driver Diagram**

**Primary Drivers**

- Timely and appropriate initiation of antibiotics

**Secondary Drivers**

- Promptly identify patients who require antibiotics
- Obtain cultures prior to starting antibiotics
- Do not give antibiotics with overlapping activity or combinations not supported by evidence or guidelines
- Determine and verify antibiotic allergies and tailor therapy accordingly
- Consider local antibiotic susceptibility patterns in selecting therapy
- Specify expected duration of therapy based on evidence and national and hospital guidelines
- Make antibiotics patient is receiving and start date visible at point of care
- Give antibiotics at the right dose and interval
- Stop or de-escalate therapy promptly based on the culture and sensitivity results
- Reconcile and adjust antibiotics at all transitions as changes in patient’s condition
- Monitor for toxicity reliably and adjust agent and dose promptly

**Timely and appropriate antibiotic utilization in the acute care setting**

- Decreased incidence of antibiotic-related adverse drug events (ADEs)
- Decreased prevalence of antibiotic resistant healthcare-associated pathogens
- Decreased incidence of healthcare-associated C. difficile infection
- Decreased pharmacy cost for antibiotics

**Appropriate administration and de-escalation**

**Data monitoring, transparency, and stewardship infrastructure**

**Availability of expertise at the point of care**
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

**FRONT-END STRATEGY**
- Preauthorization and restriction
- Antibiotic prescription (by primary team)
- First few doses permitted for selected antibiotics
- Institution restriction criteria for selected antibiotics
  - Antimicrobial stewardship team or infectious diseases physician
    - Approval
    - Intervention to optimize antibiotic treatment
  - Patient

**BACK-END STRATEGY**
- Prospective audit and feedback
- Antibiotic prescription (by primary team)
  - Day 1: review dose and possibility of IV-to-oral switch
  - Day 4: review appropriateness considering microbiological culture results
  - Day 7: review duration of therapy
- Continues, unless intervened by ASP

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

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

Back-End Strategies

- Audit and direct feedback to prescribers
  - by infectious diseases specialist or clinical pharmacist
  - 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
  - Identify 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, questionnaires, tests...
COMMUNICATE

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

What are we trying to accomplish?

How will we know that a change is an improvement?

What changes can we make that will result in improvement?

www.ihi.org/knowledge/Pages/HowtoImprove/ScienceofImprovementHowtoImprove
- In Erasme Hospital (Brussels, Belgium)
  - Monthly meetings (9-10 / year)