Antimicrobial Stewardship
Esperienza Torinese

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Antimicrobial Stewardship

• First introduced by Dale Gerding in 1997

• “The optimal selection, dose, and duration of an antimicrobial that results in the best clinical outcome, for the treatment or prevention of infection, with minimal toxicity to the patient and minimal impact on subsequent resistance development”
Insegnamenti Tradizionali

• Definire la diagnosi
• Scegliere l’antibiotico
• Definire dosaggio e durata della terapia
• Prevenire gli effetti collaterali
• Ridurre la comparsa di antibiotico-resistenza
Levels of Interventions

• **Theory**
  – Courses

• **Practice**
  – Diagnosis and treatment
  – Costs and side effects
  – Antimicrobial resistance
  – PK and TDM

• **Infection control**

• **Treatment strategies**
  – Sparing carbapenems and liposomal amphotericin

• **Audits**

• **New drugs and resources**
Start Smart – Then Focus

• Evidence-based optimal standards
  – For routine antimicrobial use
• Competence & educational programmes
  – For all staff that use antimicrobials
• Communicating
  – Antimicrobial issues to all stakeholders
• Auditing
  – The impact and uptake of these processes
• Optimizing
  – Outcomes for patients who receive antimicrobials

Ashiru-Oredrope D et al JAC 2012; 67 (S1): i51-i63
Antimicrobial Stewardship: Patients Over Process

- Importance for patients and public health
- Core elements of hospital AS programs from the center for disease control and prevention
- The role of public health in AS in healthcare
- Innovation of novel antibiotics: an economic perspective
- Outcomes and metrics for AS: survey of physicians and pharmacists
- AS: philosophy versus practice
- Use of electronic health records and clinical decision support systems for AS
- Review of rapid diagnostic tests used by AS programs

- Demonstrating the value of AS programs to hospital administrators
- Assessing appropriateness of antimicrobial therapy: in the eye of the interpreter
- Knowledge and attitudes of doctor of pharmacy students regarding the appropriate use of antimicrobials
- Identifying best practices across three countries: hospital AS in the UK, France and the US
- Breaking down the barriers: challenges with the development and implementation of an Industry-sponsored AS data collection and analysis tool
- Optimizing research methods used for the evaluation of AS programs
Antimicrobial Stewardship: Philosophy Versus Practice

- Impact difficult to measure
- Outcome and process measures as metrics
- Antimicrobial use & costs are indicators most used
  - By institutions to justify…. The effectiveness of AS programs
- Use of more meaningful outcomes has been constrained by:
  - Difficulties inherent to those measures
  - Lack of funding and resources
  - Inadequate study designs
- AS programs can be made more credible by:
  - Refocusing to target specific disease states
  - Reassessing the usefulness of current metrics
  - Integrating AS programs into institutional quality & safety efforts

Dodds Ashley ES et al Clin Infect Dis 2014; 59(S3): S112-121
Turin, Italy: 10 years experience

- **Multidisciplinary**
  - Infection Control
    - Campaign «watch the wash (hand-washing)»
  - Pharmacy
  - Infectious Diseases and Clinical Microbiology
  - Internal Medicine
- **Never restrictive *ab initio***
  - Meropenem and ciprofloxacin
- **Courses for Health-care associated infections**
- **Surgical prophylaxis**
  - Guidelines
- **Manual for empiric antibiotic treatment**
  - Paper and web
- **Invasive Fungal Infections**
# Stewardship: Examples

## Etiology
- MRSA
- VRE
- ESBL
- KPC-Kp
- R-FQ
- MDR
- *Candida*
- *Aspergillus*

## Diagnosis
- CAP
- HCAP
- HAP / VAP
- IE / BSI
- Tuberculosis
- ....

## Ward
- Surgery
  - Profilassi & Terapia
- Internal Medicine
- ER
- ICU
- Oncohaematology

## Drugs
- Glycopeptides, carbapenems, FQs, Daptomycin, linezolid, pip/tazo, tigecycline
- Antifungals
Manuale di Terapia Antibiotica Empirica
Reparti di Medicina, Chirurgia Generale e Urologia

C.I.O. – C.A. – Gruppo EBM
In giallo le % di KPC; ESBL, MRSA e C. non albicans
In rosso le % di KPC; ESBL, MRSA e C. non albicans
In rosa le % di KPC; ESBL, C. non albicans
In giallo le % di KPC; ESBL e C. non albicans
Infection Control, Antimicrobial Stewardship, Patients & Guidelines

**Delayed**
- Inappropriate Antibiotic Therapy
  - Measured as: Response & Outcome, Length of Stay, Diagnostic Sensitivity

**Prolonged**
- Inappropriate Antibiotic Therapy
  - Measured as: Antibiotic-free days, Antibiotic Resistance, Diagnostic Specificity
Antifungal Stewardship Consideration
Hamdy RF et al Virulence 2016

• **Bundles**
  – Prescription
  – Post-prescription review
  – Feedback
  – Prior authorization no/yes

• **Institutional guidelines**
  – Guide diagnostic testing in at-risk population
  – Appropriate choice, dose & duration of treatment
  – TDM
  – De-escalation
Antifungal Utilization: Adults & Pediatrics
Hamdy RF et al Virulence 2016

• No study assessed for prescribing quality
• Few data on antifungal consumption in adults
  – Increased utilization in 5 Germany Hospitals: surgical and medical ICUs & oncohaematology
    • Gross BN et al Infections 2015
  – Heterogeneous use in 13 German ICUs:
    – 153 DDD/1000 patient-days in transplant ICU
    – 46 DDD/1000 patient-days in non-transplant ICU
      • Meyer E et JAC 2007
• Sparse but similar data in pediatrics
Evidence for Antifungal Stewardship

- Post-prescription review and feedback, education and development of clinical guidelines
  - Mondain V et al, Infection 2013
  - Micallef C et al, JAC 2015
  - Lopez-Medrano F et al, CMI 2013

- De-escalation in candidemia
How To Implement Antifungal Stewardship

• 2016 IDSA / SHEA Guidelines
• Prior Authorization
• Post-prescription review and feedback
• Supplemental strategies including:
  – Formulary restriction, guideline development
  – Prescriber education, de-escalation
  – IV to PO switch

• At-risk patients:
  – ASP & Clinical Microbiology
  – Rapid diagnostic & local epidemiology
<table>
<thead>
<tr>
<th>Process metrics</th>
<th>Examples of metric</th>
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<tbody>
<tr>
<td>Antifungal drug consumption</td>
<td>Days of therapy per 1000 patient-days OR Defined daily doses per 1000 patient-days</td>
</tr>
<tr>
<td>Compliance with institutional guidelines</td>
<td></td>
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<tr>
<td>• Choice of drug</td>
<td>Proportion of patients treated with drug of choice for indication</td>
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<tr>
<td>• Dose</td>
<td>Proportion of patients prescribed appropriate dosing for indication</td>
</tr>
<tr>
<td>• Therapeutic drug monitoring</td>
<td>Proportion of patients on azole for whom serum level was checked appropriately from time of initiation</td>
</tr>
<tr>
<td>• De-escalation</td>
<td>Proportion of patients with fluconazole-sensitive <em>Candida</em> for whom therapy was switched from echinocandin (or other broad-spectrum agent) to fluconazole</td>
</tr>
<tr>
<td>• Intravenous-to-oral conversion</td>
<td>Proportion of patients taking an azole who were switched from intravenous to oral formulation</td>
</tr>
<tr>
<td>• Use of diagnostic tests</td>
<td>Proportion of high-risk patients in compliance with institutional recommendations for monitoring serum galactomannan</td>
</tr>
<tr>
<td>• Source control</td>
<td>Proportion of patients with candidemia with catheter removal</td>
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Process Metrics
Hamdy RF et al Virulence 2016
# Outcome Metrics

**Hamdy RF et al** Virulence 2016

<table>
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<th>Examples of metric</th>
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<tr>
<td>Preventive strategies in high-risk patients</td>
<td>Episodes of invasive fungal infection in target groups</td>
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<tr>
<td>Treatment of invasive fungal infection</td>
<td>Proportion of patients with clinical cure</td>
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<td></td>
<td>Proportion of patients with candidemia with recurrent infection</td>
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<tr>
<td>Resistance</td>
<td>Proportion of <em>Candida</em> isolates caused by fluconazole-resistant strains</td>
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<tr>
<td>Cost</td>
<td>Total cost of prescriptions per year, stratified by antifungal drug</td>
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