Antibiotic Stewardship-growing a positive culture

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Conflict of interest to declare

- None
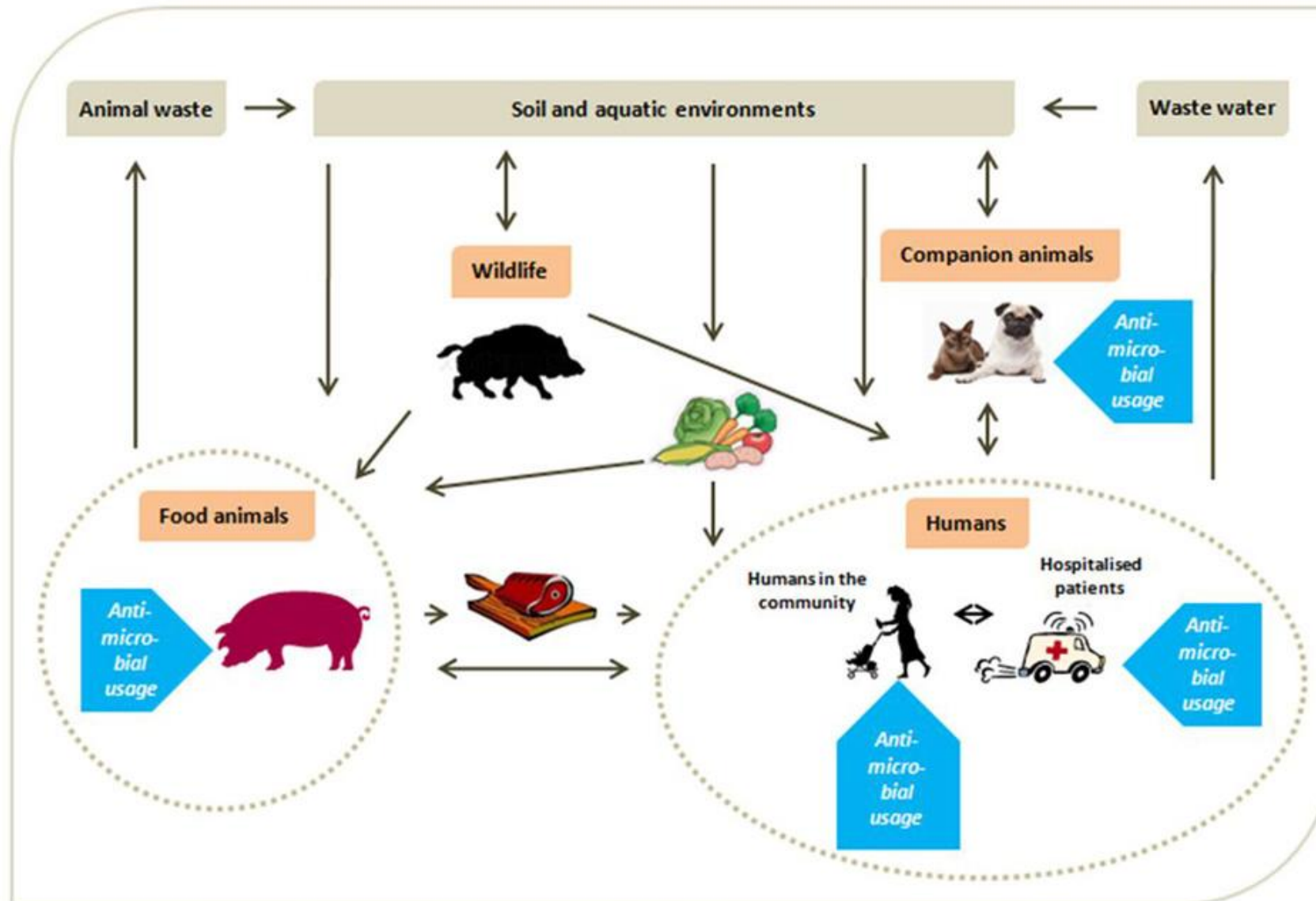
Self assesment questions
Yes or No

- Antimicrobial stewardship works best in combination with infection control

- AMS programmes should address behavioral issues

- Too short antibiotic courses select resistance

Exchange of resistance mechanisms and bacteria between different reservoirs

ECDC/EFSA/EMA first joint report on the integrated analysis of the consumption of antimicrobial agents and occurrence of antimicrobial resistance in bacteria from humans and food-producing animals

Healthcare-associated infections

Antimicrobial resistance

Community-acquired infections

ECDC official slide

Containment of spread of MDR pathogens
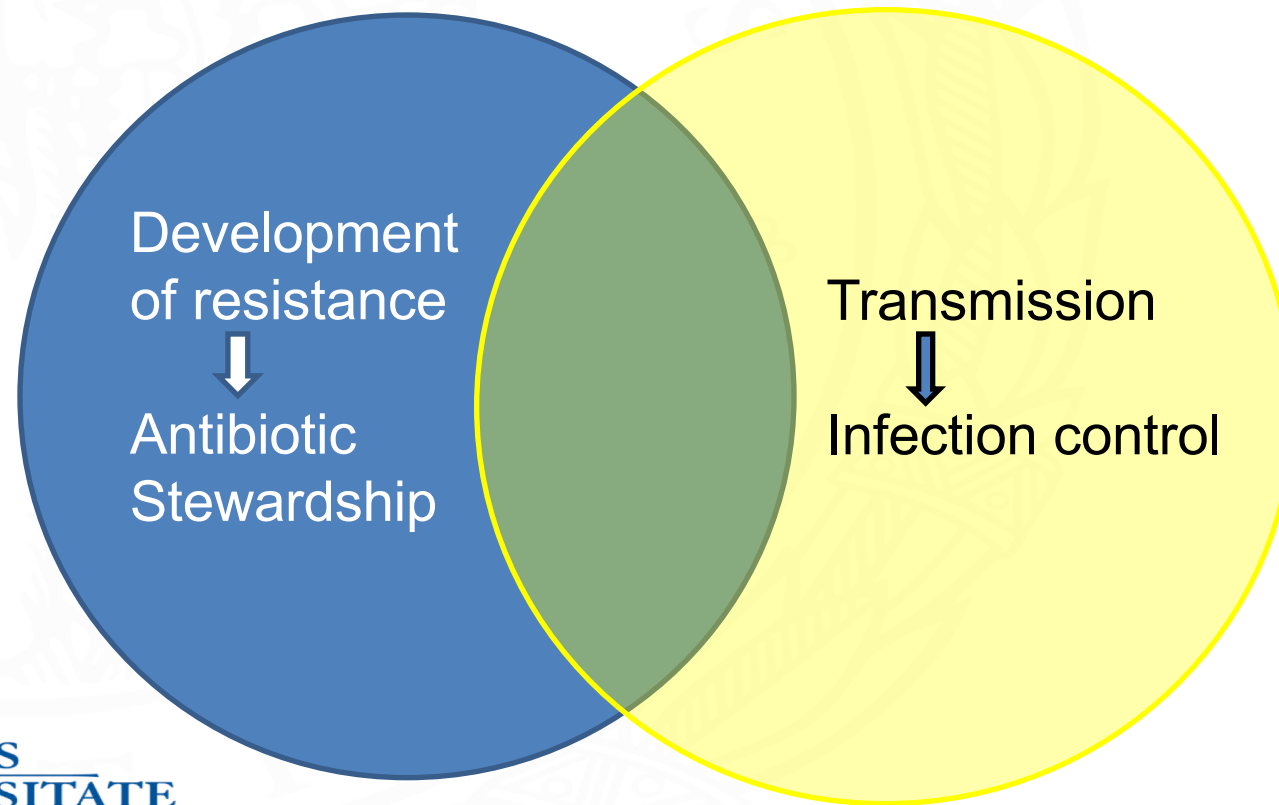
Antimicrobial stewardship (AMS)

- Definition of AMS: a strategy aiming at promoting responsible antibiotic use

- AMS programme in hospitals= a set of interventions to fine tune antibiotic use in regards to
  - Efficacy
  - Toxicity
  - Resistance-induction
  - *Clostridium difficile* induction
  - IV to PO switch
  - Cost
  - Discontinuation

PILGRIM study proposal

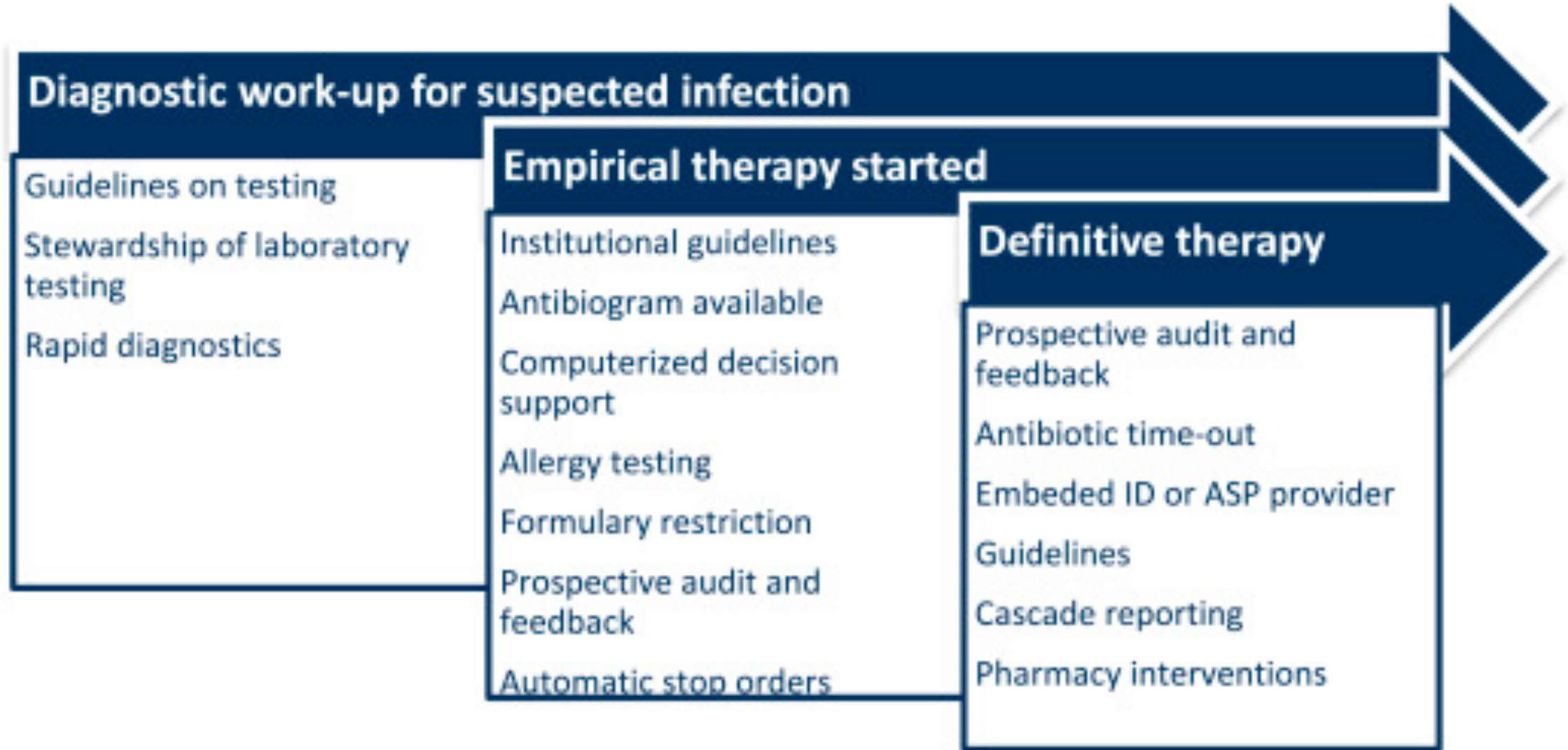|	Number of studies		Incidence ratio (95% CI)
Study setting			
Intensive care unit	10		0·77 (0·66–0·89)
Medical ward	27		0·78 (0·66–0·91)
Surgical ward	5		0·76 (0·46–1·25)
Haematology-oncology ward	3		0·41 (0·20–0·85)
Co-implementation of ICMs			
ASP alone	23		0·81 (0·67–0·97)
ASP + ICMs	9		0·69 (0·54–0·88)
ASP + hand-hygiene intervention	5		0·34 (0·21–0·54)
Type of intervention			
Antibiotic restriction	15		0·77 (0·67–0·89)
Audits/feedback	19		0·66 (0·52–0·83)
Antibiotic cycling	3		0·49 (0·34–0·72)
Year of study			
1980–2000	5		0·90 (0·60–1·36)
2001–05	10		0·79 (0·69–0·90)
2006–13	17		0·68 (0·49–0·95)
Infection and/or colonisation			
Infection and colonisation	8		0·91 (0·60–1·37)
Infection	21		0·75 (0·66–0·85)
Colonisation	3		0·72 (0·41–1·25)
Study design			
Interrupted time-series studies	6		1·20 (0·97–1·50)
Cohort studies	7		0·79 (0·61–1·02)
Before–after studies	18		0·66 (0·54–0·81)

← ASP effective   ASP not effective →

Baur D. Systematic review 2017 Lancet infectious Diseases

Opportunities antibiotic stewardship policies

Diagnostic work-up for suspected infection
- Guidelines on testing
- Stewardship of laboratory testing
- Rapid diagnostics

Empirical therapy started
- Institutional guidelines
- Antibiogram available
- Computerized decision support
- Allergy testing
- Formulary restriction
- Prospective audit and feedback
- Automatic stop orders

Definitive therapy
- Prospective audit and feedback
- Antibiotic time-out
- Embeded ID or ASP provider
- Guidelines
- Cascade reporting
- Pharmacy interventions

Where to start AMS activity?

- Clear opportunity to improve
  - PPS data
  - Laboratory surveillance reports
  - Healthcare associated infection surveillance
- Potential high impact on use and spread of resistance
  - Intensive care units
  - Transplantation
  - Nephrology

How to start?

- Start with friendly collegues

- Frequent personal presence

- Start small

- Build on success

- Monitor your impact and adapt

- Avoid multiplicity of advisers for the same patient/department

- Feedback to collegues
  - Short and easy to understand
  - Real time involvement

Planning stage

- Administrative support
- Creation of the team
- Choose monitoring system
- List of indicators
- Information for the department

How to measure and assess antibiotic use?

- Electronic records RDD or PDD
- Point prevalence surveys PDD
- Pharmacy
  - DDD/stays,
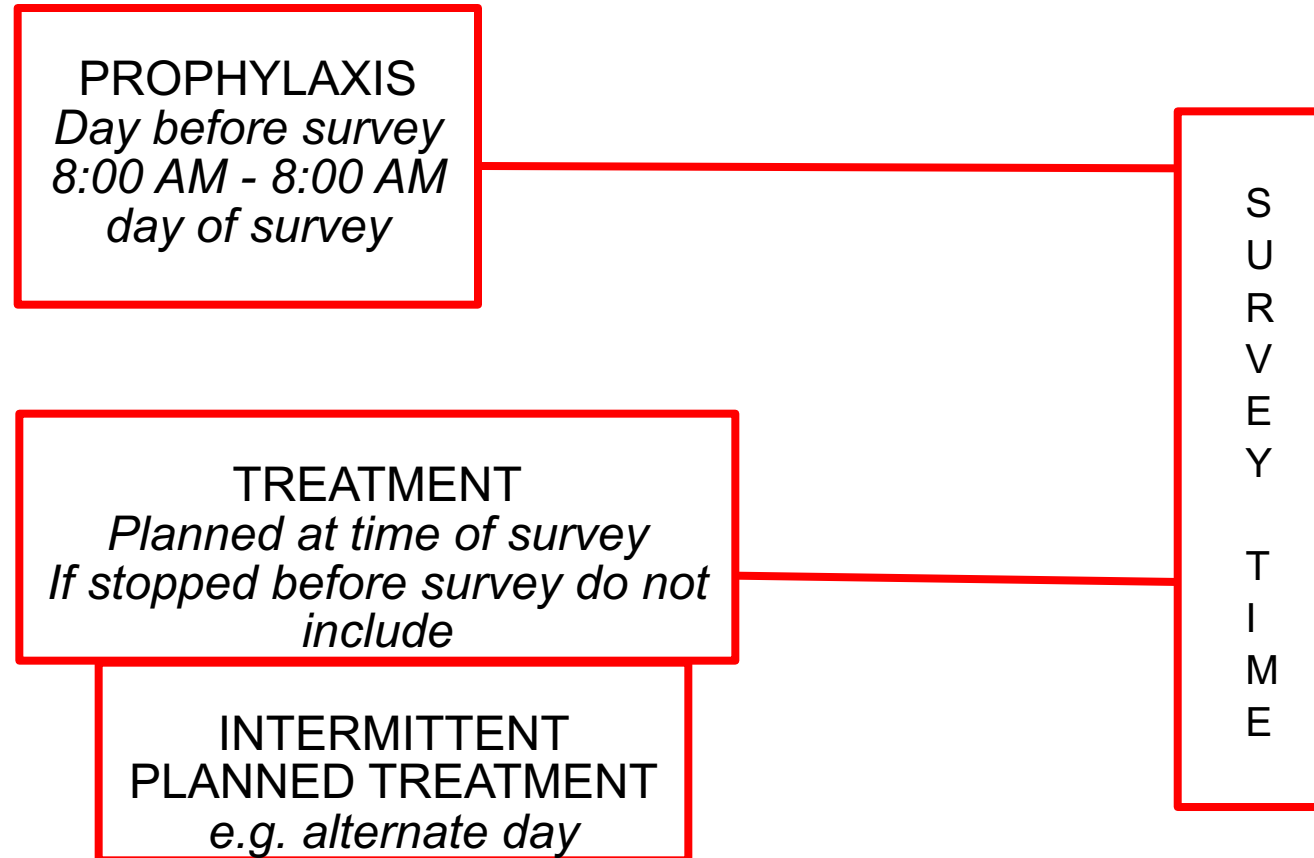 - Packages
  - Grams
  - Euros

DDD usefullness

- Reduction in general consumption DDD/stays
- Reduction in consumption of selected antibiotics DDD/stays
- Replacement by different antibiotic DDD/stays

- Difficult due to patient mix

Point prevalence approach

- One day, one clinical unit
- All patients on antibiotics/all patients
  - Patient demographics
  - Reason for antibiotics
  - Antibiotic
  - Dose

# What to include on antimicrobial section??

PROPHYLAXIS
*Day before survey
8:00 AM - 8:00 AM
day of survey*

TREATMENT
*Planned at time of survey
If stopped before survey do not
include*

INTERMITTENT
PLANNED TREATMENT
e.g. alternate day

S U R V E Y   T I M E

European Prevalence Survey of Healthcare-Associated Infections and Antimicrobial Use
Form A. Patient-based data (standard protocol)

Patient data (to collect for all patients)

Hospital code [ ]

Ward name (abbr.)/Unit Id [ ] Ward specialty [ ]

Survey date: ___ / ___ / _____ (*dd/mm/yyyy*)

Patient Counter: _____

Age in years: _____ yrs; Age if < 2 year old: _____ months

Sex: M F   **Date of hospital admission:** ___ / ___ / _____
dd / mm / yyyy

Consultant/Patient Specialty: [ ]

Surgery since admission:

- O No surgery   O Minimal invasive/non-NHSN surgery
- O NHSN surgery   O Unknown

McCabe score:
- O Non-fatal disease
- O Ultimately fatal disease
- O Rapidly fatal disease
- O Unknown

Central vascular catheter: O No , O Yes O Unk

Peripheral vascular catheter: O No O Yes O Unk

Urinary catheter: O No O Yes O Unk

Intubation: O No O Yes O Unk

Patient receives **antimicrobial(s)**[1]: O No   O Yes

Patient has **active HAI**[2]:   O No   O Yes

IF YES

(1) At the time of the survey, except for surgical prophylaxis 24h before 8:00 AM on the day of the survey; if yes, fill antimicrobial use data; (2) [infection with onset ≥ Day 3, OR SSI criteria met (surgery in previous 30d/1yr), OR discharged from acute care hospital <48h ago, OR CDI and discharged from acute care hospital < 28 days ago OR onset < Day 3 after invasive device/procedure on D1 or D2] AND [HAI case criteria met on survey day OR patient is receiving (any) treatment for HAI AND case criteria are met between D1 of treatment and survey day]; if yes, fill HAI data

Antimicrobial (generic or brand name)	Route	Indication	Diagnosis (site)	Reason in notes

Route: P: parenteral, O: oral, R: rectal, I: inhalation; **Indication**: CI - LI - HI: treatment intention for community-acquired (CI), long/intermediate-term care-acquired (LI) or acute hospital-acquired infection (HI); surgical prophylaxis: SP1: single dose, SP2: one day, SP3: >1day; MP: medical prophylaxis; O: other; UI: Unknown indication; **Diagnosis**: see site list, only for treatment intention **Reason in notes**: Y/N

	HAI 1	HAI 2	HAI 3
Case definition code			
Relevant device in situ before onset[3]	O Yes O No O Unknown	O Yes O No O Unknown	O Yes O No O Unknown
Present at admission	O Yes O No	O Yes O No	O Yes O No
Date of onset[4]	___ / ___ / _____	___ / ___ / _____	___ / ___ / _____
Origin of infection	O current hospital O other hospital O other origin/ unk	O current hospital O other hospital O other origin/ unk	O current hospital O other hospital O other origin/ unk
If BSI: source[5]			

	MO-code	R[6]	MO-code	R[6]	MO-code	R[6]
Microorganism 1						
Microorganism 2						
Microorganism 3						

(3) relevant device use (intubation for PN, CVC for BSI, urinary catheter for UTI) in 48 hours before onset of infection (even intermittent use), 7 days for UTI; (4) Only for infections not present/active at admission (dd/mm/yyyy); (5) C-CVC, C-PVC, S-PUL, S-UTI, S-DIG, S-SSI, S-SST, S-OTH, UO, UNK; (6) AMR marker 0,1,2 or 9, see table

GLOBAL-PPS PATIENT Form (Please fill in one form per patient on antimicrobial treatment/prophylaxis)

Ward Name/code	Activity [i] (M, S, IC)	Patient Identifier [ii]	Survey Number [iii]	Patient Age [iv]			Gender M or F
				Years (if ≥ 2 years)	Months (1-23 month)	Days (if <1 month)	

Antimicrobial Name [v]		1.		2.		3.		4.		5.
Single Unit Dose [vi]	Unit (g, mg, or IU) [vii]									
Doses/ day [viii]	Route (P, O, R, I) [ix]									
Diagnosis [x] (see appendix II)										
Type of indication [xi] (see appendix III)										
Reason in Notes (Yes or No) [xii]										
Guideline Compliance (Y, N, NA, NI) [xiii]										
Is a stop/review date documented? (Yes or No)										
Treatment (E: Empirical; T: Targeted)										
Treatment based on biomarker data (Yes or No) [xiva]										
If yes, on which biomarker [xivb] (fill in: CRP, PCT or other)										
Targeted treatment choice based on microbiology data (Yes, No) [xv]										
IF YES: (This section is to be filled in only if the treatment choice is based on microbiology data AND the organism is one of the following)										
MRSA (Yes or No) [xvi]										
MRCoNS (Yes or No) [xvii]										
VRE (Yes or No) [xviii]										
ESBL-producing Enterobacteriaceae (Yes or No) [xix]										
3rd generation cephalosporin resistant Enterobacteriaceae non-ESBL producing										
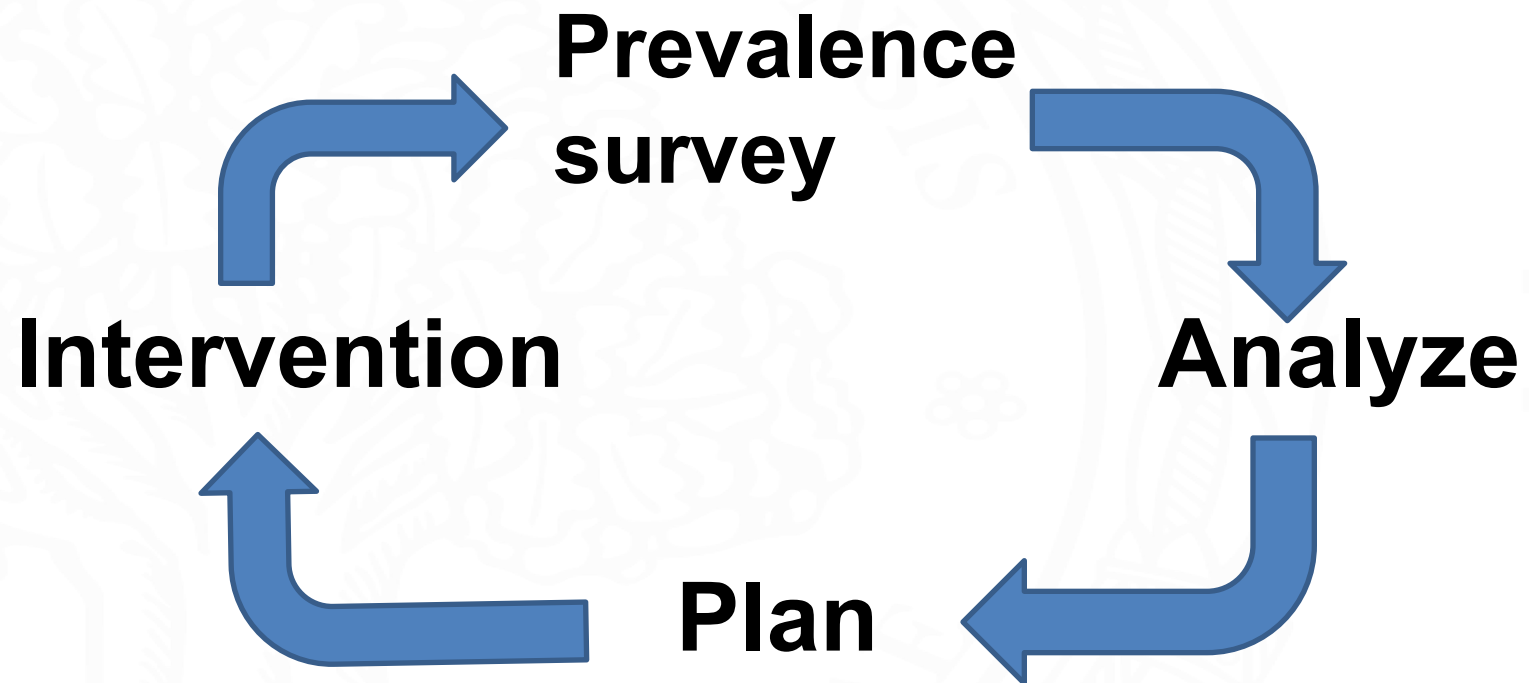
Funnel plot comparing hospital prescribing in the UK using proportion of children on antibiotics.
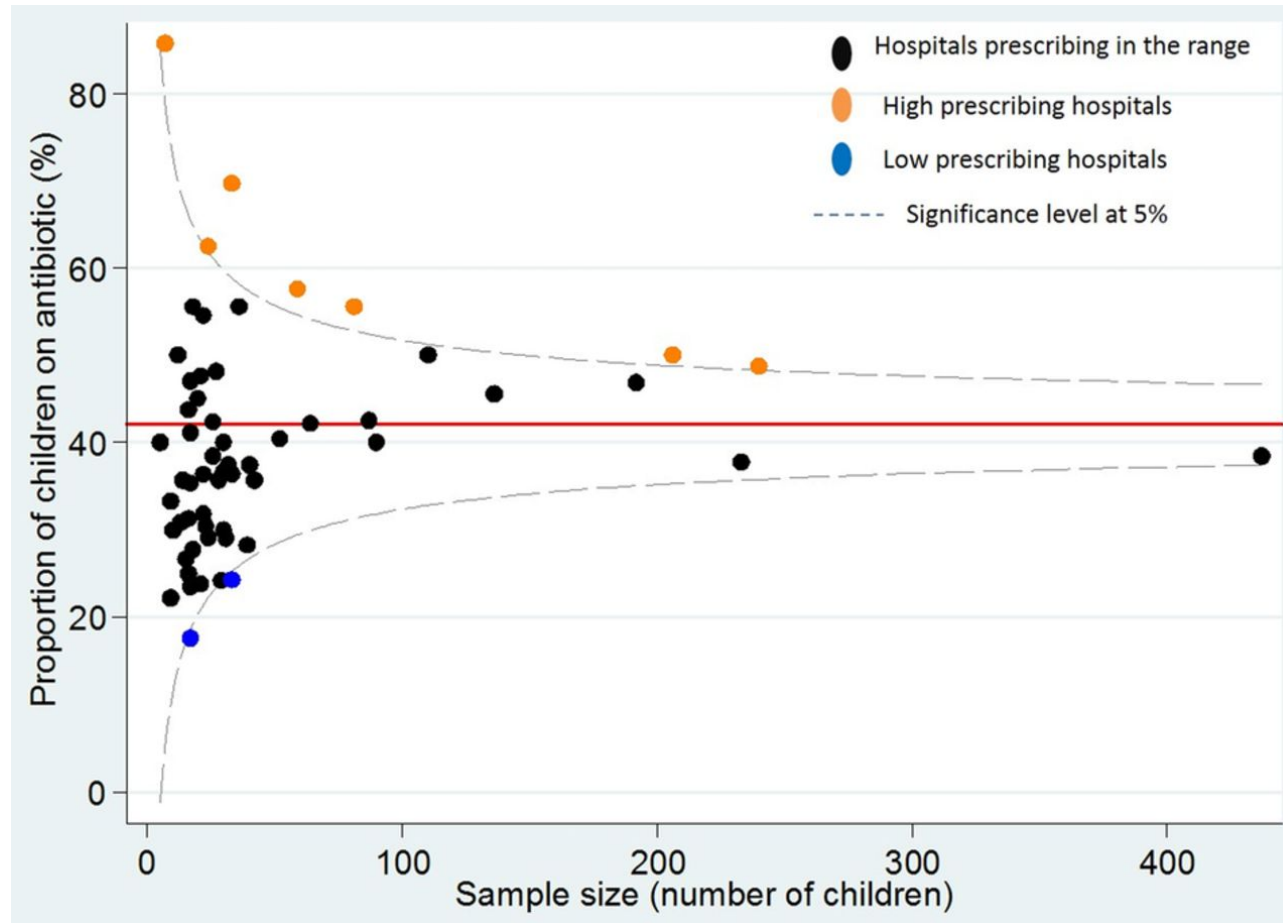
BMJ Open

Appropriateness of use of AMT (95% confidence interval) in six surveys between 2001 and 2004.
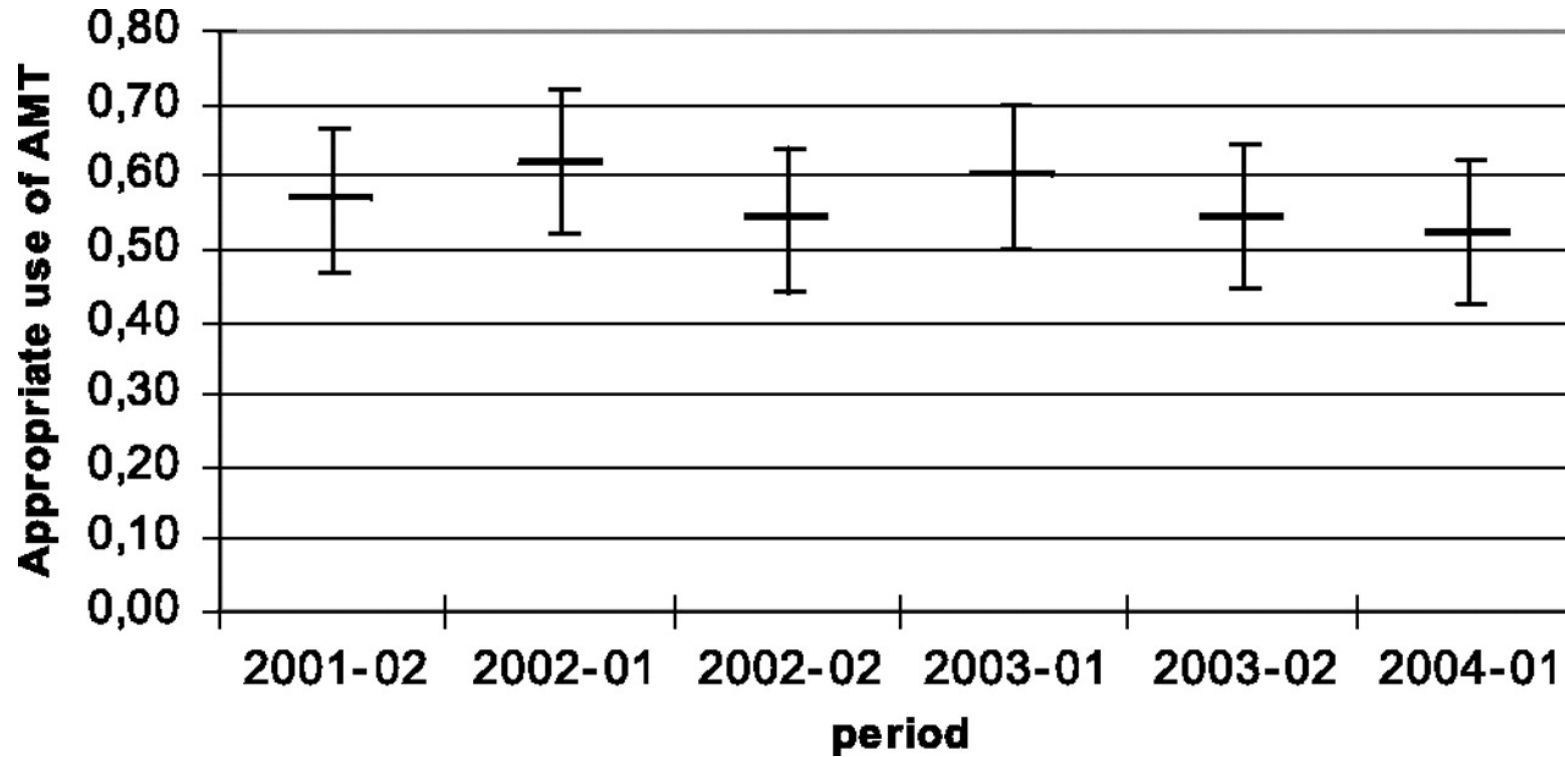
Antimicrobial Agents and Chemotherapy

Interventions measured by point prevalence (Process measures)

- New formulary and education
- New guidelines and education
- Shortened laboratory reports
- Switch from IV to oral

Appropriateness of antibiotic prescriptions assesed with point prevance survey

- Appropriateness of antibiotic prescriptions according to the class of antibiotic

- Appropriateness of antibiotic therapy by diagnosis

- Appropriateness of antibiotic therapy by medical specialization

High quality of each prescription: ultimate goal of all AMS programmes.

An informed choice

https://openwho.org/courses/AMR-competency
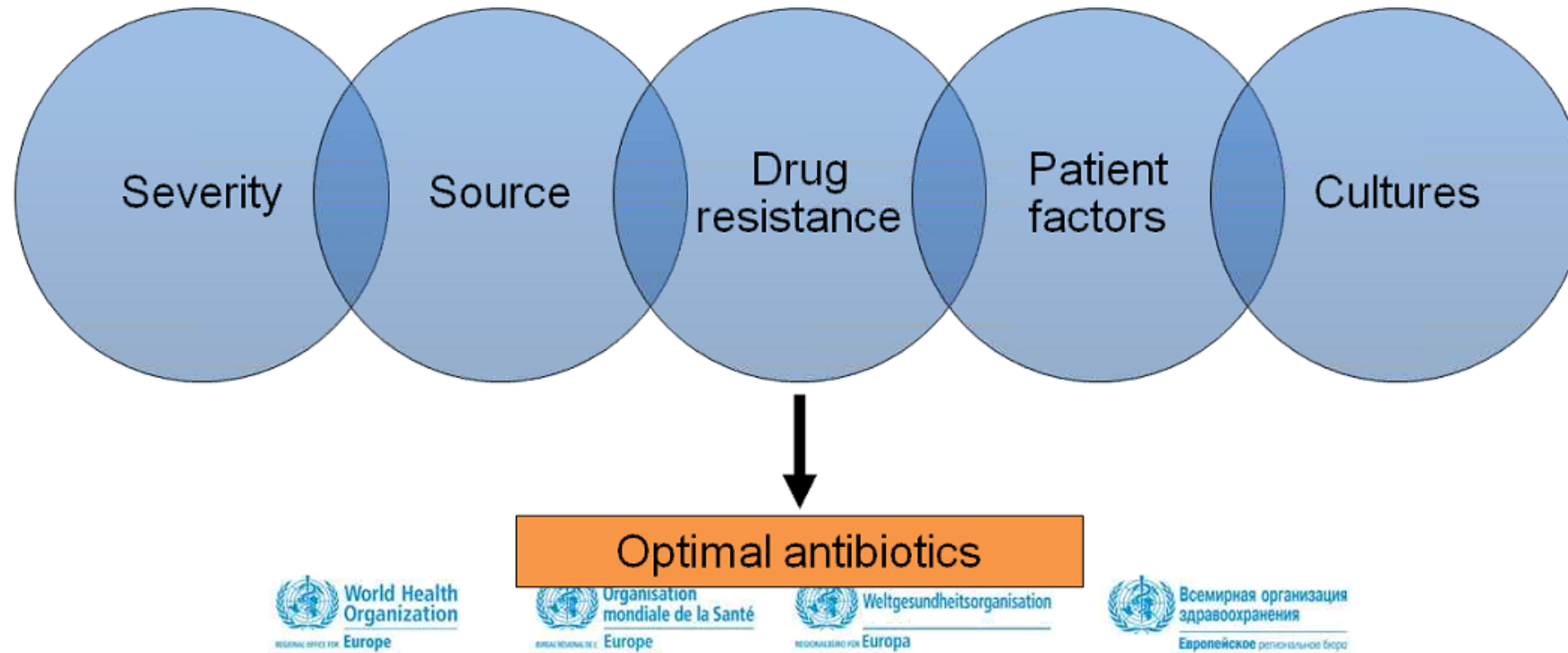
THE GLOBAL DEFINITION OF RESPONSIBLE ANTIBIOTIC USE: THREE HIGHLIGHTS

- Education
- Duration
- Access and availability

What are the harms of inappropriately prolonged antibiotic therapy?
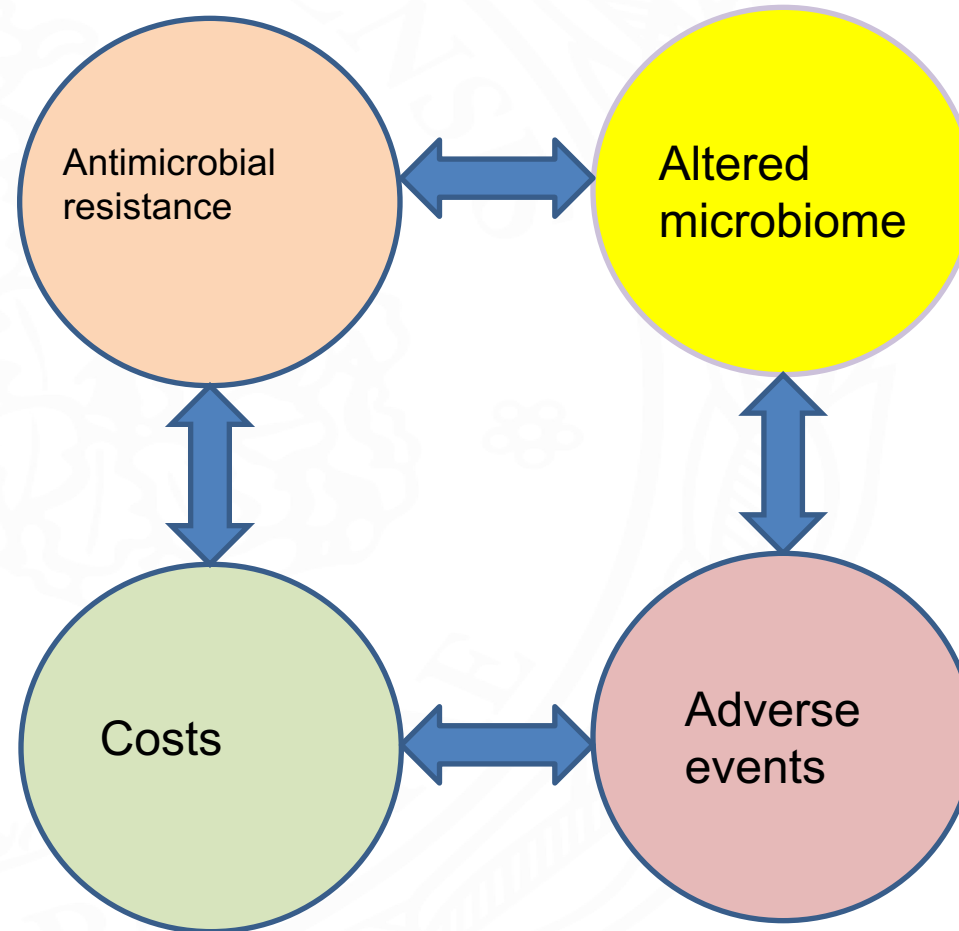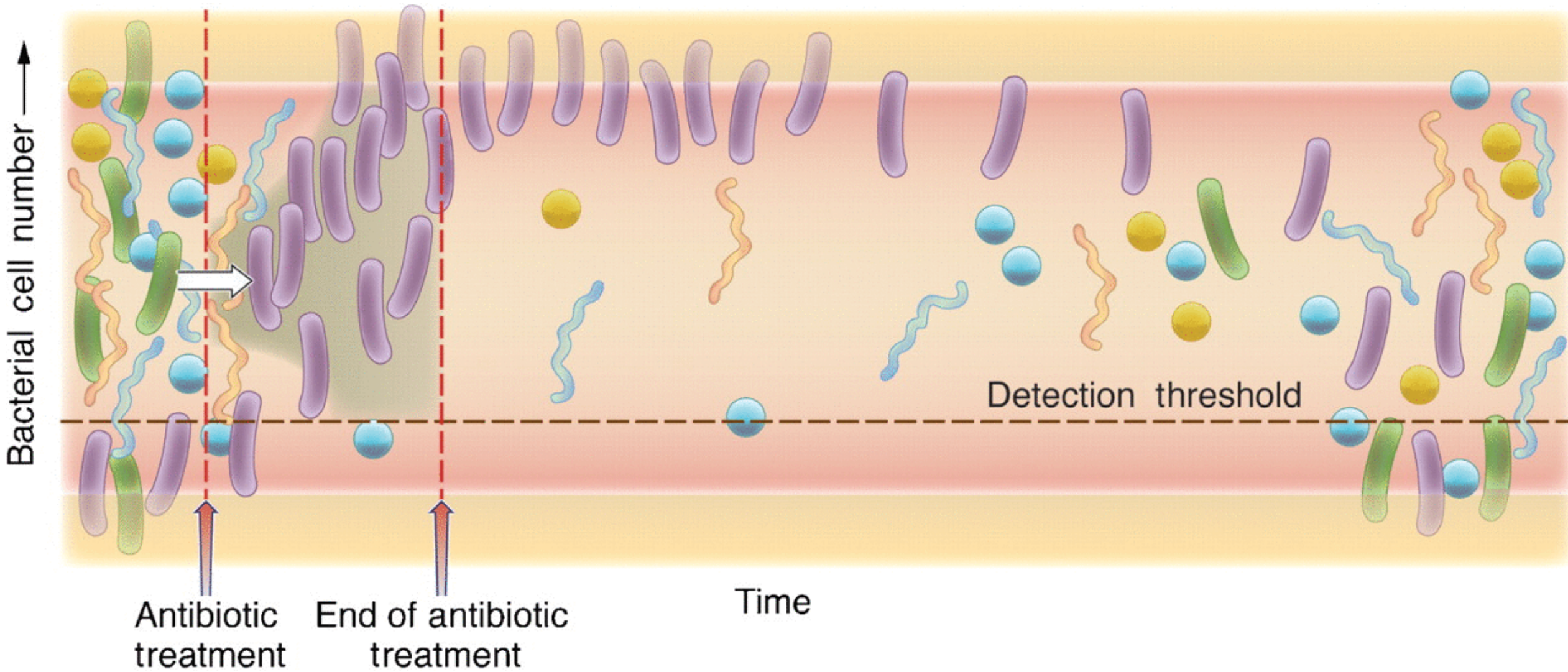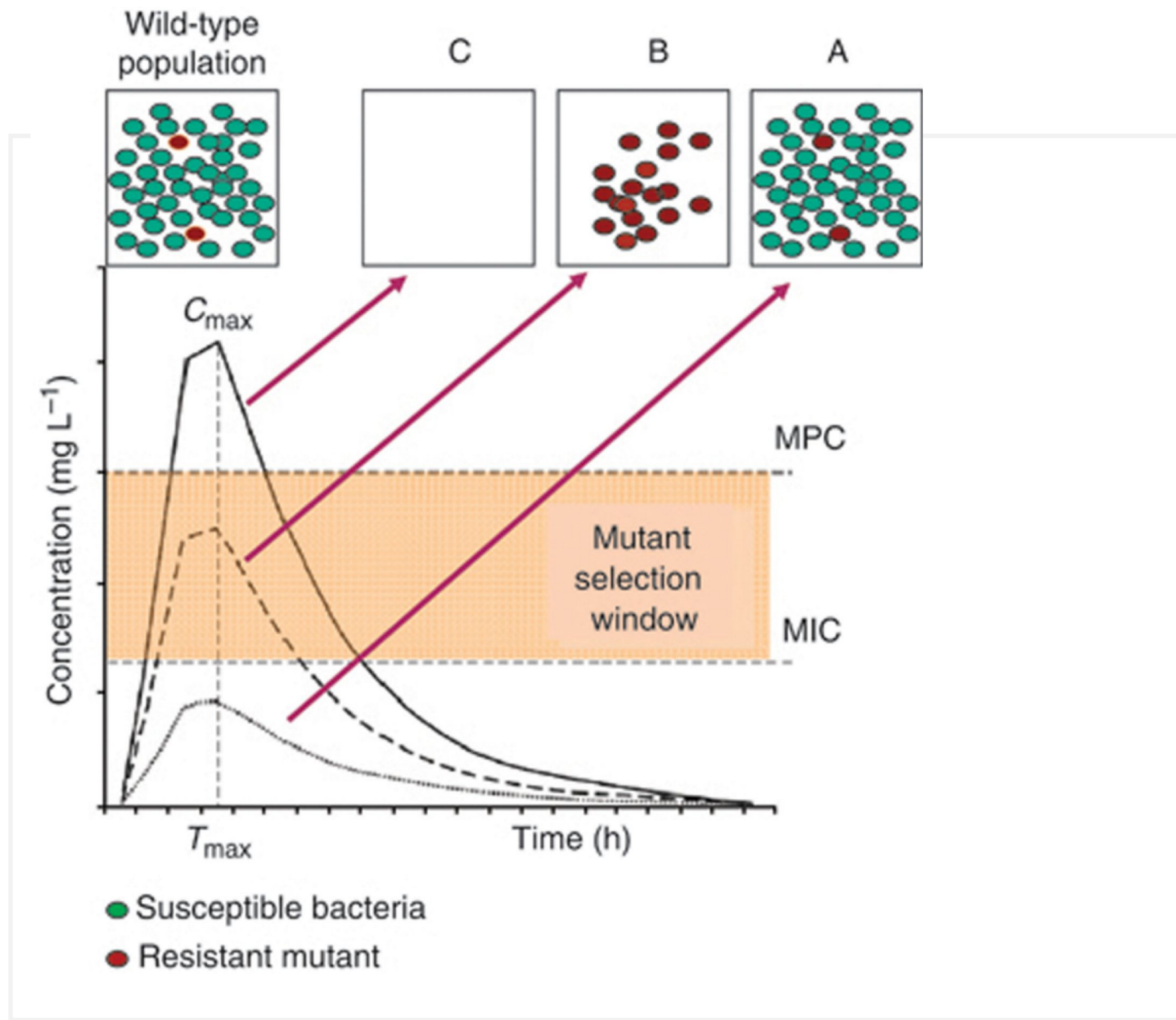
Emergence and spread of antibiotic resistance following exposure to antibiotics
FEMS Microbiol Rev. 2011;35(5):977-991. doi:10.1111/j.1574-6976.2011.00295.x

Comparing the Outcomes of Adults With Enterobacteriaceae Bacteremia Receiving Short-Course Versus Prolonged-Course Antibiotic Therapy in a Multicenter, Propensity Score–Matched Cohort

Darunee Chotiprasitsakul,[1] Jennifer H. Han,[2] Sara E. Cosgrove,[3] Anthony D. Harris,[4] Ebbing Lautenbach,[2] Anna T. Conley,[5] Pam Tolomeo,[2] Jacqueleen Wise,[2] and Pranita D. Tamma[6]; for the Antibacterial Resistance Leadership Group
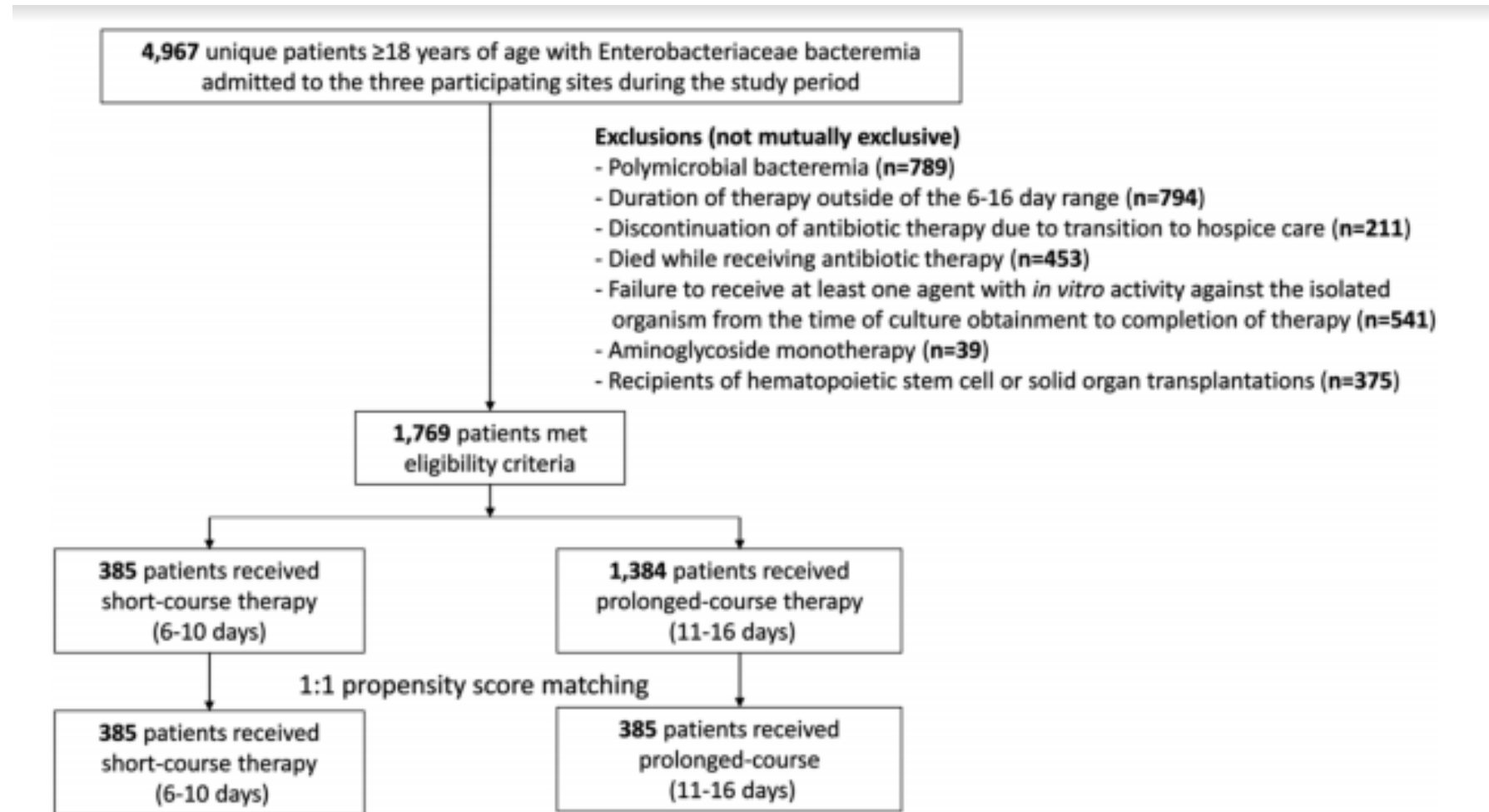
How to stop antibiotics earlier?

- Reduction in procalcitonin and CRP
- No fever for 2-3 days
- Feeling well, eating well

When the antibiotic treatment should be stopped

- When the benefit to the patient (but also for society) no longer outweights the potential harm

Conclusions

- AMS interventions should be targeted and well planned

- Different methods can be used to asses the impact of AMS activities

- Selection of optimal treatment regimen for each patient is essential for credibility of AMS programmes

Self assesment questions

- Antimicrobial stewardship works best in combination with infection control

Yes

- AMS programmes should address behavioral issues

Yes

- Too short antibiotic courses select resistance

No