Antimicrobial Stewardship (AMS)

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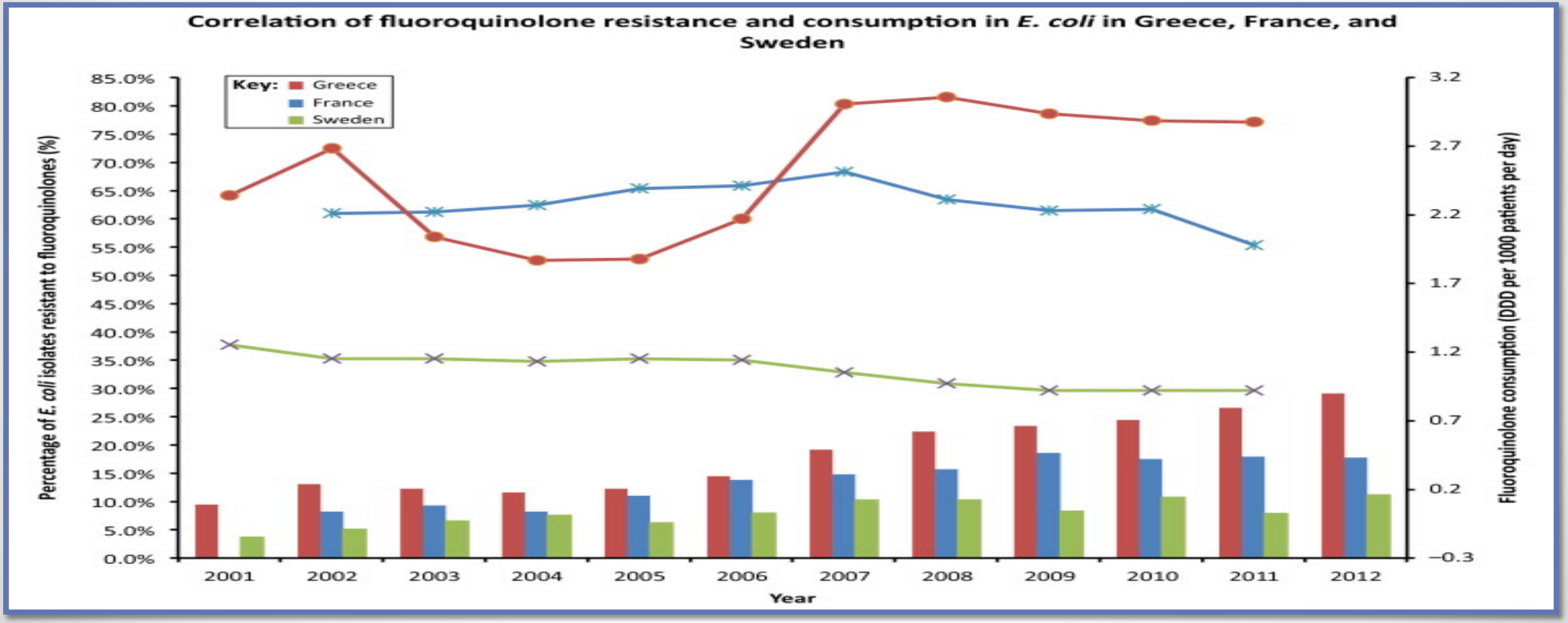
July 2018

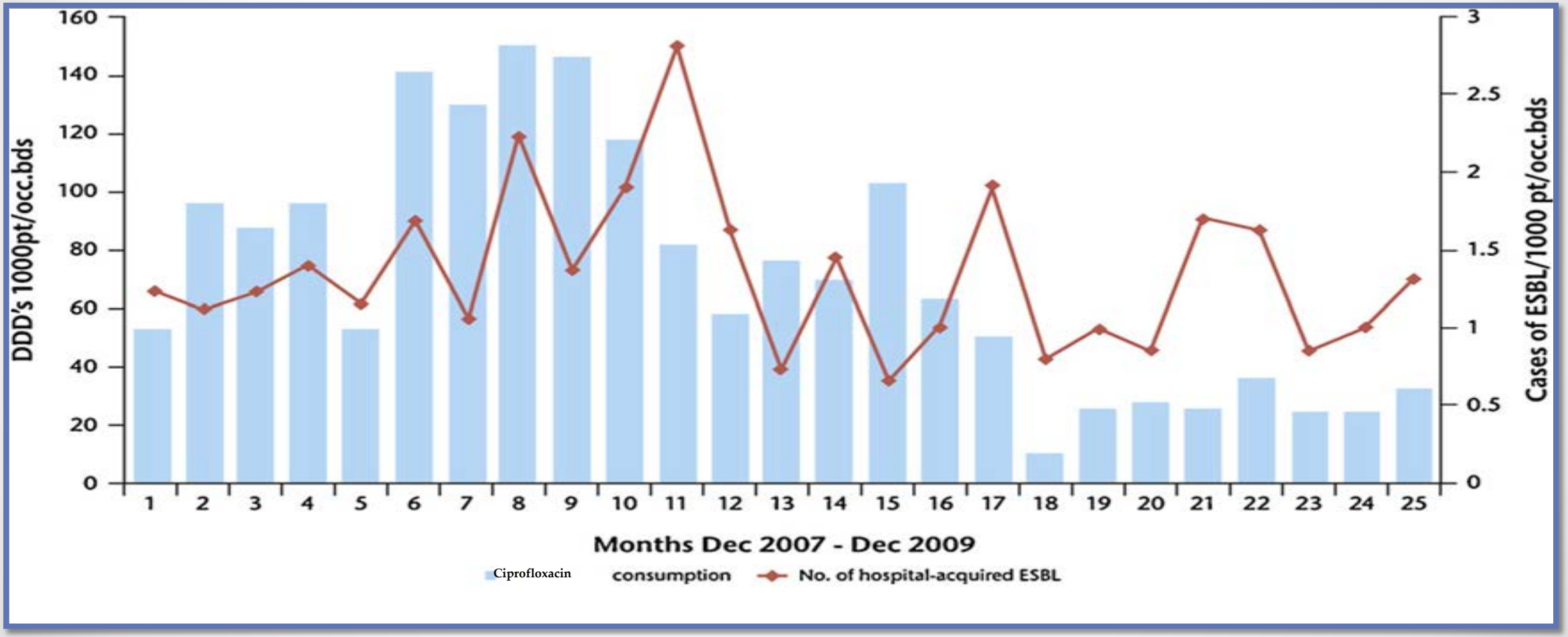
Why Antimicrobial Stewardship in an Infection Prevention and Control Workshop?

Correlation Between Antibiotic Consumption and Resistance



Redgrave LS et al.Trends in Microbiology August 2014, Vol. 22, No. 8

Correlation Between Antibiotic Consumption and Resistance

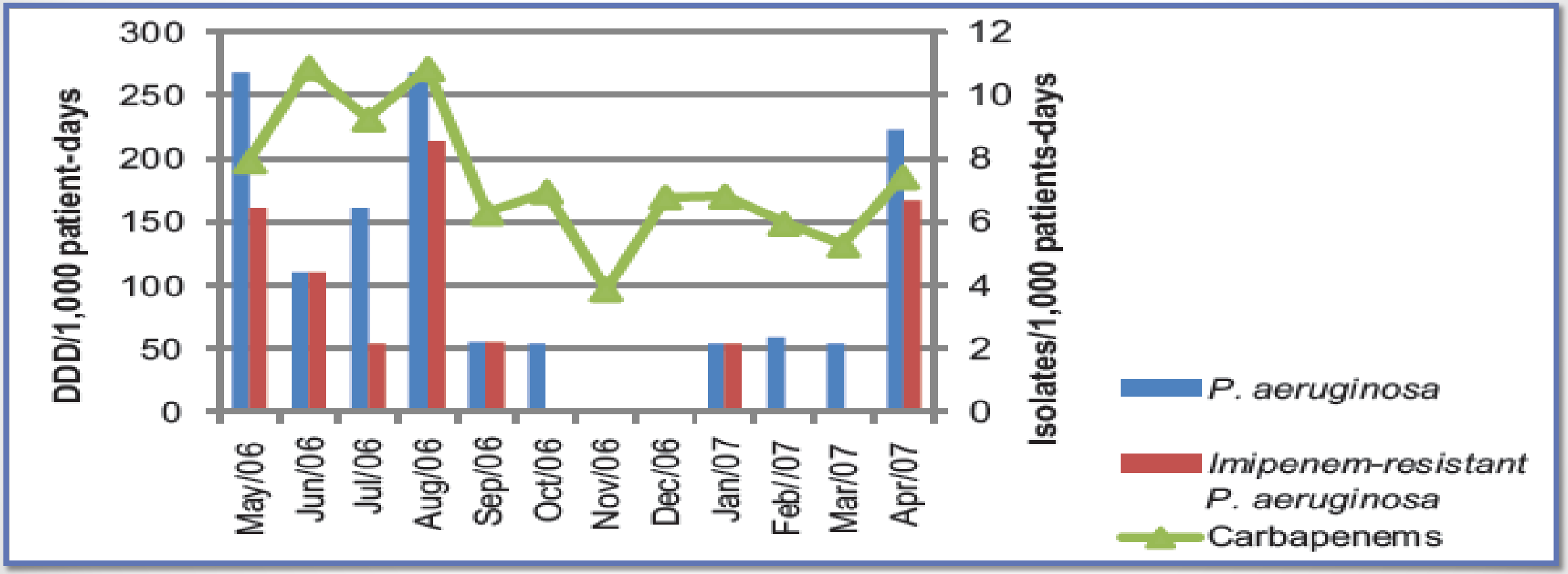


Ciprofloxacin consumption and number of cases of hospital-acquired (ESBL)-producing coliforms

DDDs, defined daily doses; pt/occ.bds, patient-occupied bed-days

S.J. Dancer et al. International Journal of Antimicrobial Agents 41 (2013) 137–142

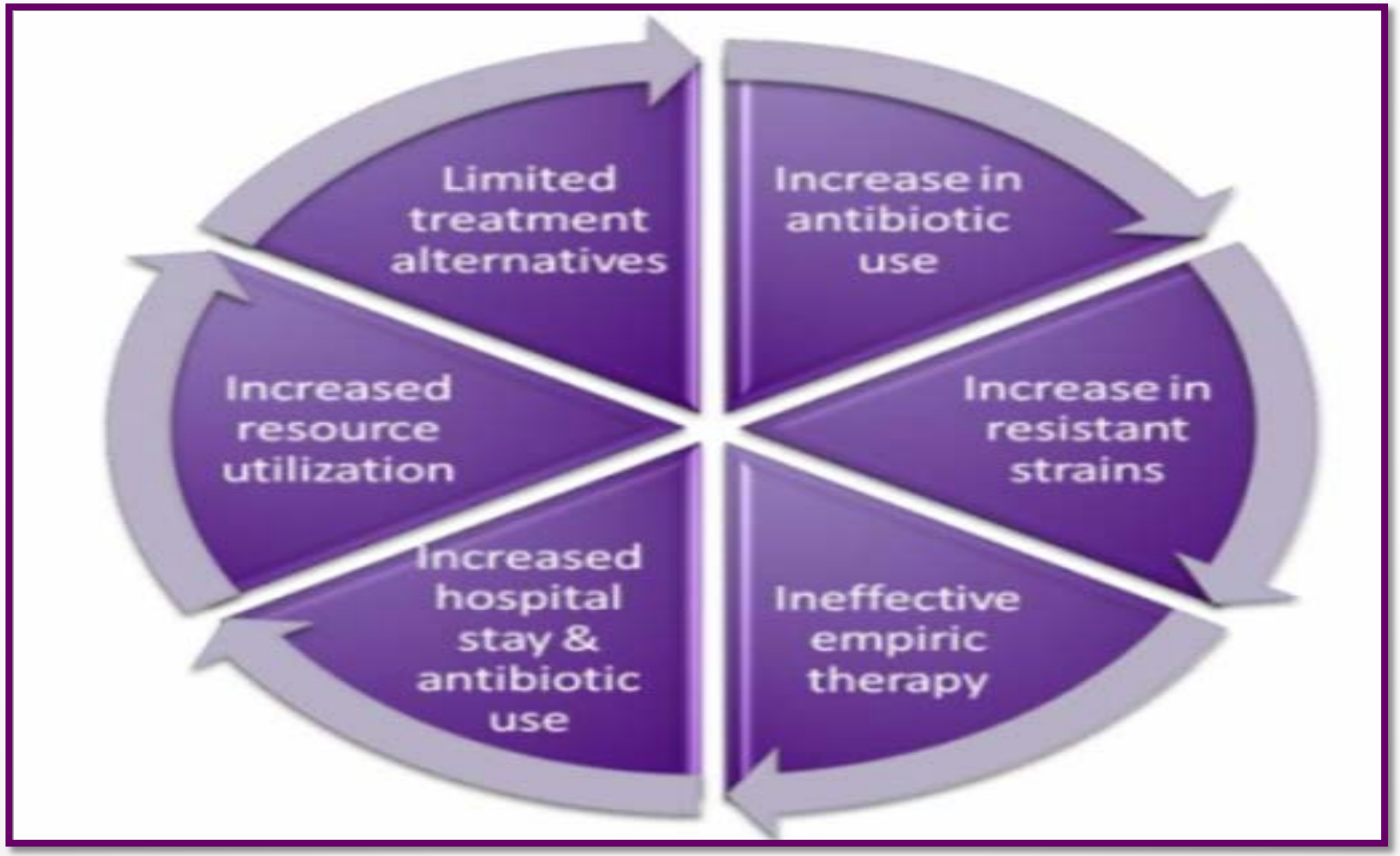
Correlation Between Antibiotic Consumption and Resistance



Relationship between incidence density of Pseudomonas aeruginosa isolated from VAP (isolates/1,000 patient days) susceptible (Pearson r = 0.66/p = 0.02) or resistant (Pearson r = 0.70/ p = 0.01) to imipenem and density of use of carbapenems in DDD/1,000 patient-days.

Moreira MR et al. Revista da Sociedade Brasileira de Medicina Tropical 2013;46(1):39-44.

How Antibiotic Use Affects Patients and Population



Increasing prevalence of some WHO priority pathogens in Lebanon

Resistant Organism	Mean Prevalence in 2011/2013	Mean Prevalence in 2015/2016 (Range)
3rd generation cephalosporin-resistant Enterobacteriaceae	35%	41% (28%-65%)
Carbapenem-resistant Enterobacteriaceae	1%	3% (0-10%)
Carbapenem-resistant P. aeruginosa	27%	30% (5%-45%)
Carbapenem-resistant A. baumannii	82%	88% (26%-97%)
FQ resistant Salmonella spp.	5%	10% (0-44%)
Methicillin resistant S. aureus	27%	28% (14%-48%)
Vancomycin resistant Enterococci	1%	2% (0-17%)
Penicillin non-susceptible S. pneumoniae	-	25% (21%-40%)

Chamoun K. et al. Int J Infect Dis 2016; 46: 64–70
Moghnieh R. et al (Unpublished Data, 2018)

What Is Antibiotic Stewardship?

- On Going effort to achieve the goals of:

- Using the right antibiotic for the right indication, at the right time at the right dose for the right duration.

Primary goal

- Optimize clinical outcomes while minimizing unintended consequences of antimicrobial use, including toxicity, the selection of pathogenic organisms, and the emergence of AMR .

Why Stewardship?

Appropriate initial antibiotic while improving patient outcomes and heathcare

Unnecessary antibiotics and adverse patient outcomes and increased cost

A Balancing Act

Strategy

- Education
- Guidelines and clinical pathways
- Antimicrobial restriction, prophylaxis preprinted order forms, policies
- De-escalation
- Dose optimization, duration
- IV to PO therapy

Education

- Conferences, presentations
- Staff rounds
- Dissemination of local guidelines
- E-education
- Education alone without intervention is only marginally effective and nonsustainable
- Audit and Feedback

Antibiotic Use

- Limited use to bacterial infections only
- Right timing
- Narrowest spectrum
- Highest dose
- Shortest duration
- In a way to ensure maximal compliance

Policies

- Restriction of broad-spectrum antibiotics
- Antimicrobial prophylaxis

Role of ID Physician

- Guidelines
- Education
- Consultation
- Evaluating stopping orders
- Giving Feedback
- Deciding what to measure
- Communicating with all teams including administration.

Role of Clinical Pharmacist

- Evaluating prescription pattern in the hospital
- Measuring consumption
- Giving advice about :Time, dose, duration, corrective actions, DDI.
- Education
- Consulting with ID

Role of IC

- Stop transmission of infections in the hospital
- Reporting infections to ID, ASP, MOH,...
- Hand hygiene
- Proper isolation

Role of Clinical Microbiologist

- Quick reporting of culture
- Rapid testing of AMR
- Reporting of AMR patterns

Where To Start: Components

- **Leadership Commitment:** dedicating necessary human, financial, and IT resources.
- **Accountability:** Appointing a single leader responsible for program outcomes. Experience with successful programs show that a physician leader is effective.
- **Drug Expertise:** Appointing a single pharmacist leader responsible for working to improve ABX use.
- **Action:** Implementing at least one recommended action, such as systemic evaluation of ongoing treatment need after a set period of initial treatment (i.e. “ABX time out” after 48 h).
- **Tracking:** Monitoring ABX prescribing and resistance patterns
- **Reporting:** Regular reporting information on ABX use and resistance to doctors, nurses and relevant staff.
- **Education:** Educating clinicians about resistance and optimal prescribing.

Leadership Support

- Leadership support in a number of forms, including:
  - Formal statements that the facility supports efforts to improve and monitor ABX use.
  - Including stewardship-related duties in job descriptions and annual performance reviews.
  - Ensuring staff from relevant departments are given sufficient time to contribute to stewardship activities.
  - Supporting training and education.
  - Ensuring participation from many groups that can support stewardship activities.
- Financial support greatly arguments the capacity and impact of a stewardship program and stewardship programs will often pay for themselves, both through savings in both ABX expenditures and indirect costs.

A Lebanese Experience

- The MGH AMS Experience: 2016- Ongoing

MGH Experience: The Ultimate Aim

- To ensure that every patient receives the right antibiotics(IF NEEDED) at the right time using the right dose for the right duration
- To reduce mortality, toxicity and length of stay,
- To reduce AMR, and
- To Decrease the cost of ABX.

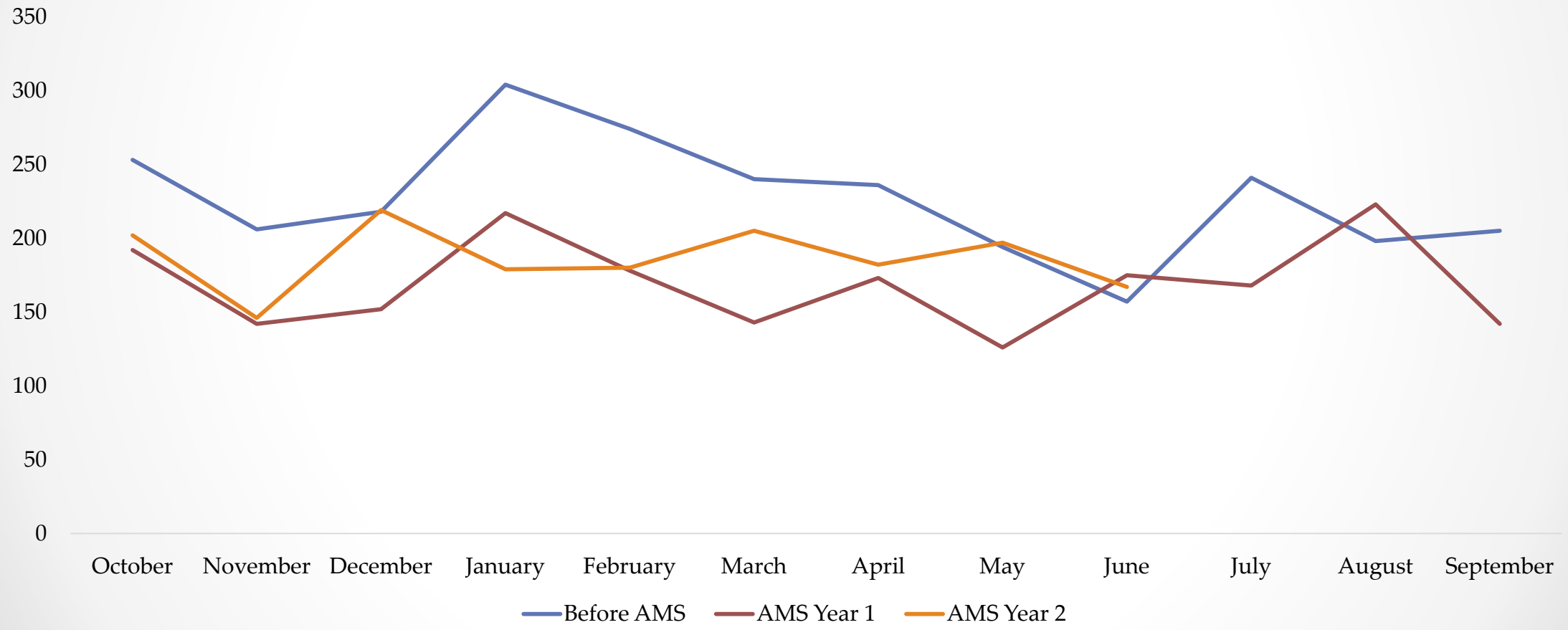
MGH Experience: Antibiotic stewardship committee or team

- ID specialist
- Clinical ID pharmacist
- Clinical microbiologist
- IC specialist
- Information Technologist.
- Administration representative

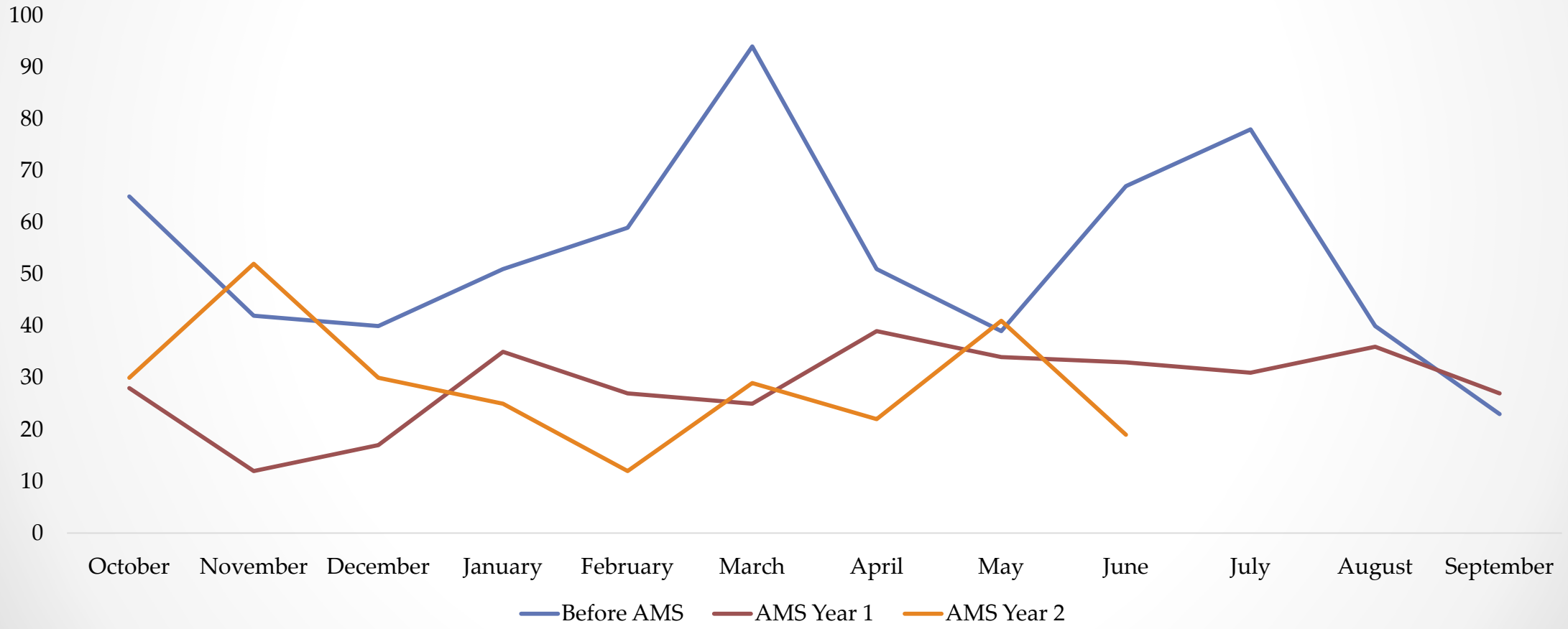
MGH Experience: Indicators

- Antibiotic consumption: DOT/1000 patient days.
- Antimicrobial resistance: Isolated MDR/XDR/1000 patient days.
- Antimicrobial consumption: million LL/year.
- Clinical outcome per antibiotic use.

MGH Experience:
Antipseudomonal Carbapenems Use
(Days of therapy (DOT)/1000 patient days)

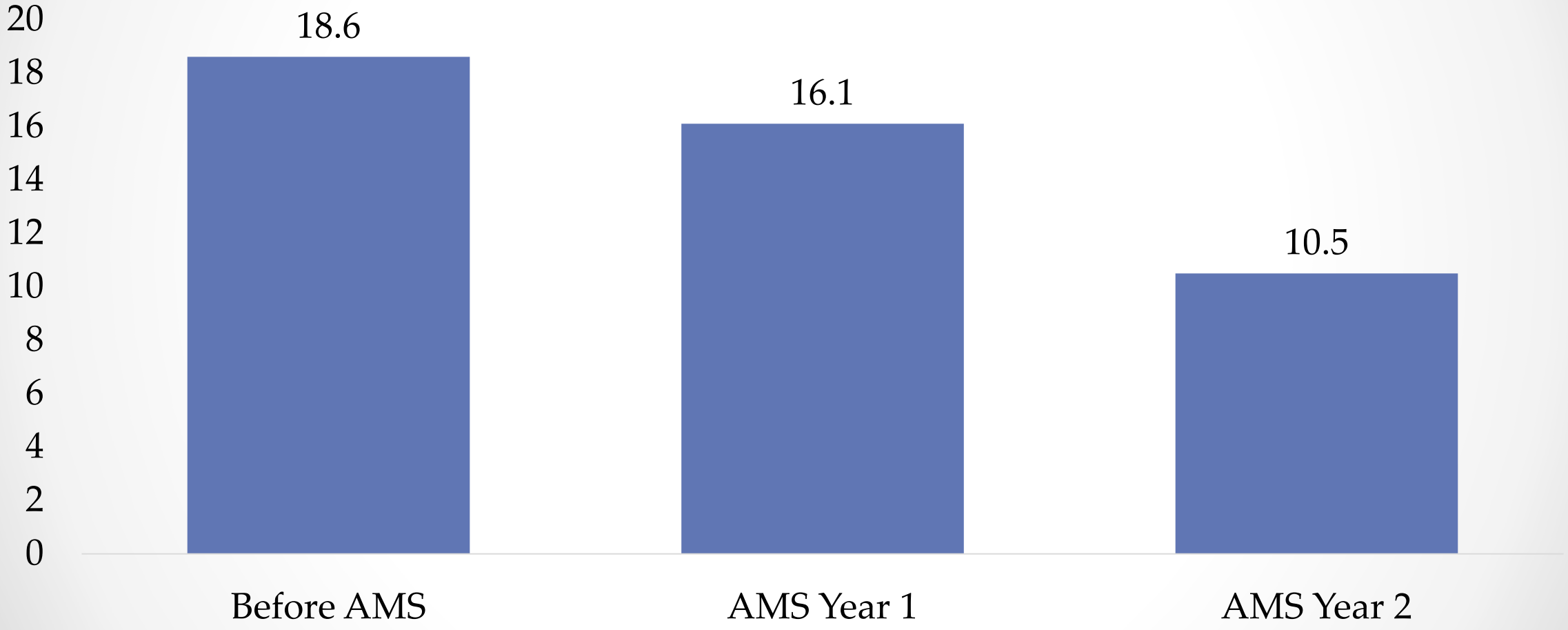


MGH Experience:
Colistin Use
(Days of therapy (DOT)/1000 patient days)

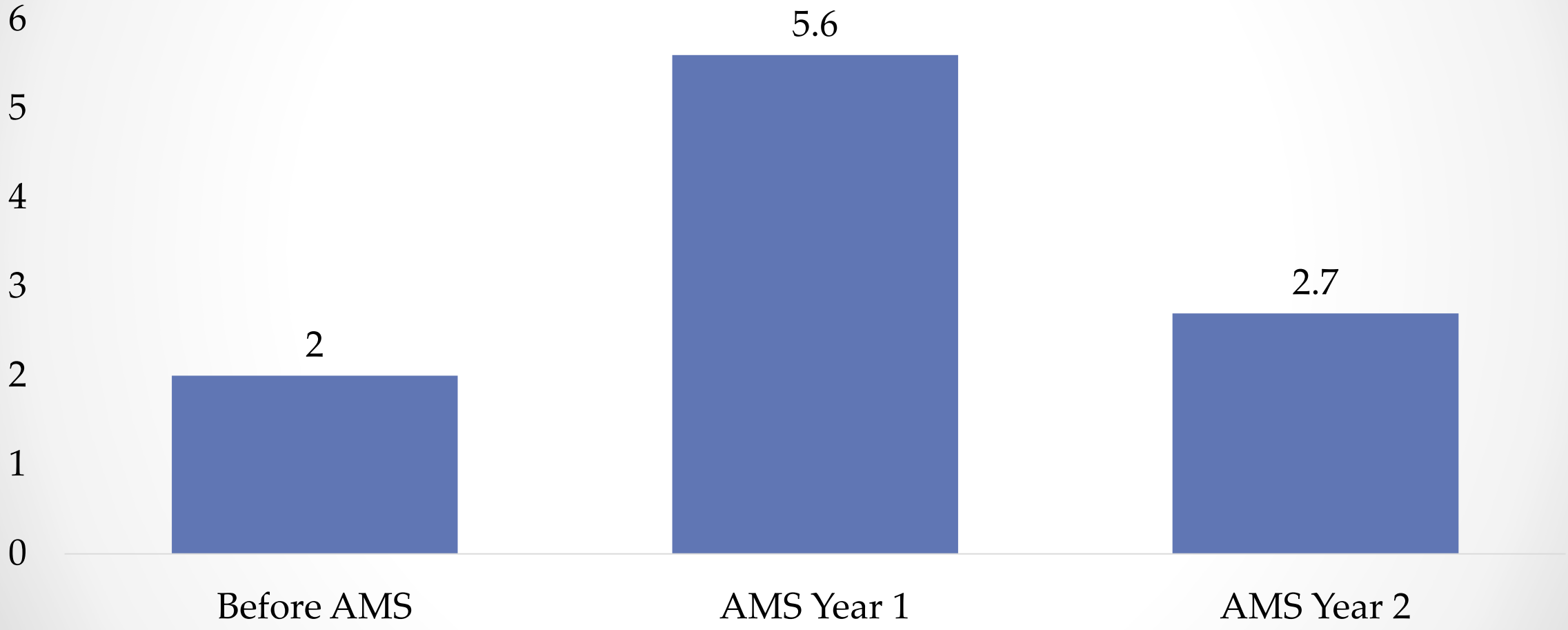


MGH Experience: **Acinetobacter XDR**

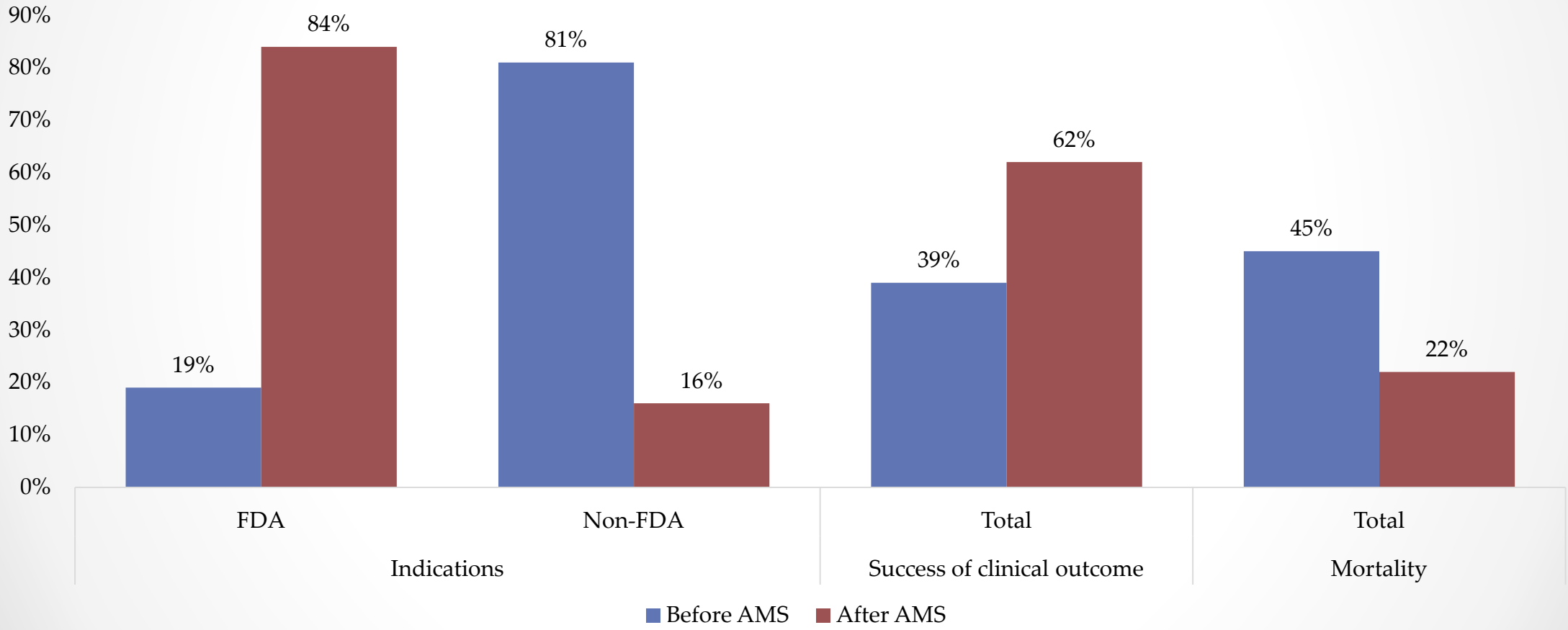
(Numbers/1000 patient days)



MGH Experience: **CRE**
(Numbers/1000 patient days)



patients
(In Percentages)



MGH Experience: Antibiotics Expenditure

Year	Money (L.L.)
Before AMS	2,715,634,733
AMS Year 1	2,189,847,745
AMS Year 2	1,951,359,105

- 20%

- 11%

Impact of coupled AMS and IPC interventions on AMR rates

Infection and Drug Resistance

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ORIGINAL RESEARCH

Successful control of resistance in *Pseudomonas aeruginosa* using antibiotic stewardship and infection control programs at a Chinese university hospital: a 6-year prospective study

Liu L et al. Infection and Drug Resistance 2018:11 637–646

The Chinese Experience

- **Objective:**
  - Investigate the effect of AMS and IPC in controlling the resistance of *P. aeruginosa* at a tertiary hospital center, China between 2012 and 2017.
- **Methods:**
  - Antibiotic use was restricted through AMS program.
  - The IPC program included environmental cleaning and disinfection, hand hygiene, active surveillance of *P.* aeruginosa, and education about infection control.

Liu L et al. Infection and Drug Resistance 2018:11 637–646

Results

A significant correlation was found between the incidence rate of MDR *P. aeruginosa* and the consumption of antimicrobial agents (P=0.01).

Consumption of antimicrobial agents and ABHG during the study period at a hospital center in China

	Year						P-value
	2012	2013	2014	2015	2016	2017	
DDD (g/1,000 patient-days)	45	44.19	43.37	39.52	38.55	38.15	0.04
ABHG (L/1,000 patient-days)	0.6	3.8	5.7	8.5	9.8	10.9	0.005

Abbreviations: ABHG, alcohol-based hand gel; DDD, daily defined dose.

	% of isolates with the MDR or XDR phenotype						
MDR	20	22	18.5	17	17.4	15	0.04
XDR	5.8	4.9	3.5	2.1	1.2	1	nd

Note: nd, statistical analysis not performed for the XDR subset due to the small number of isolates.

Liu L et al. Infection and Drug Resistance 2018:11 637–646

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Thank You