AMERICAN UNIVERSITY OF BEIRUT

FACULTY OF MEDICINE

EXPERIENCE AND PERSPECTIVES FROM IMPLEMENTING AN ANTIMICROBIAL STEWARDSHIP PROGRAM

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I declare no conflit of interest in relation to this presentation

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OBJECTIVES

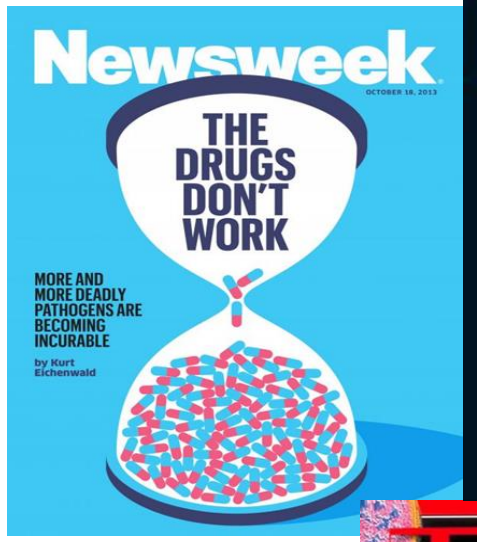
1- ANTIMICROBIAL RESISTANCE- GLOBAL IMPACT
2- AMR – SETTING THE STAGE
3- ANTIMICROBIAL STEWARDSHIP
4- EXPERIENCE AT THE AUBMC
- ASP AT AUBMC
- SUCCESSFUL INTERVENTIONS
- DATA AND OUTCOMES

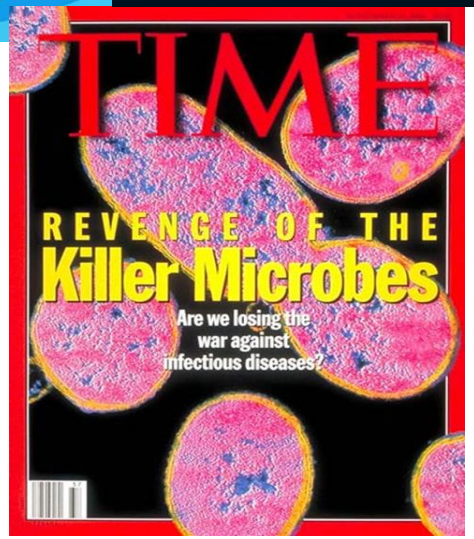
5- COVID-19 at AUBMC
6- CONCLUDING REMARKS

AMR is rising to dangerously high levels in **all parts of the world** and is recognized as a major threat to public health, economy, and security.

Changing world and **climate** disruptions.

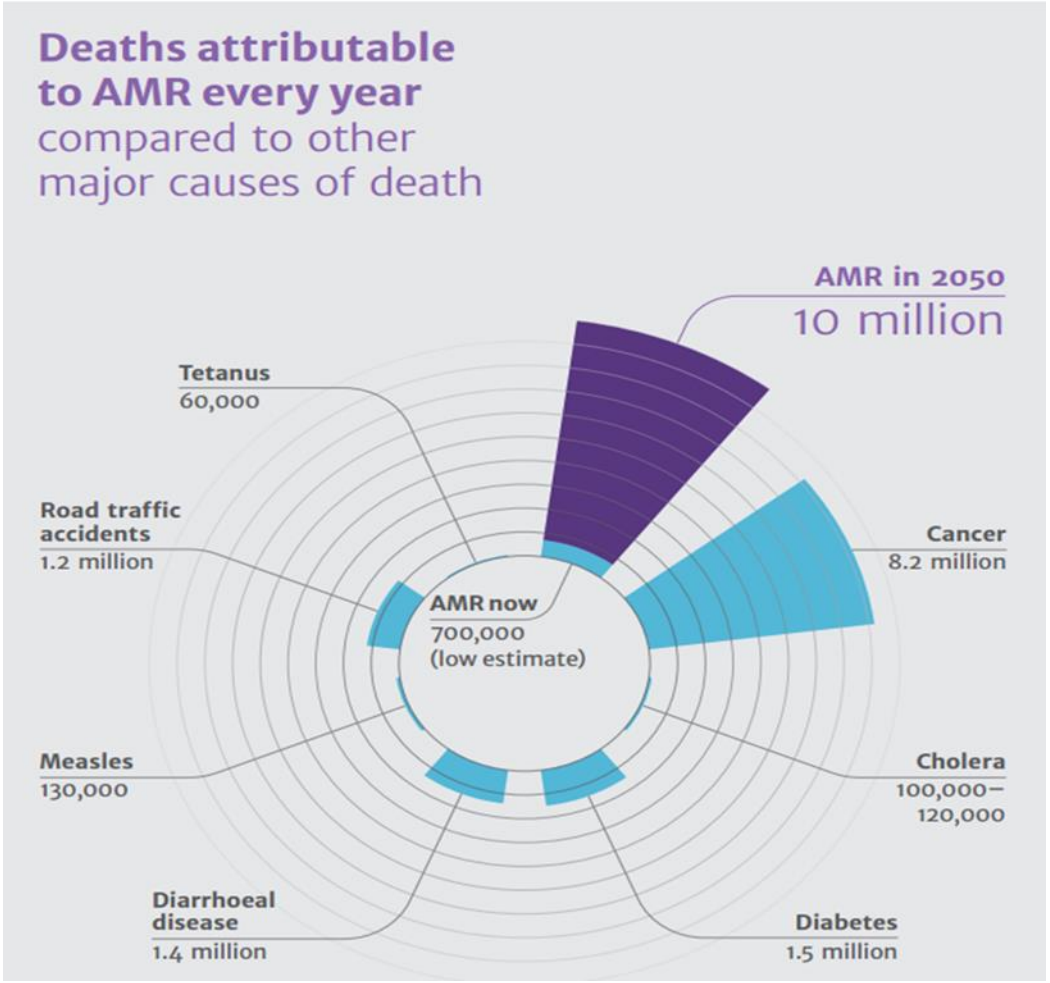
New resistance mechanisms are emerging and spreading, threatening our **ability to treat common infectious diseases**.
– such as **pneumonia, tuberculosis, Gonorrhea, and foodborne illnesses.**





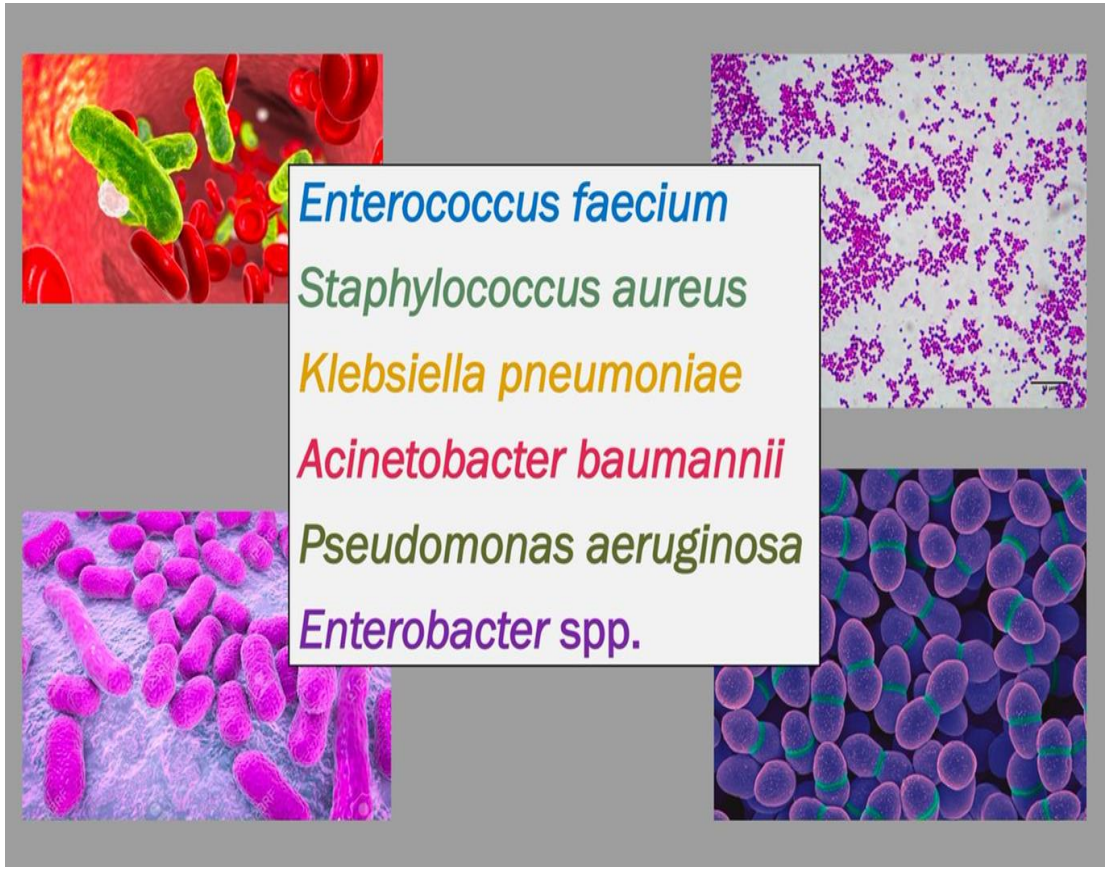
THE MAGNITUDE OF THE THREAT

It is estimated that a continued rise in AMR would lead to 10 million deaths yearly across the globe by 2050.



THE MAGNITUDE OF THE THREAT

During the last decade, there was a **dramatic rise in AMR**, especially among **Gram-negative bacteria**.
Of particular interest is the emergence of multiple resistant strains including **the ESKAPE organisms.**
The ESKAPE pathogens are the leading cause of **nosocomial infections** throughout the world.



Ho, J.; Tambyah, P.A.; Paterson, D.L. Curr. Opin. Infect. Dis. 2010, 23, 546–553.
Falagas, M.E. et al. Int. J. Antimicrob. Agents 2008, 32, 450–454.
Santajit, S.; Indrawattana, N. BioMed Res. Int. 2016, 2016, 2475067.

THE PIPELINE IS DRY

THE REGIONAL CONTEXT

We are faced with **high rates of antimicrobial resistant organisms** in the Middle East.

Hotspot *for infections diseases due to cultural and religious and economic factors.*

Some countries have **economic stability and wealth**

- Travel
- Tourism

Oher countries suffer from **political instability and conflicts**

- Weaken their health infrastructures
- Displaced millions of people
- Victims of violence and wars

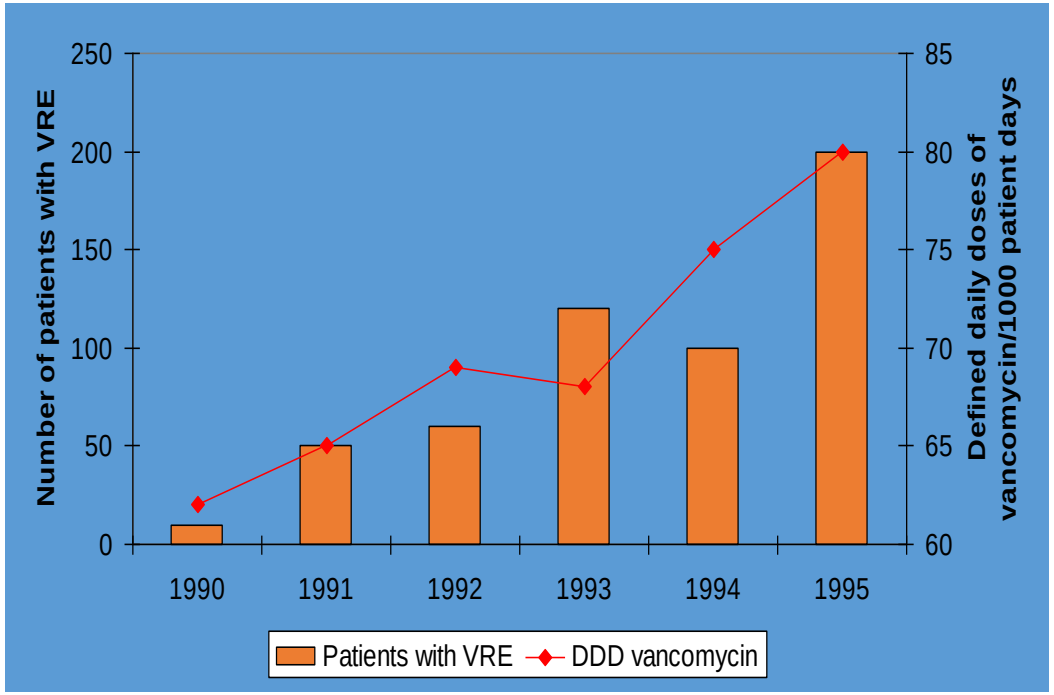
CONSEQUENCES OF AMR

- High morbidity and mortality
- Significant direct and indirect costs
- Prolonged hospitalizations
  - due to antibiotic treatment failures
- Increasing incidence of *C. difficile*
- Toxicity

Schwaber MJ, Carmeli Y. Crit Care. 2009;13(1):106. Epub 2009 Jan 12
Giske CG, Monnet DL, Cars O, Carmeli Y. Antimicrob Agents Chemother. 2008 Mar;52(3):813-21. Epub 2007 Dec 10.

ANTIBIOTIC EXPOSURE LEADS TO RESISTANCE

- **Exposure to antibiotics** increases the risk of colonization or infection with a resistant organism.
- **Increased Risk**
  - **ESBL producing organisms** and Cephalosporins
  - **Carbapenem Resistant Enterobacterales** and Carbapenems



Increasing use of antibiotics increases the prevalence of resistant bacteria in hospitals.

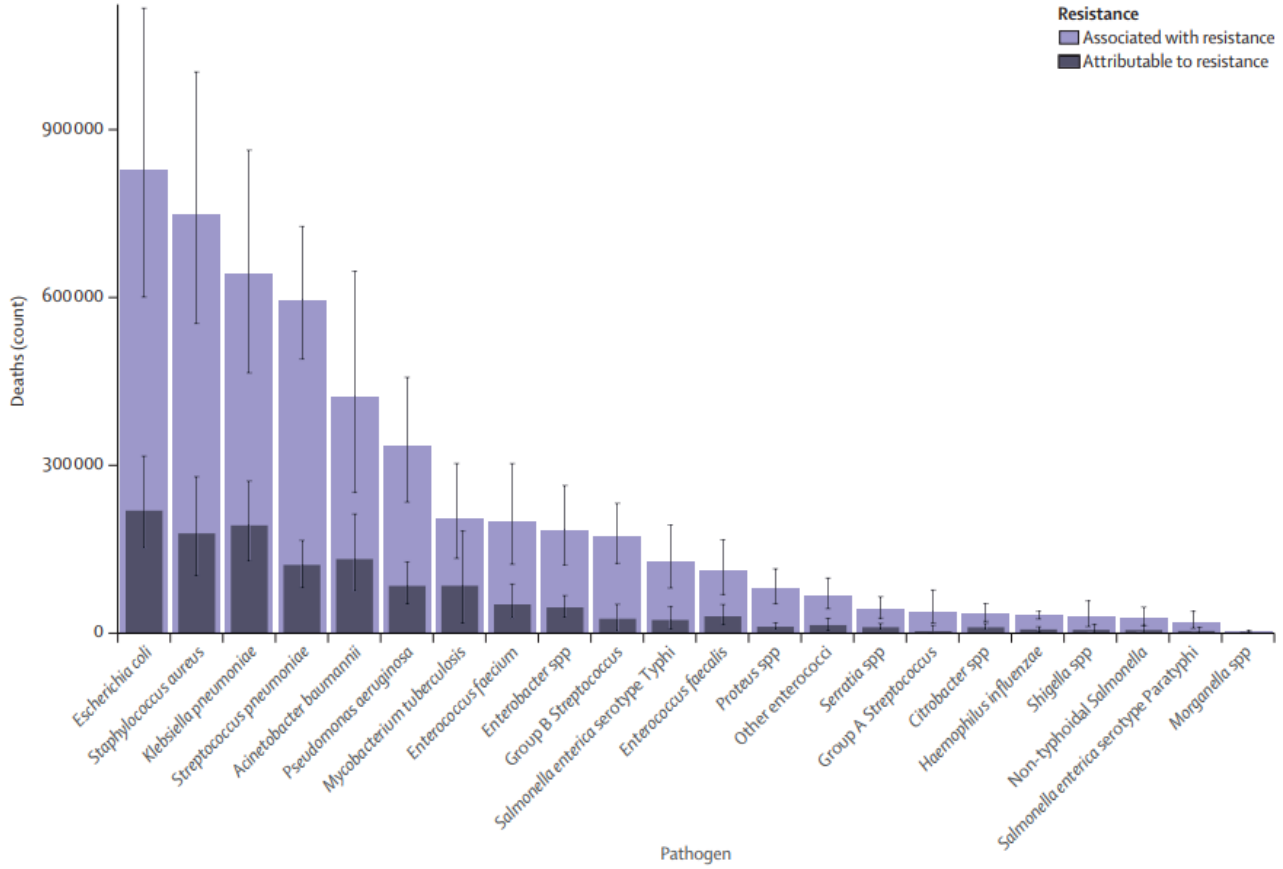
Patel G et al. *Infect Control Hosp Epidemiol* 2008;29:1099-1106
Zaoutis TE et al. *Pediatrics* 2005;114:942-9
Talon D et al. *Clin Microbiol Infect* 2000;6:376-84

JID 1999;179:163

ANTIBIOTIC RESISTANCE INCREASES MORTALITY

In 2019, approximately 5 millions deaths were associated with AMR, of which 1.27 million deaths were attributable to AMR.

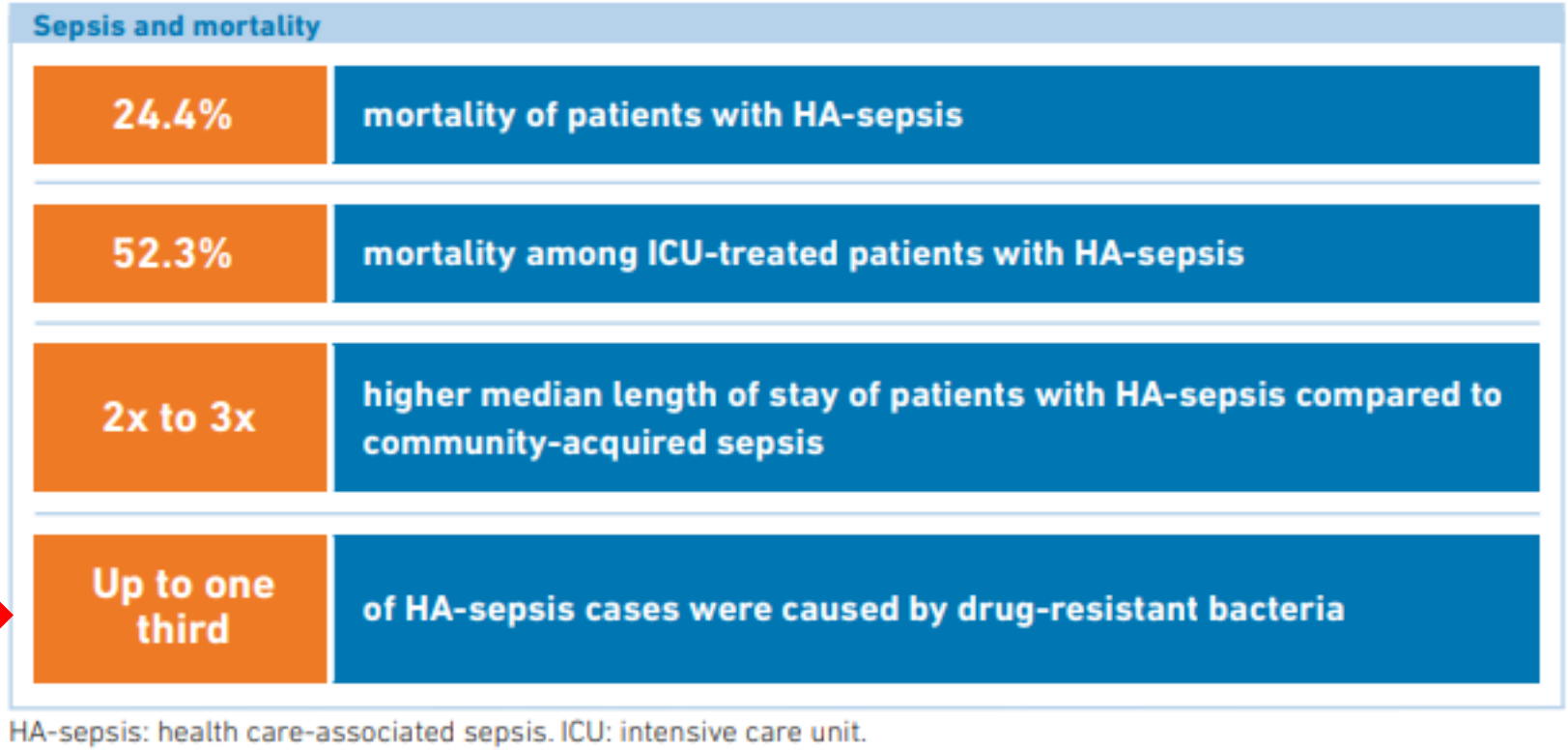
The six leading pathogens for deaths associated with resistance were **Escherichia coli**, **Staphylococcus aureus**, **Klebsiella pneumoniae**, **Streptococcus pneumoniae**, **Acinetobacter baumannii**, and **Pseudomonas aeruginosa**



Global deaths attributable to and associated with bacterial AMR in 2019 by pathogen

Murray, C. L. J. *et al. Lancet* https://doi.org/10.1016/S0140-6736(21)02724-0 (2022).

MORTALITY FROM SEPSIS/nosocomial

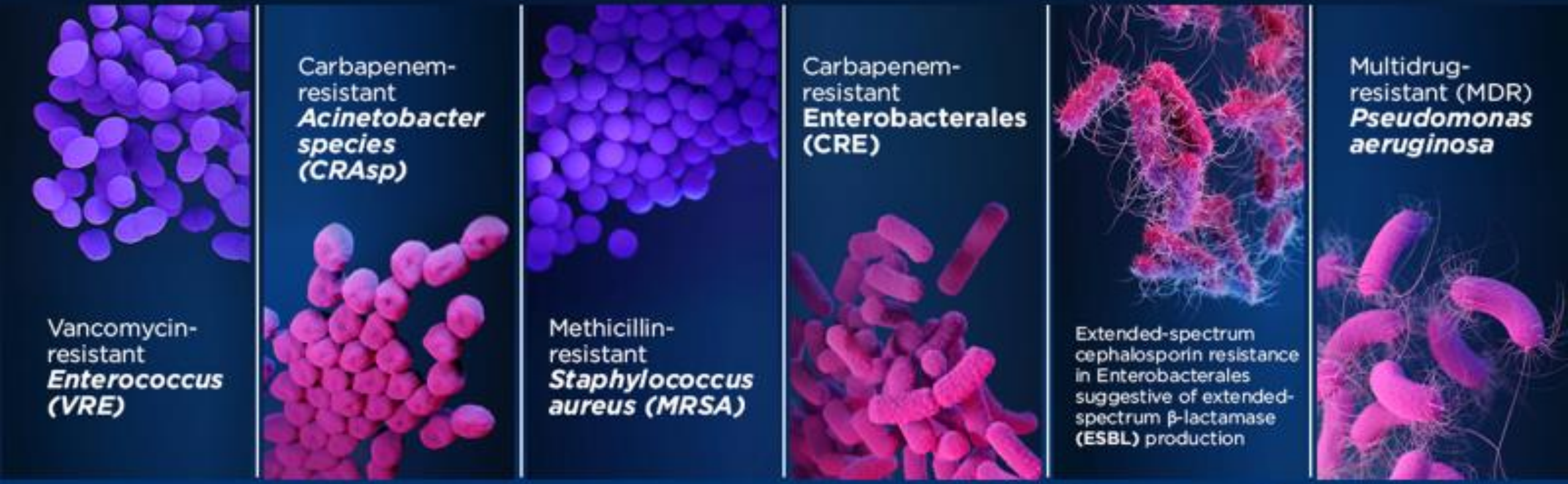


HA-sepsis: health care-associated sepsis. ICU: intensive care unit.

A systematic review published in 2020, which included an analysis of 51 countries (with 21 categorized as low- to middle-income) highlighted the burden of hospital acquired sepsis, particularly in the intensive care unit.

Markwart, R., Saito, H., Harder, T. *et al.* Epidemiology and burden of sepsis acquired in hospitals and intensive care units: a systematic review and meta-analysis. *Intensive Care Med* **46**, 1536–1551 (2020).
Global report on the epidemiology and burden of sepsis: current evidence, identifying gaps and future directions. Geneva: World Health Organization; 2020. Licence: CC BY-NC-SA 3.0 IGO

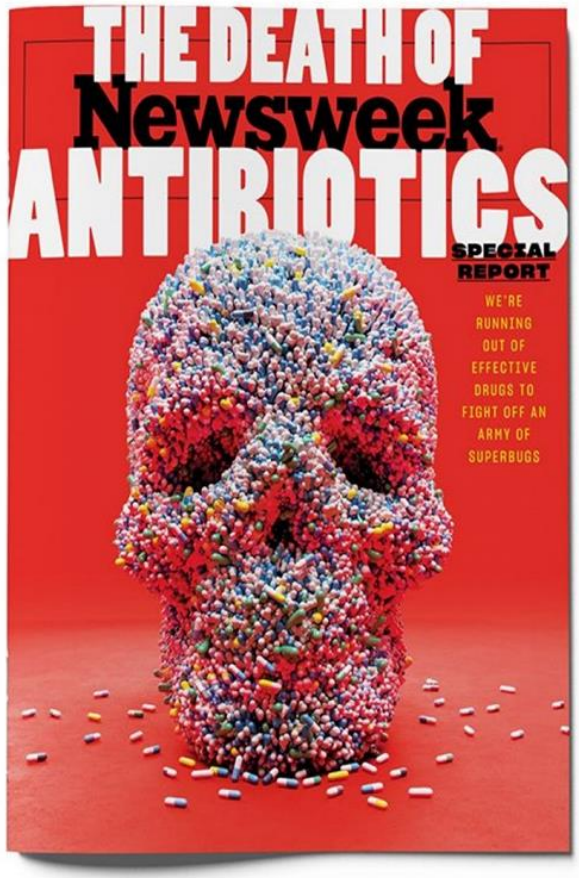
6 of the 18 most alarming **antibiotic resistance threats** cost the U.S. more than **$4.6 billion annually**



www.cdc.gov/DrugResistance

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

DEVELOPING A FRAMEWORK TO TACKLE AMR



THE NEED FOR A REASONABLE AND PRACTICAL APPROACH ANTIMICROBIAL STEWARDSHIP

ANTIMICROBIAL STEWARDSHIP PROGRAM (ASP)

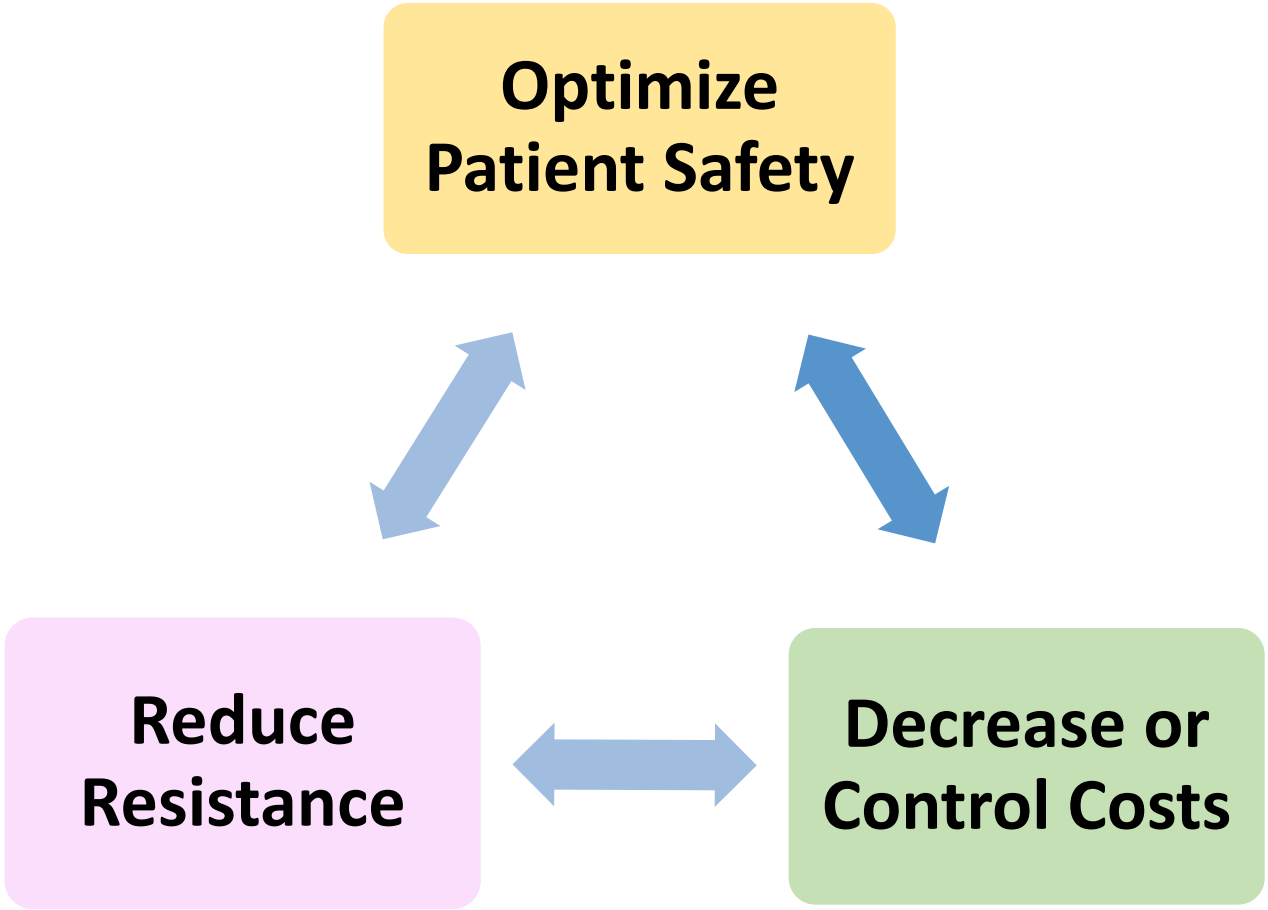
What is it?

- A comprehensive system of health-care **providers**, **pathways**, **guidelines**, **order sets**, and **informatics** designed to **optimize** antimicrobial utilization

Mission

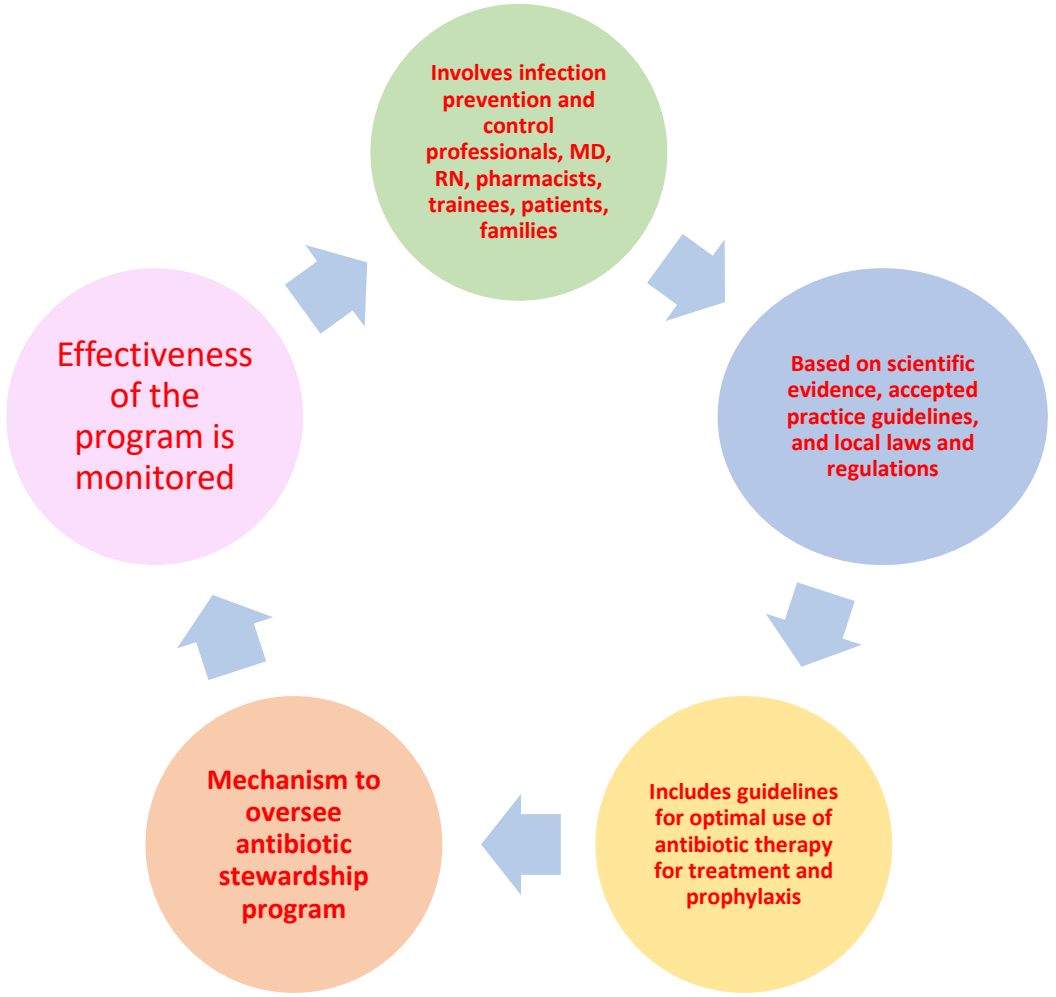
- To **improve patient outcomes** through **optimization** of antimicrobial therapy and support the education of health-care providers in appropriate antimicrobial use

ANTIMICROBIAL STEWARDSHIP



SHEA/IDSA Guidelines, *CID* Volume 62, Issue 10, 15 May 2016

ANTIMICROBIAL STEWARDSHIP



ASHP 2016, Pharmacist Guide to Antimicrobial Stewardship

ANTIMICROBIAL STEWARDSHIP
HOW?

Antimicrobial stewardship promotes the use of the:

- **Right antibiotic**
- **Right dose**
- **Right route**
- **Right duration**
- **Right time**

SMART APPROACH TO ANTIBIOTIC USE

START SMART

- Do not start antibiotics unless there is clear evidence of infection.
- Take a thorough allergy history.
- Obtain cultures before antibiotics.
- Initiate antibiotics within 1 hour of diagnosis in patients with severe-sepsis or life threatening infection.
- Comply with local antibiotic guidelines.
- Document clinical indication on the prescription and in clinical notes.
- Include a review date or duration of therapy.

At 48 – 72 hours, review the clinical diagnosis & continued need for antibiotics.
Document a clear plan of action, either:

THEN FOCUS

- Stop antibiotics if there is no evidence of infection.
- Switch antibiotics from intravenous to oral.
- Change antibiotics, ideally to a narrower spectrum (or broader if required) according the microbiology results if applicable.
- Referral for outpatient parenteral antibiotic therapy (OPAT).
- Continue and document next review or stop date.

ASP AT THE AUBMC

ASP at AUBMC

LAUNCHING OF THE ANTIMICROBIAL STEWARDSHIP PROGRAM

- Efforts started in 2007
- Official launch of the program : June 2018
- ASP team works under the umbrella of the **ANTIMICROBIAL STEWARDSHIP COMMITTEE**
- Multidisciplinary team approach
  - Collaboration with infection control, infectious diseases adult and pediatric divisions, pharmacy, microbiology laboratory, quality, and various medical/surgical departments

SUMMARY OF ASP ACTIVITIES

- Operates at AUBMC, all nursing units
- Provides support 24/24 hours, 7/7 days
- Reports to the Chief of Staff

ANTIMICROBIAL STEWARDSHIP PROGRAM AT AUBMC

Infection Control

Microbiology Lab

Medical Doctors

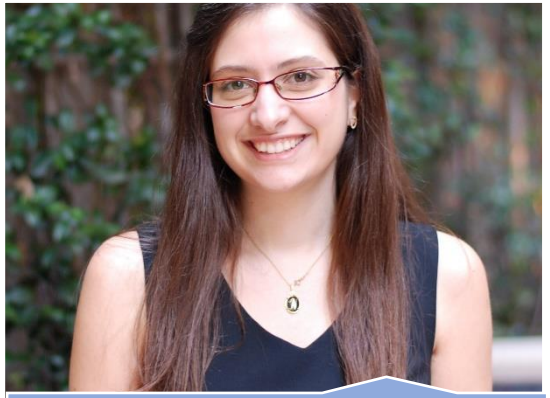
Director of ASP

Co-Director of ASP

Pharmacy and Nursing

Quality

IT/DATA



Pharmacist

Pediatric ASP

PROCESS MEASURES OF THE ASP

Prospective Process Measures

Appropriateness of antibiotic drug regimen
Appropriate duration of therapy
Appropriate antibiotic drug choice post 48-72h of therapy initiation

Retrospective Process Measures

- **Defined Daily Dose (DDD) for antimicrobials**
- **Duration of Therapy (DOT) for carbapenems**
- Restricted antimicrobial usage rate in percentage
- Rate of adherence to guidelines, care bundles, policies
- Appropriateness of time of initiation of pre-operative antibiotic
- Impact Assessment (C diff rates, MDROs…)
- Antibiotic cost per patient-day

KEY ELEMENTS OF AMS

HANDSHAKE STEWARDSHIP

- New, specific ASP model
- Involves prospective review of **antimicrobial** ordering
- Includes a compressed "second look" of relevant clinical and historical patient data
- Utilization of the EMR
- **In-person recommendations are then provided directly to the medical team.**

KEY ELEMENTS OF AMS

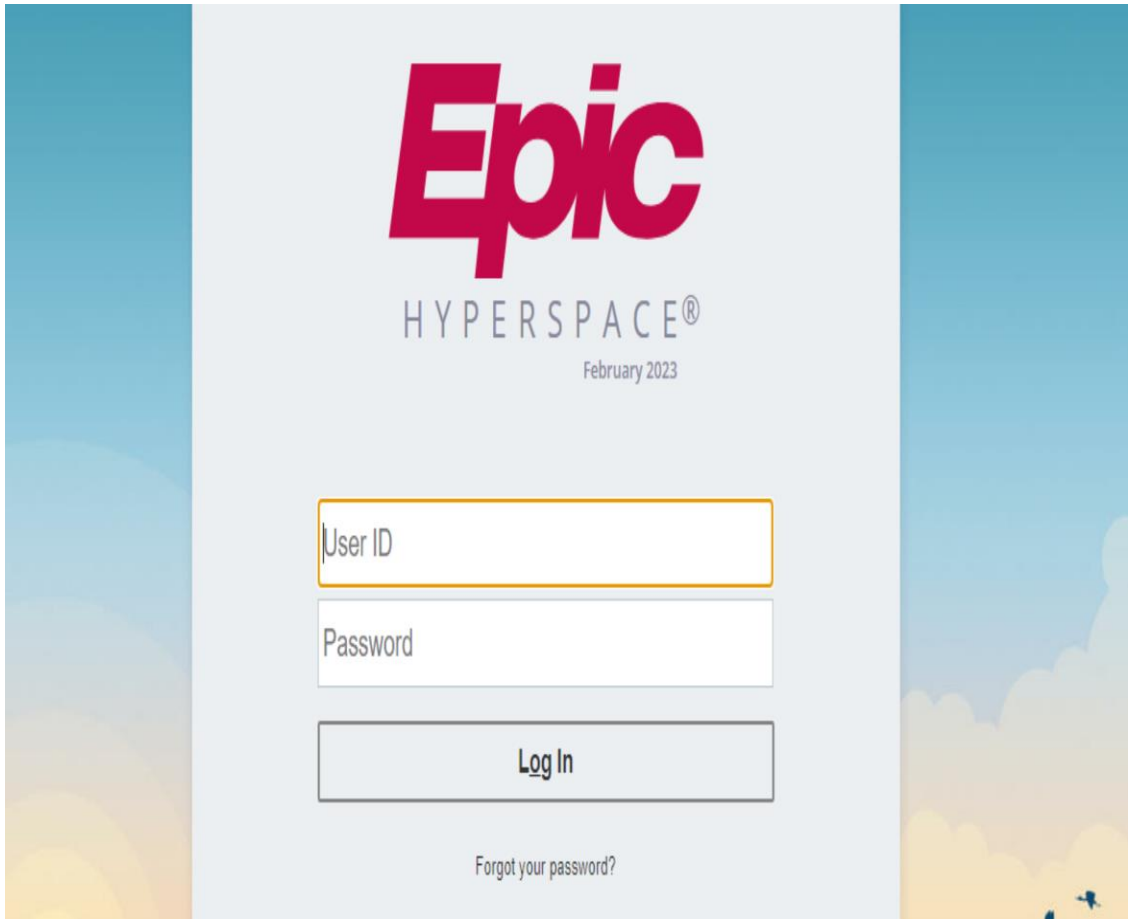
Prospective Audit and Feedback

Re-evaluation of the choice of antibiotics based on diagnostic results

Contact the provider with alternative recommendations if antimicrobial use is **unjustified** based on predetermined criteria.

Onorato L et al. Clin Microbiol Infect. 2019 Oct 31. pii: S1198-743X(19)30557-9.
Cosgrove, S et al. Infection Control & Hospital Epidemiology, 33(4), 374-380.

KEY ELEMENTS OF AMS



ELECTRONIC MEDICAL RECORD

- Antibiotic Time-Outs
- require less direct ASP involvement
- Clinical Pathways and Clinical Decision Support
- Integrated in the EMR to offer alternative antibiotics
- Alerts for inappropriate use based on microbiological data
- **Alerts for toxicities**
- **DDIs**

TYPICAL ANTIMICROBIAL STEWARDSHIP INTERVENTIONS

Directly Related to Antimicrobial Stewardship

- ***IV to PO Switch***
- **Therapy De-escalation:** empiric to targeted therapy, or discontinuation if cultures negative
- **Duration of Therapy:** completed targeted or empiric therapy (specific to indication)
- **ID Consult/Follow-up** Recommended: patient on an antimicrobial and needs consult/follow-up
- **Drug-Bug Mismatch**: Antibiotic resistant to culture, or susceptible in vitro but not for specific indication
- **Duplicate Coverage**: Unnecessary duplicate coverage of antimicrobials

Indirectly Related to Antimicrobial Stewardship

- **Dose change:** under-dosing (for specific indication, obese patients, site of infection), overdosing (renal/liver dose adjustment), includes antibiotics that need dose change/extended infusion use to target specific organism.
- **Frequency change:** Same as for dose change.
- **Therapeutic Monitoring:** Applies to aminoglycosides and vancomycin in specific, monitoring of levels, serum creatinine, and other laboratory parameters as applicable

ADDITIONAL STRATEGIES

ASP Rounds/Educational Sessions

- Therapeutic monitoring of antibiotics → Audience: medical residents (core curriculum), pharmacists, ID fellows
- Introduction to antimicrobial stewardship → Audience: ID fellows
- Updates in antimicrobial stewardship → Audience: ID division, pharmacists

Order Sets

- Febrile Neutropenia
- Perioperative antibiotics
- Continuous/extended infusion of beta-lactams in the critical care areas
- Antibiotic lock therapy

OPTIMIZING ANTIBIOTIC USAGE

- Carbapenem sparing strategies
- Extended Infusion of beta lactams
- Antibiotic Lock Therapy Order Set
- Febrile Neutropenia Order Set
- Peri-operative order sets including intra-operative re-dosing of antibiotics
- COVID-19 protocols and order sets

Campion M, Scully G.J Intensive Care Med. 2018 Dec;33(12):647-655.

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KEY ELEMENTS OF AMS
ROLE OF INFECTION CONTROL

-Hand hygiene
-PPE
-Limited visitation

Local epidemiologic data

Point prevalence testing

Surveillance testing

Outbreak investigations

De Waele JJ. Antimicrobial resistance and antibiotic stewardship programs in the ICU: insistence and persistence in the fight against resistance. A position statement from ESICM/ESCMID/WAAAR round table on multi-drug resistance. Intensive Care Med. 2018 Feb;44(2):189-196.

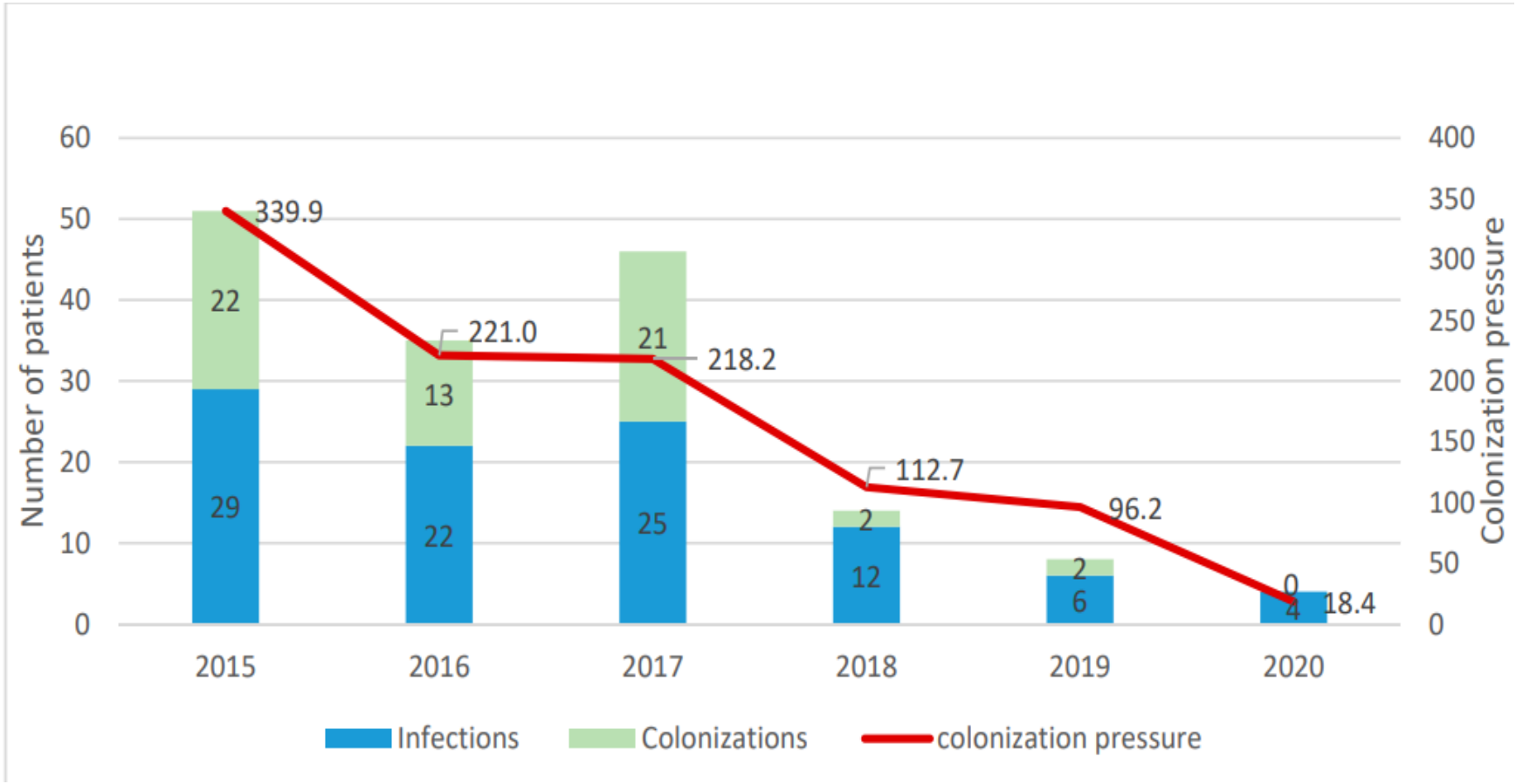
ANTIMICROBIAL STEWARDSHIP INTERVENTION AT AUBMC

The Impact of Antimicrobial Stewardship and Infection Control Interventions on *Acinetobacter baumannii* Resistance Rates in the ICU of a Tertiary Care Center in Lebanon

Nesrine A. Rizk [1], Nada Zahreddine [2,†], Nisrine Haddad [3,†], Rihab Ahmadieh [2], Audra Hannun [3], Souad Bou Harb [1], Sara F. Haddad [1], Rony M. Zeenny [3] and Souha S. Kanj [1,*]

Due to the emergence of carbapenem resistance, namely among *Acinetobacter baumannii*, the ASP team introduced, in April 2019, an initiative for carbapenem sparing with the aim of reducing carbapenem consumption and assessing the impact on resistance rates.

ASP and ICP combined intervention at AUBMC



CRAb Colonization Pressure in ICU over 7-year Period by Year

OPTIMIZING ANTIBIOTIC USAGE

- Carbapenem sparing strategies
- Extended Infusion of beta lactams
- Antibiotic Lock Therapy Order Set
- Febrile Neutropenia Order Set
- Peri-operative order sets including intra-operative re-dosing of antibiotics
- COVID-19 protocols and order sets

Campion M, Scully G.J Intensive Care Med. 2018 Dec;33(12):647-655.

Extended Infusion Order Set in the ICU

AUBMC
AMERICAN UNIVERSITY of BEIRUT MEDICAL CENTER

Identification label

Extended Infusions of Antibiotics for Adults in Critical Care Units

Last Name: _____ Unit: _____
First and Middle Name: _____ Weight: _____ Height: _____
Patient Number: _____ Expanded Precautions: ☐ None ☐ Airborne
Date of Birth: _____ Age: _____ ☐ Droplet ☐ Contact ☐ Contact Plus
Gender: ☐ Male ☐ Female Other Precautions: _____
Admission Date: _____ Allergy ☐ No ☐ Yes (specify reaction):
Admitting Physician: _____

The following abbreviations may not be used to document patient care: U IU QD QOD .X mg X.0 mg MS MSO_4 $MgSO_4$ CC µg mcg

☑ Check the Applicable Order

	Nurse's Name and Signature	Time Noted
☒ Consult Infectious Diseases		

Kindly pick the desired antibiotic and dose based on the patient's creatinine clearance (CrCl).

☐ **Cefepime – Continuous Infusion**
- ☐ Loading dose (LD):
  - ☐ Omit LD of Cefepime if a dose was given within the past 8 hours
  - ☐ CrCl greater than or equal to 10 mL/min: 15 mg/kg IV in 50mL D5W (if total dose ≤1g) or 100mL D5W (if total dose >1g) bolus ___ over 30 min
- ☐ Maintenance dose: Begin immediately after LD
  - ☐ CrCl greater than or equal to 60 mL/min: 2 gm IV in 100mL D5W over 8 hours every 8 hours
  - ☐ CrCl between 30 and 59 mL/min: 2 gm IV in 100mL D5W over 12 hours every 12 hours
  - ☐ CrCl between 10 and 29 mL/min: 2 gm IV in 100mL D5W over 24 hours every 24 hours
  - ☐ CrCl less than 10 mL/min or on dialysis (**HD, PD, or CVVHD**): Do not use this order sheet and use adjusted dose for intermittent infusion

☐ **Ceftazidime – Continuous Infusion**
- ☐ Loading dose (LD):
  - ☐ Omit LD of Ceftazidime if a dose was given within the past 8 hours
  - ☐ CrCl greater than or equal to 10 mL/min: 15 mg/kg IV in 50mL D5W (if total dose ≤1g) or 100mL D5W (if total dose >1g) bolus ___ over 30 min
- ☐ Maintenance dose: Begin immediately after LD
  - ☐ CrCl greater than or equal to 50 mL/min: 2 gm IV in 100mL D5W over 8 hours every 8 hours
  - ☐ CrCl between 30 and 49 mL/min: 2 gm IV in 100mL D5W over 12 hours every 12 hours
  - ☐ CrCl between 10 and 29 mL/min: 2 gm IV in 100mL D5W over 24 hours every 24 hours
  - ☐ CrCl less than 10 mL/min or on dialysis (**HD, PD, or CVVHD**): Do not use this order sheet and use adjusted dose for intermittent infusion

☐ **Piperacillin/Tazobactam – Extended Infusion**
- ☐ Loading dose (LD):
  - ☐ Omit LD of Piperacillin/Tazobactam if a dose was given within the past 6 hours
  - ☐ Any CrCl level, **on HD, or on PD:** 4.5 gm IV in 50mL NSS over 30 min
- ☐ Maintenance dose:
  - ☐ CrCl greater than or equal to 40 mL/min: Start maintenance dose 4 hours after LD. Give 4.5 gm in 50mL NSS over 4 hours every 6 hours
  - ☐ CrCl between 20 and 39 mL/min: Start maintenance dose 4 hours after LD. Give 3.375 gm in 50mL NSS over 4 hours every 6 hours
  - ☐ CrCl less than 20 mL/min: Start maintenance dose 8 hours after LD. Give 3.375 gm in 50mL NSS over 4 hours every 12 hours
  - ☐ **On HD or PD:** Start maintenance dose 8 hours after LD. Give 3.375 gm in 50mL NSS over 4 hours every 12 hours. Dose after dialysis.
  - ☐ **On CVVHD:** Specific dosing regimen tailored to patient's condition

☐ **Meropenem – Extended Infusion**
- ☐ Loading dose (LD):
  - ☐ Omit LD of Meropenem if a dose was given within the past 8 hours
  - ☐ Any CrCl level, **on HD, or on CVVHD:** 1 gm IV in 100mL NSS over 30 min
- ☐ Maintenance dose:
  - ☐ CrCl greater than or equal to 50 mL/min with Meningitis or Cystic Fibrosis: Start maintenance dose 8 hours after LD. Give 2 gm IV in 100mL NSS over 4 hours every 8 hours
  - ☐ CrCl greater than or equal to 50 mL/min: Start maintenance dose 8 hours after LD. Give 1 gm IV in 100mL NSS over 4 hours every 8 hours
  - ☐ CrCl between 30 and 49 mL/min: Start maintenance dose 8 hours after LD. Give 1 gm IV in 100mL NSS over 4 hours every 8 hours
  - ☐ CrCl between 10 and 29 mL/min: Start maintenance dose 12 hours after LD. Give 1 gm IV in 100mL NSS over 4 hours every 12 hours
  - ☐ CrCl less than10 mL/min **or on HD:** Start maintenance dose 24 hours after LD. Give 500 mg in 50mL NSS IV over 4 hours every 24 hours. Dose after dialysis
  - ☐ **On CVVHD:** Start maintenance dose 8 hours after LD. Give 1 gm IV in 100mL NSS over 4 hours every 8 hours

Administration Instructions
☒ Contact the pharmacist to help resolve medication scheduling and compatibility issues.

Extended infusion of beta-lactam antibiotics: optimizing therapy in critically-ill patients in the era of antimicrobial resistance

Nesrine A. Rizk*, Zeina A. Kanafani*, Hussam Z. Tabaja and Souha S. Kanj

Division of Infectious Diseases, Department of Internal Medicine, American University of Beirut Medical Center, Beirut, Lebanon

Prolonged infusion is an alternative dosing approach that promises to provide higher fT > MIC necessary for the bactericidal effect of beta-lactam agents.
EI/CI is favored in the ICU where the PK/PD of antibiotics are altered and the MICs against isolated pathogens are higher.

ACTIVELY REDUCE ANTIBIOTIC TREATMENT

SHORT-COURSE THERAPY FOR COMMON INFECTIONS

SHORTER IS BETTER
LESS IS MORE

Shorter Is Better

Diagnosis	Short (d)	Long (d)	Result	#RCT
CAP	3-5	5-14	Equal	14
Atypical CAP	1	3	Equal	1
Possible PNA in ICU	3	14-21	Equal	1*
VAP	8	15	Equal	2
cUTI/Pyelonephritis	5 or 7	10 or 14	Equal	9**
Intra-abd Infection	4	10	Equal	2
Complex Appendicitis	1-2	5-6	Equal	2
GNB Bacteremia	7	14	Equal	3†
Cellulitis/Wound/Abscess	5-6	10	Equal	4‡
Osteomyelitis	42	84	Equal	2
Osteo Removed Implant	28	42	Equal	1
Debrided Diabetic Osteo	10-21	42-90	Equal	2Φ
Septic Arthritis	14	28	Equal	1
Bacterial Meningitis (peds)	5	10	Equal	1
AECB & Sinusitis	≤5	≥7	Equal	>25
Variceal Bleeding	3	7	Equal	1
Neutropenic Fever	AFx72h/3 d	+ANC>500/9 d	Equal	2
Post Op Prophylaxis	0-1	1-5	Equal	55Ψ
Erythema Migrans (Lyme)	7	14	Equal	1
P. vivax Malaria	7	14	Equal	1

Total: 19 Conditions >125 RCTs

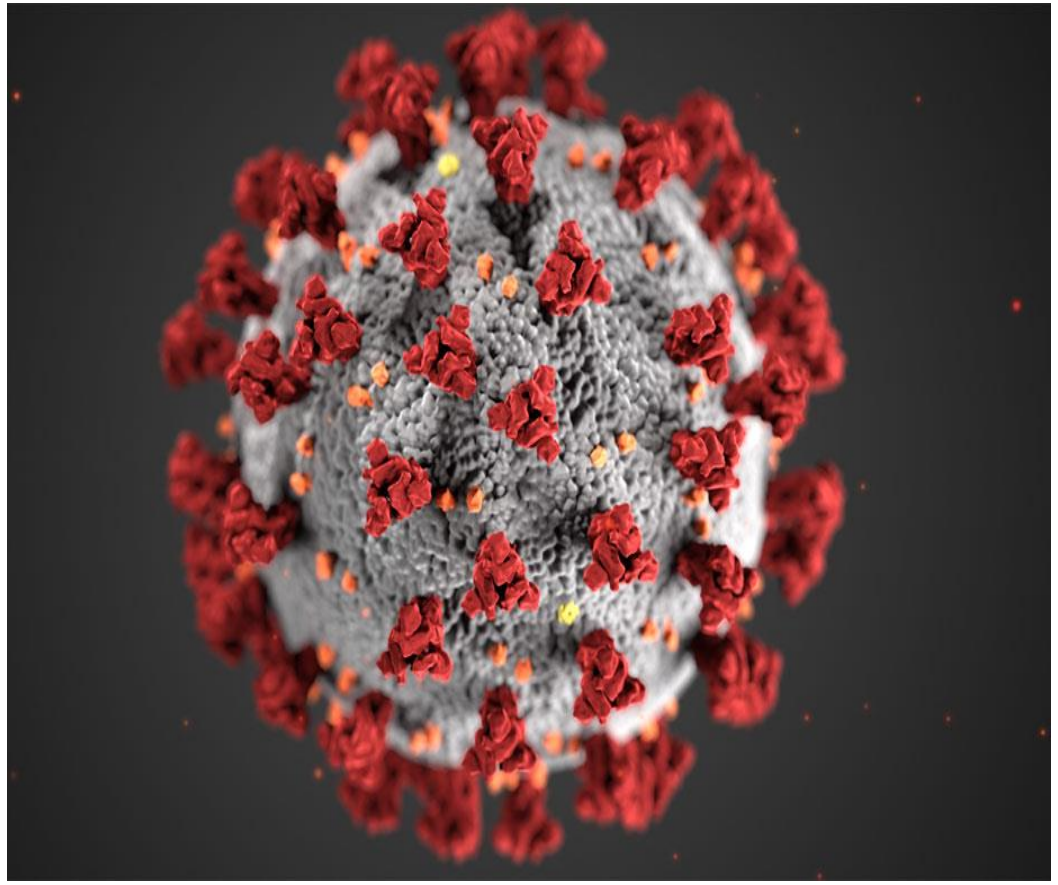
*Infiltrate on CXR but low CPIS score (≤6), both ventilated and non ventilated, likely CAP, HAP, and VAP combined; **2 RCT included males, the smaller one found lower 10-18 d f/up cure in males with 7 days of therapy but no difference at longer follow-up, larger exclusive male study found no diff in cure; †GNB bacteremia also in UTI/cIAI RCTs; ‡3 RCTs equal, 1 (low dose oral flucox) ↑relapses 2° endpoint; Φall patients debrided, in 1 study total bone resection (clean margins); ΨIncludes meta-analysis of 52 RCTs; refs at https://www.bradspellberg.com/shorter-is-better

ANTIMICROBIAL STEWARDSHIP STRATEGIES

COMPONENT	IDSA/ SHEA Guideline Strength of Evidence	Implemented at AUBMC
Formulary restriction with audit and feedback	AI	✓
Education	AIII, BII	✓
Guidelines, pathways	AI, AIII	✓
Antimicrobial cycling	CII	No
Antimicrobial order form	BII	✓
Combination therapy	CII	Not routine
De-escalation	AII	✓
Dose optimization	AII	✓
IV to PO Conversion	AII	✓

Dellitt TH et al. *Clin Infect Dis* 2007;44:159-77.

COVID-19 CREATED A PERFECT STORM FOR RESISTANT INFECTIONS IN HEALTHCARE SETTINGS

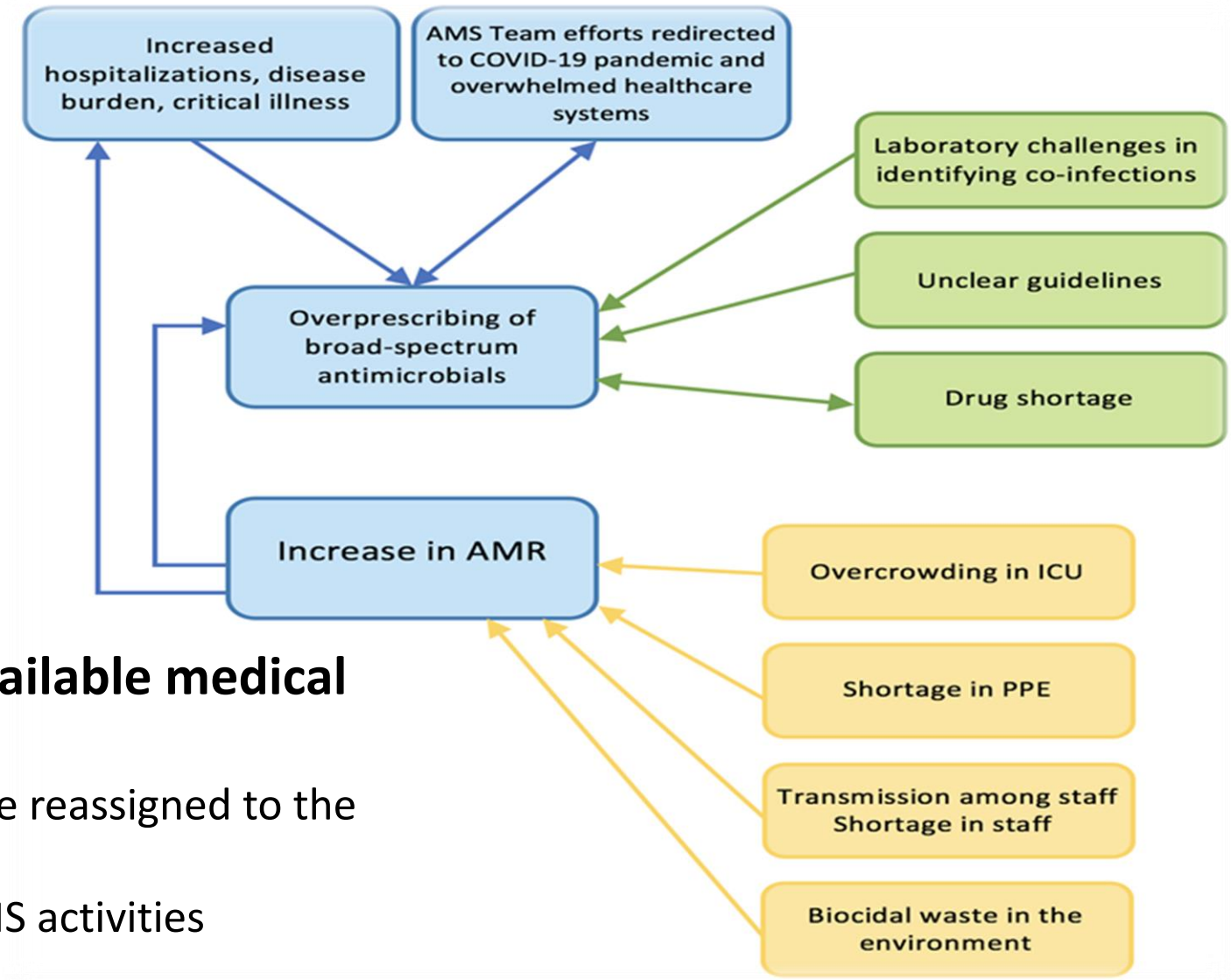


AMR POST COVID-19

THE COVID-19 RESULTED IN AN UNPRECEDENTED SURGE IN HOSPITAL ADMISSIONS OVERWHELMING HEALTHCARE SYSTEMS ACROSS THE WORLD ESPECIALLY AMONG CRITICALLY ILL

Ansari, S., et al.JAC-Antimicrobial Resistance, 2021. 3(2).
Schouten, J., et al. Int J Antimicrob Agents, 2021: p. 106409.
Langford, B.J., et al. Clin Microbiol Infect, 2021. 27(4): p. 520-531.

FACTORS CONTRIBUTING TO THE INCREASE IN AMR DURING THE COVID-19 PANDEMIC



- **Associated repurposing of all available medical resources to the response**
  - ID physicians and pharmacists were reassigned to the COVID frontline
  - indirectly leading to decreased AMS activities

AMR, antimicrobial-resistant; AMS, antimicrobial stewardship; ICU, intensive care unit; PPE, personal protective equipment

SEVERAL CHALLENGES

STAFFING ISSUES

- Our approach is based on a multidisciplinary approach
  - ID Pharmacist role
  - Shortage of clinical pharmacists
  - Nursing team support
  - EPIC team: reports and integrating order sets etc.

SEVERAL OBSTACLES

FINACIAL ISSUES

- Medication and antibiotic shortages
- Supplies/equipment
- Performance

WORLD POST COVID-19

- Rise in AMR worldwide and especially in LMICs
- Lingering pandemic, low vaccination rates
- Healthcare restructure ??

COVID-19: IMPACT ON ANTIMICROBIAL CONSUMPTION

ANTIMICROBIAL STEWARDSHIP INTERVENTION AT AUBMC

Evaluate the impact of Antimicrobial Stewardship Program (ASP) interventions on antibiotic consumption and trends of Antimicrobial Resistance (AMR) at a tertiary care center in Beirut before and after the COVID-19 pandemic.

ANTIMICROBIAL STEWARDSHIP INTERVENTION AT AUBMC

ASP team recommendations considered as interventions.

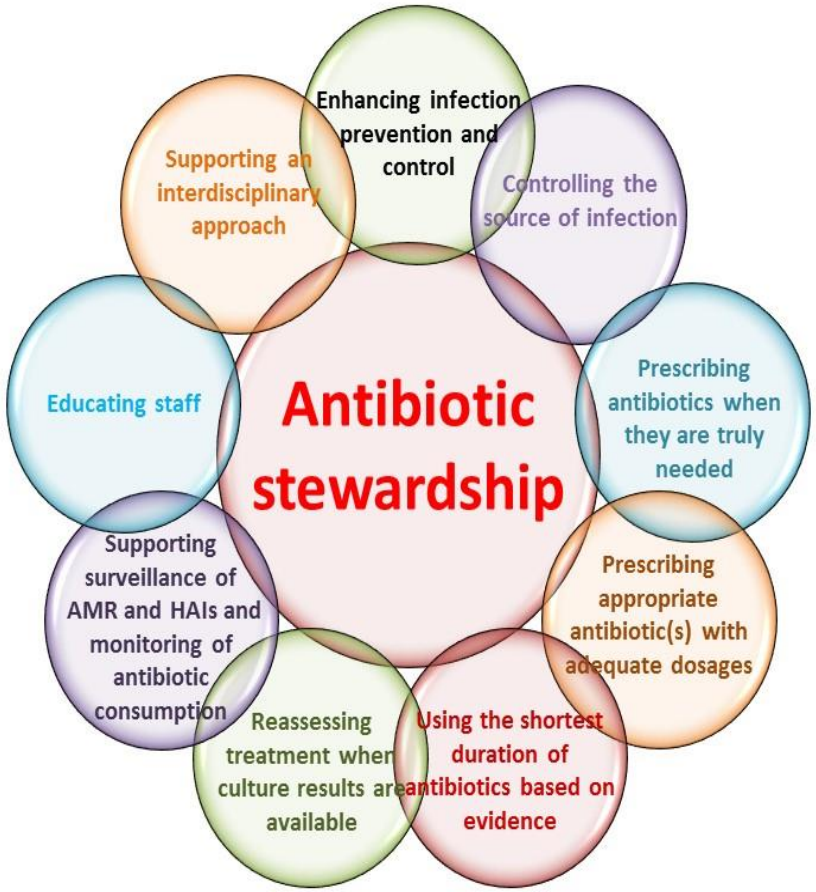
ASP interventions compiled from **January 2019 to December 2021.**

Collected data on antimicrobial consumption, measured as **defined daily dose (DDD)** per 100 patient days, for all anti-infectives and restricted anti-infectives quarterly.

Obtained data on **Multidrug-Resistant Organism (MDRO)** rated from the clinical microbiology laboratory from 2019 to 2022.

REASONS TO ENDORSE STEWARDSHIP

PROPER ANTIBIOTIC USE WITHIN STEWARDSHIP PROGRAMS CAN ENHANCE PATIENT OUTCOMES AND PLAY A ROLE IN FIGHTING INFECTIONS WHILE ALSO REDUCING THE DANGERS OF ANTIMICROBIAL RESISTANCE.



IMPLEMENTATION OF STEWARDSHIP

- IMPLEMENT ANTIMICROBIAL STEWARDSHIP MEASURES
- INCLUDE PATIENT EDUCATION
- PROVIDE TRAINING FOR HEALTHCARE PROFESSIONALS
- CONDUCT REGULAR AUDITS AND FEEDBACK OF PRESCRIPTION PRACTICES
- ENSURE AVAILABILITY OF EFFECTIVE ANTIBIOTICS FOR SEPSIS TREATMENT IN THE LONG-TERM
- MINIMIZE UNNECESSARY ANTIBIOTIC USE

Rush L, Patterson C, McDaid L, Hilton S. Communicating antimicrobial resistance and stewardship in the national press: Lessons from sepsis awareness campaigns. J Infect. 2019 Feb;78(2):88-94. doi: 10.1016/j.jinf.2018.09.001. Epub 2018 Sep 5. PMID: 30194956; PMCID: PMC6423462.


KEEP
CALM
AND DO
ANTIMICROBIAL
STEWARDSHIP

GRATEFUL SUPPORT

ID DIVISION

CHIEF

FELLOWS

HOUSESTAFF

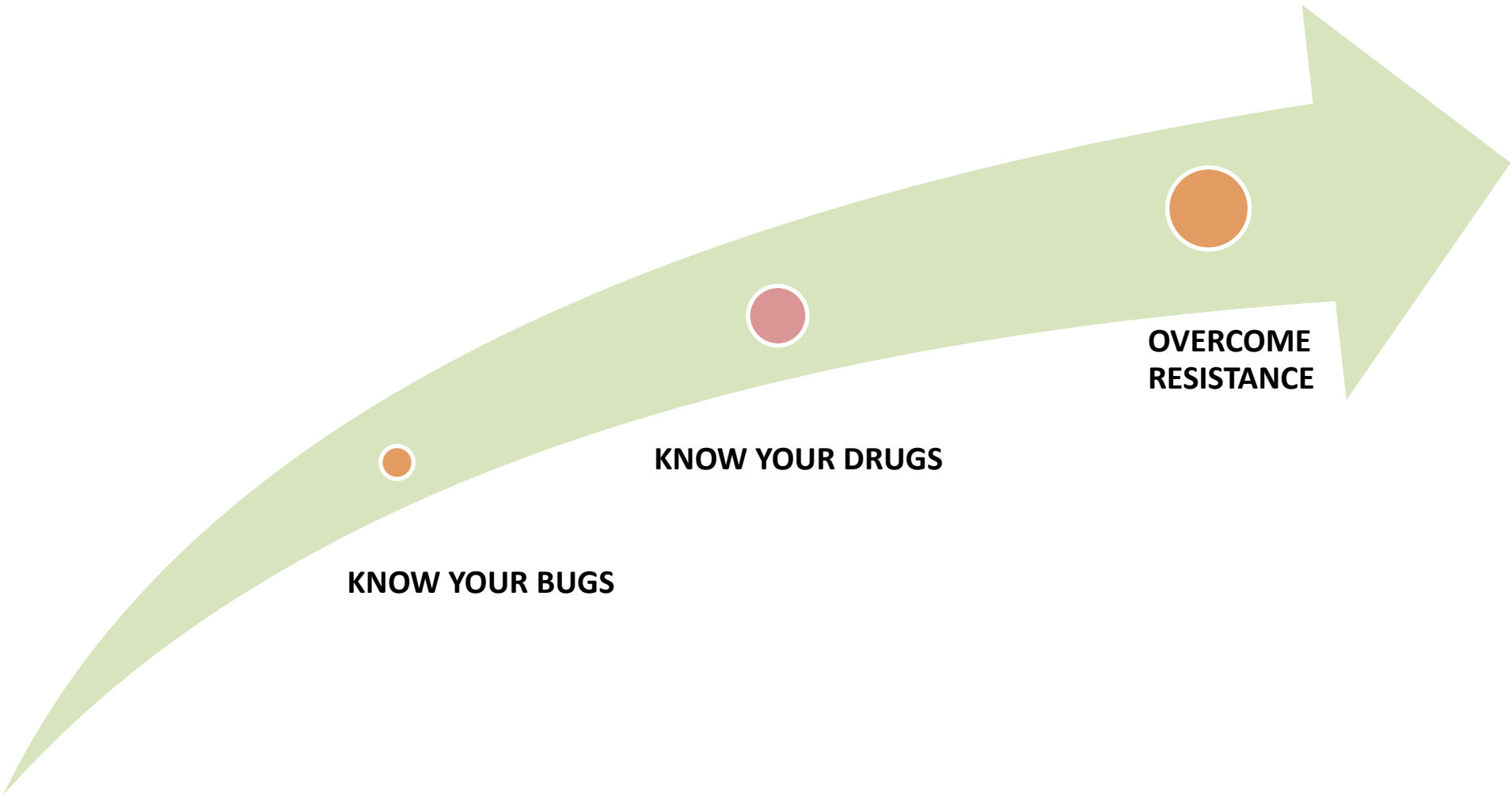
PHARMACY

NURSE

ICP

MICRO LAB

THANK YOU


KNOW YOUR BUGS
KNOW YOUR DRUGS
OVERCOME RESISTANCE

ANTIBIOTIC STEWARDSHIP

IN YOUR FACILITY WILL

DECREASE

- ANTIBIOTIC RESISTANCE
- C. DIFFICILE INFECTIONS
- COSTS

INCREASE

- GOOD PATIENT OUTCOMES