IMPLEMENTING AN EFFECTIVE ANTIMICROBIAL STEWARDSHIP PROGRAM

Juan Teran, MD

Assistant Professor of Medicine, Division of Infectious Diseases

University of Nebraska Medical Center

Medical Director for Nebraska ICAP

Nebraska Infection Control Network

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Today's Outline

- Why is antimicrobial stewardship necessary?
- What is antimicrobial stewardship?
- How can we successfully implement antimicrobial stewardship?
- What are some examples, guidelines, and resources?
- Role of the IP in Antimicrobial Stewardship

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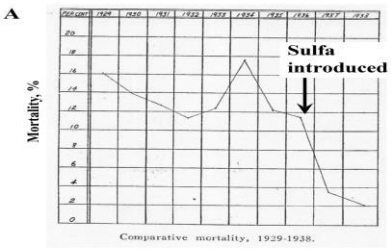
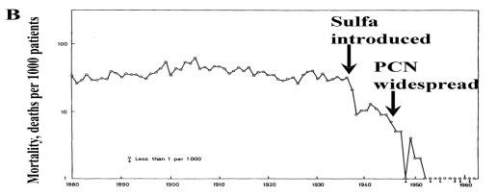
Why is Antimicrobial Stewardship Necessary?

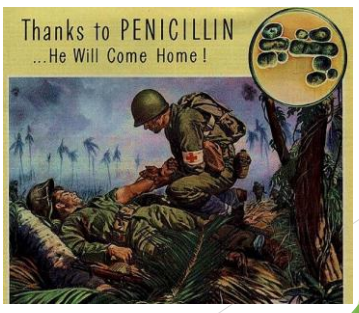
3

Antimicrobial Impact





(A) Mortality rates for erysipelas at Cook County Hospital 1929-1938
(B) Mortality of erysipelas from Norwegian national registry



Spellberg, et al. *Clin Infect Dis.* 2009;49:383-91.

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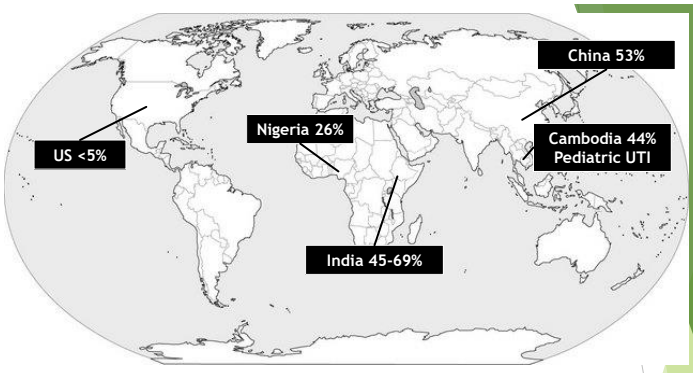
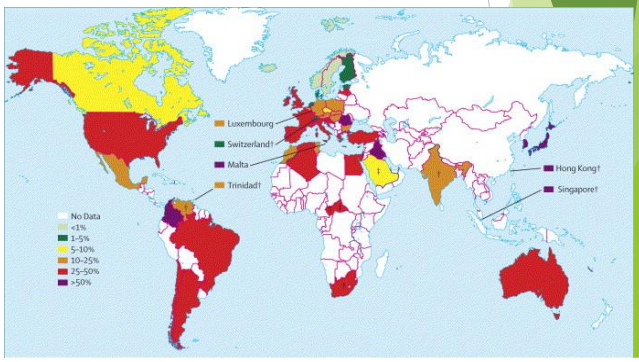
Worldwide *E. coli* Resistant to 3rd Generation Cephalosporins (ESBL)



MRSA Prevalence



Doi Y, et al. *Clin Infect Dis*. 2013;56:641-8.
Qiao LD, et al. *BMJ Open*. 2013;3:e004152.
Sanchez GV, et al. *Emerg Infect Dis*. 2013;19:133-6.
Ogbolu DO, et al. *Int J Antimicrob Agents*. 2011;37:62-6.
Moore CE, et al. Paediatr Int Child Health. 2016;36:113-6.
Pathak A, et al. *Infect Drug Resist*. 2012;5:65-73.
Kaur N, et al. *J Clin Diagn Res*. 2014;8:DC01-3.
Grundmann H, et al. *Lancet* 2006;368:874-85.

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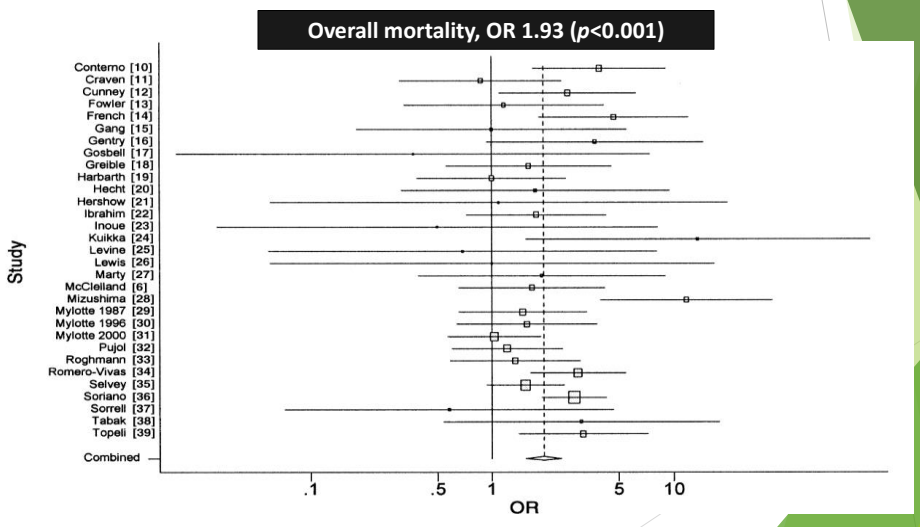
Does Resistance Matter?

Meta-analysis of 31 Cohort Studies: MSSA vs. MRSA Bacteremia



Cosgrove SE, et al. *Clin Infect Dis*. 2003;36:53-9.

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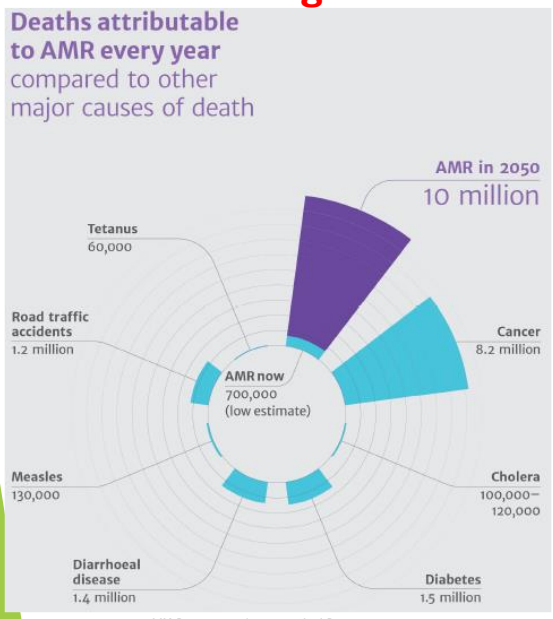
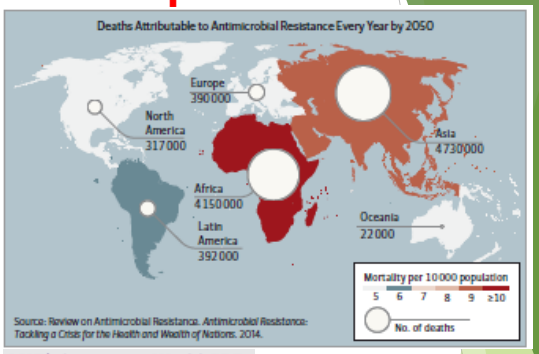
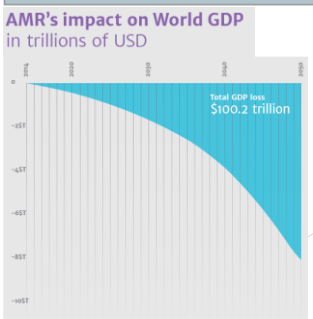
Long-term Worldwide Impact of AMR







UK Review on Antimicrobial Resistance
www.amr-review.org/home

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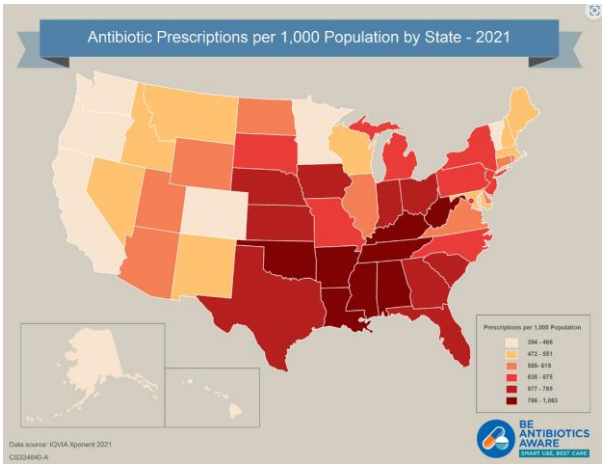
Antibiotic Overuse



US outpatient antibiotic use

- 12.6% visits resulted in antibiotic prescription
- Respiratory conditions 43.7% of all scripts

Nebraska #11

Estimated 30% of use unnecessary = 47 million unneeded prescriptions annually

Fleming-Dutra KE, et al. *JAMA*. 2016;315:1864-73.

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What is Antimicrobial Stewardship?

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What is Antimicrobial Stewardship?

- Antimicrobial Stewardship refers to processes designed to optimize the use of antimicrobials
  - Includes interventions to guide clinicians in:
    - Determining **when** antibiotics are needed
    - **What** agent(s) to use
    - **How to** dose, route and duration
  - Focus is on **patient and public health** with goals:
    - Cure or prevent infection
    - Minimize toxicity
    - Minimize resistance

Reduce treatment costs

Dellit TH, et al. *Clin Infect Dis*. 2007;44:159-77.
SHEA/IDSA/PIDS. *Infect Control Hosp Epidemiol*. 2012;33:322-7.
Barlam TF, et al. *Clin Infect Dis*. 2016;62:1-27

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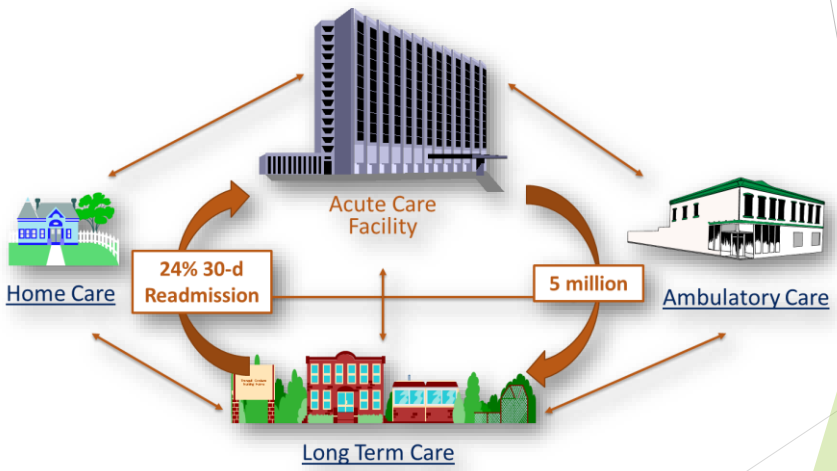
Implementing Antimicrobial Stewardship Across the Entire Healthcare Continuum



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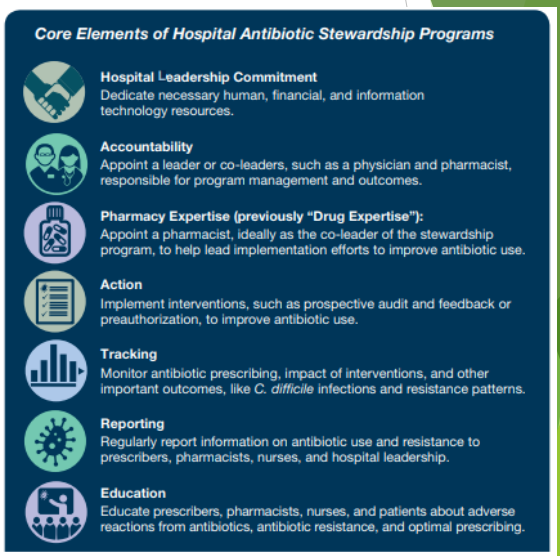
ASP Core Elements – Hospitals, Small and Critical Access Hospitals



https://www.cdc.gov/antibiotic-use/core-elements/index.html

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Regulatory Requirements


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CMS Issues Proposed Rule that Prohibits Discrimination, Reduces Hospital-Acquired Conditions, and Promotes Antibiotic Stewardship in Hospitals

Date 2016-06-13

DEPARTMENT OF HEALTH & HUMAN SERVICES
Centers for Medicare & Medicaid Services
7500 Security Boulevard, Mail Stop C2-21-16
Baltimore, Maryland 21244-1850

CMS
CENTERS FOR MEDICARE & MEDICAID SERVICES

Center for Clinical Standards and Quality/Quality, Safety & Oversight Group

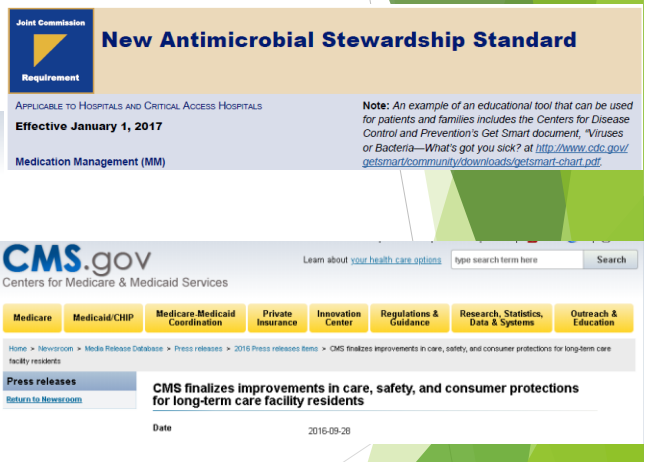
Ref: QSO-22-20-Hospitals

DATE: July 6, 2022

TO: State Survey Agency Directors

FROM: Director, Quality, Safety & Oversight Group (QSOG)

SUBJECT: Infection Prevention and Control and Antibiotic Stewardship Program Interpretive Guidance Update


Joint Commission Requirement

New Antimicrobial Stewardship Standard

Applicable to Hospitals and Critical Access Hospitals

Effective January 1, 2017

Medication Management (MM)

Note: *An example of an educational tool that can be used for patients and families includes the Centers for Disease Control and Prevention's Get Smart document, "Viruses or Bacteria—What's got you sick? at http://www.cdc.gov/getsmart/community/downloads/getsmart-chart.pdf.*

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Press releases
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CMS finalizes improvements in care, safety, and consumer protections for long-term care facility residents

Date 2016-09-28

§482.42(b)(2) The hospital-wide antibiotic stewardship program:
(i) Demonstrates coordination among all components of the hospital responsible for antibiotic use and resistance, including, but not limited to, the infection prevention and control program, the QAPI program, the medical staff, nursing services, and pharmacy services;

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How Can We Successfully Implement an Antimicrobial Stewardship Program?

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Core Element #1: Leadership Commitment

Priorities

- ASP leader given time to manage program & conduct interventions
- Resource allocation (staff, **IT**, marketing, education)
- Formal statements of commitment/policies

Other Examples

- Set clear expectations for leadership & staffing (include in contracts, **job descriptions** upon hire) & responsibilities & outcomes
- Create a culture around optimal antibiotic use (messages, posters, newsletters, emails)
- **Support training** for ASP leaders

https://www.cdc.gov/antibiotic-use/core-elements/small-critical.html
https://www.cdc.gov/antibiotic-use/core-elements/hospital.html

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Core Element #2: Accountability

- **Appoint a leader or co-leaders, such as a physician and pharmacist, responsible for program management and outcomes**
- Facility leadership and ASP together are responsible for ensuring AS implementation
- Members should be passionate about improving the quality of your facility and reducing resistance and misuse.
- At a minimum, an ASP team should include:
  - Medical Director
  - Pharmacist

https://www.cdc.gov/antibiotic-use/core-elements/small-critical.html

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Members

- Effective ASP team includes a multidisciplinary group with clinical, pharmaceutical, diagnostic, and technical expertise
- Core members should include:
  - **Infection preventionists**
  - **Information Technology**
  - RN leader
  - Microbiologists

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Core Element #3: Pharmacy Expertise

- **Appoint a pharmacist, ideally as the co-leader of the ASP, to help lead implementation efforts to improve antibiotic use**
- In most critical access hospitals, a pharmacist, usually one who is on site provides the leadership and expertise for an ASP
  - Partner with local experts with ID training or develop ASP expertise within

https://www.cdc.gov/antibiotic-use/core-elements/small-critical.html

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Core Element #4: Action

- **Implement interventions, such as prospective audit and feedback or preauthorization, and facility specific treatment guidelines to improve antibiotic use**
- There is no "one size fits all" set of strategies or policies, and each hospital should tailor interventions to what is both a priority and feasible to their local needs

https://www.cdc.gov/antibiotic-use/core-elements/hospital.html#_ENREF_30

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IDSA/SHEA ASP Strategies

Interventions

- Restriction
- **Pre-authorization**
- **Audit feedback**
- **Syndrome-focused practice guidelines**
- Clinical decision support systems
- Decreased *C. difficile*-promoting antibiotics
- Education

Other Strategies

- PK monitoring
- Alternate dosing of beta-lactams
- IV to PO conversion
- Allergy assessment
- Duration of therapy

Dellit TH, et al. *Clin Infect Dis*. 2007;44:159-77.
Barlam TF, et al. *Clin Infect Dis*. 2016;62:1-27

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Core Elements #5 and #6: Tracking and Reporting

Tracking: Monitor antibiotic prescribing, impact of interventions, and other important outcomes, like *C. difficile* infections and resistance patterns

Reporting: Regularly report information on antibiotic use and resistance to prescribers, pharmacists, nurses, and hospital leadership

- Share data collected as well as outcomes with all healthcare providers as well as leadership and any other stakeholders.

https://www.cdc.gov/antibiotic-use/core-elements/hospital.html#_ENREF_30

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Tracking and Reporting: NHSN AUR Module

Hospital Core Elements	Priorities for Hospital Core Element Implementation
Tracking	
Monitor antibiotic prescribing, impact of interventions, and other important outcomes, like *C. difficile* infections and resistance patterns.	Hospital submits antibiotic use data to the NHSN Antimicrobial Use Option.

CMS Requirement in CY 2024

Beginning in CY 2024, AUR Module data are required under the Public Health and Clinical Data Exchange Objective of the CMS Promoting Interoperability Program

CoreElements-Hospital-Priorities-Table (cdc.gov)

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Core Element #7: Education

- **Educate prescribers, pharmacists, nurses, and patients about adverse reactions from antibiotics, antibiotic resistance, and optimal prescribing**
- Any major antimicrobial stewardship intervention will require some education or informational communication to clinicians
- Ongoing training opportunities should be available to physicians, pharmacists, and nurses
- Consider engaging patients and families

https://www.cdc.gov/antibiotic-use/core-elements/hospital.html#_ENREF_30

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What are some examples, guidelines, and resources?

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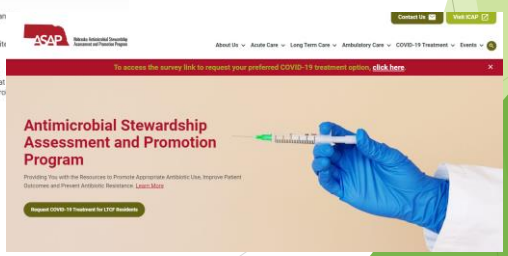
Web-based Resources

https://www.unmc.edu/intmed/divisions/id/asp/index.html

asap.nebraskamed.com



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Role of the IP in Antimicrobial Stewardship

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The **Synergy** of IPC and AS Programs

- Common goals:
  - Keep patients safe
  - Improve patient outcomes
  - Decreased burden of MDRO infections
    - Increased treatment costs
    - Greater morbidity and mortality

Manning et al. Am J Infect Control. 2018 Apr;46(4):364-368.

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Role of the IP in the 7 Core Elements

- Leadership Commitment:
  - IPC and AS program leaders must work together to align their programs
  - Promote communication and collaboration
- Accountability:
  - AS programs are best co-led by an Infectious Disease physician and a Clinical Pharmacist with expertise in Stewardship
  - Not feasible for all settings

Manning et al. Am J Infect Control. 2018 Apr;46(4):364-368.

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Role of the IP in the 7 Core Elements

- Drug Expertise:
  - Most healthcare facilities do not have access to an ID pharmacist
  - When remote expertise is used, IPs can inform goals for improved collaboration
- Action:
  - IPs may not be involved in preauthorization or prospective audit and feedback, but they do engage in a diverse range of clinical disciplines
  - Facilitate nursing support for antibiotic timeouts
  - Can Invite AS team members to unit-based safety teams

Manning et al. Am J Infect Control. 2018 Apr;46(4):364-368.

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Role of the IP in the 7 Core Elements

- Tracking:
  - NHSN reporting. Facility structure and other reporting considerations
  - Surveillance of emerging pathogens and possible transmission
- Reporting and Education:
  - Coordinating reports to patient safety, medical executive committees, and the board of directors can help with common goals (e.g. CDI testing)
  - Education should be team-oriented and problem-based.

Manning et al. Am J Infect Control. 2018 Apr;46(4):364-368.

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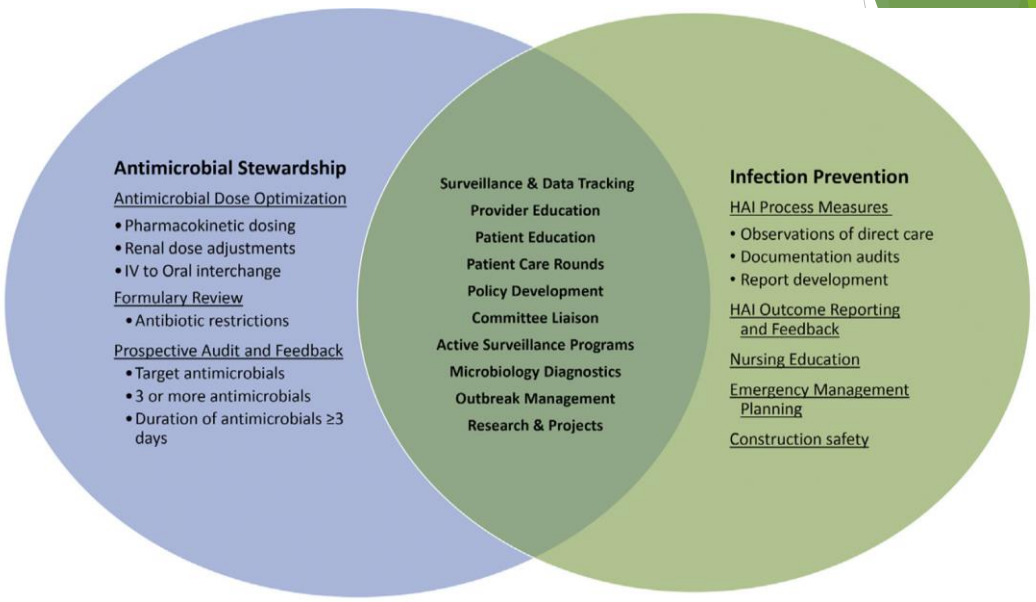
Intersection of AS and IP



Gentry et al. Infect Dis Clin North Am. 2020 Mar;34(1):17-30.

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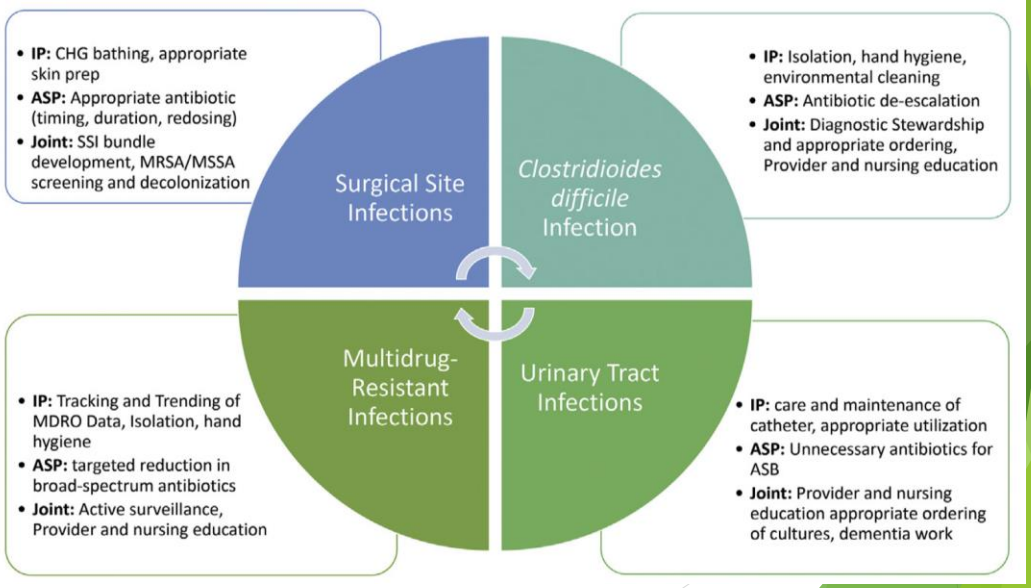
Example of joint IP-AS Initiatives



Gentry et al. Infect Dis Clin North Am. 2020 Mar;34(1):17-30.

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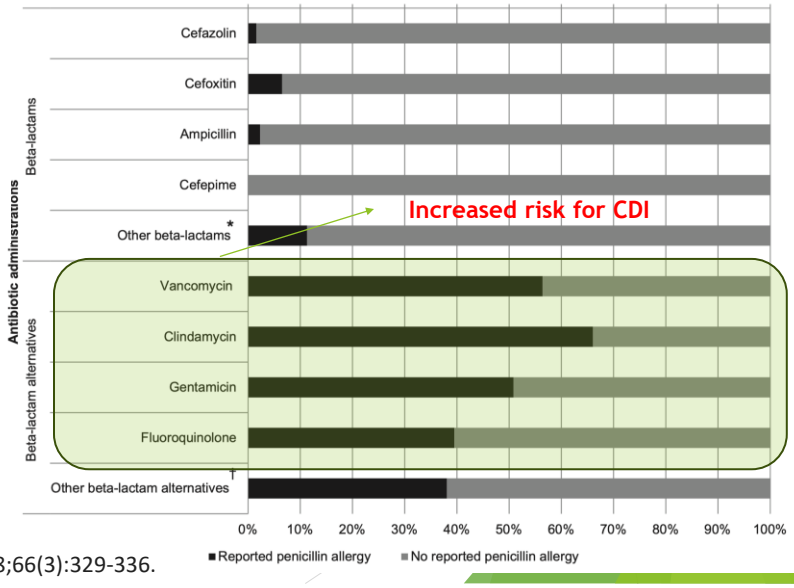
Penicillin Allergy and Risk of SSI
ASP Can Help Lower Your SSI Rate

Table 3. Impact of a Reported Penicillin Allergy on Surgical Site Infection

Adjustment	Odds ratio (95% confidence interval)	*P* value
None (univariable)	1.36 (.94–1.97)	.10
Surgery type	1.45 (1.00–2.12)	.051
Surgery type, age, sex, and race	1.49 (1.02–2.18)	.04
Surgery type, age, sex, race, American Society of Anesthesiologists class, procedure duration, and wound class	1.51 (1.02–2.22)	.04

Patients with reported penicillin allergy had a 50% increased odds of SSI, attributable to second-line perioperative antibiotics



Blumenthal et al. Clin Infect Dis. 2018 Jan 18;66(3):329-336.

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Leveraging IT Infrastructure for IPC and ASP
Computerized Clinical decision support (CDDS) example

- Any C. difficile order attempt led to a “soft stop” and a hyperlink to C. difficile testing best practices if any of the following conditions were present:
  - Laxative use within the preceding 48h
  - Negative C. difficile test within the previous 7 days
  - Positive test within the previous 14 days.
- Providers were instructed to call microbiology if testing was still deemed necessary
- If provider tried to override the “soft stop”, this led to a second “hard stop” that required a passcode from microbiology to proceed with testing.

Mizusawa et al. Clin Infect Dis. 2019 Nov 13;69(11):2019-2021

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Results

- Testing was reduced on all three hospitals. Number of tests per 1000 inpatient days and absolute risk reduction:
  - 12.6 +/- 1.7 → 9.5 +/- 1.3 (**24%**, p <0.001) Johns Hopkins Hospital
  - 10.1 +/- 2.9 → 6.4 +/- 2.9 (**37%**, p <0.001) Howard County Hospital
  - 14 +/- 4.2 → 9.6 +/- 3.5 (**31%**, p < 0.001) Suburban Hospital
- In the first quarter after CCDS activation at JHH, there was a decrease in oral vancomycin use (incidence risk ratio, 0.69 [95% confidence interval, .48–.99])

Mizusawa et al. Clin Infect Dis. 2019 Nov 13;69(11):2019-2021

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Safety concerns

- Significant adverse effects were defined as CDI-associated death, or delayed diagnosis of CDI or associated ileus or megacolon.
- No predefined adverse events were found in patients in whom providers followed the CDDS
- In the group that tested despite CDDS, 11 had positive C. difficile testing. 3 represented colonization

Mizusawa et al. Clin Infect Dis. 2019 Nov 13;69(11):2019-2021

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Lessons from the Covid Pandemic

The pandemic caused significant constraints on IPC programs and has created the immediate need for a change in infrastructure to reduce duplicate efforts and increase the efficiency of existing systems. COVID-19 highlighted the shortage and demand for trained professionals.

Table 1 Opportunities for future collaboration between ASPs and IPPs

Low-hanging fruit	Moderate-hanging fruit	High-hanging fruit
Solidify plans for regular senior leadership access by ASPs in collaboration with IPPs	Refine and enhance data tracking and reporting by ASPs, including NHSN reporting	Consider enhanced models for ID physician recruitment, training and certification in Hospital Epidemiology/Infection Prevention and Antimicrobial Stewardship
Utilize infrastructure for telecommunication that was enhanced during the pandemic for future ASP-IPP collaborations	Create collaborative ASP-IPP business plans (e.g. adoption of third party software platforms, enhancing access to IT support)	Consider new combined ASP-IPP program models incorporating streamlined command and reporting structures
Utilize infrastructure that was created for data access, reporting and collaboration during the pandemic for future ASP-IPP collaborations	Collaborate on enhancing access to IT, microbiology, nursing staff	Collaborate on providing bundled ASP-IPP telehealth services to other hospitals
	Collaborate on patient and staff education	

Assi et al. Curr Infect Dis Rep. 2021;23(10):15.

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Conclusions

- Antimicrobial resistance is one of the biggest threats in healthcare settings.
- Antimicrobial Stewardship is essential to decrease burden of MDROs, decrease toxicity, and improve outcomes.
- There is a large intersection between the work of IPC and ASP.
- Implementing IPC and ASP initiatives together leads to better outcomes than implementing initiatives independently.

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