Collaborative Antimicrobial Stewardship: Focus on Infection Prevention

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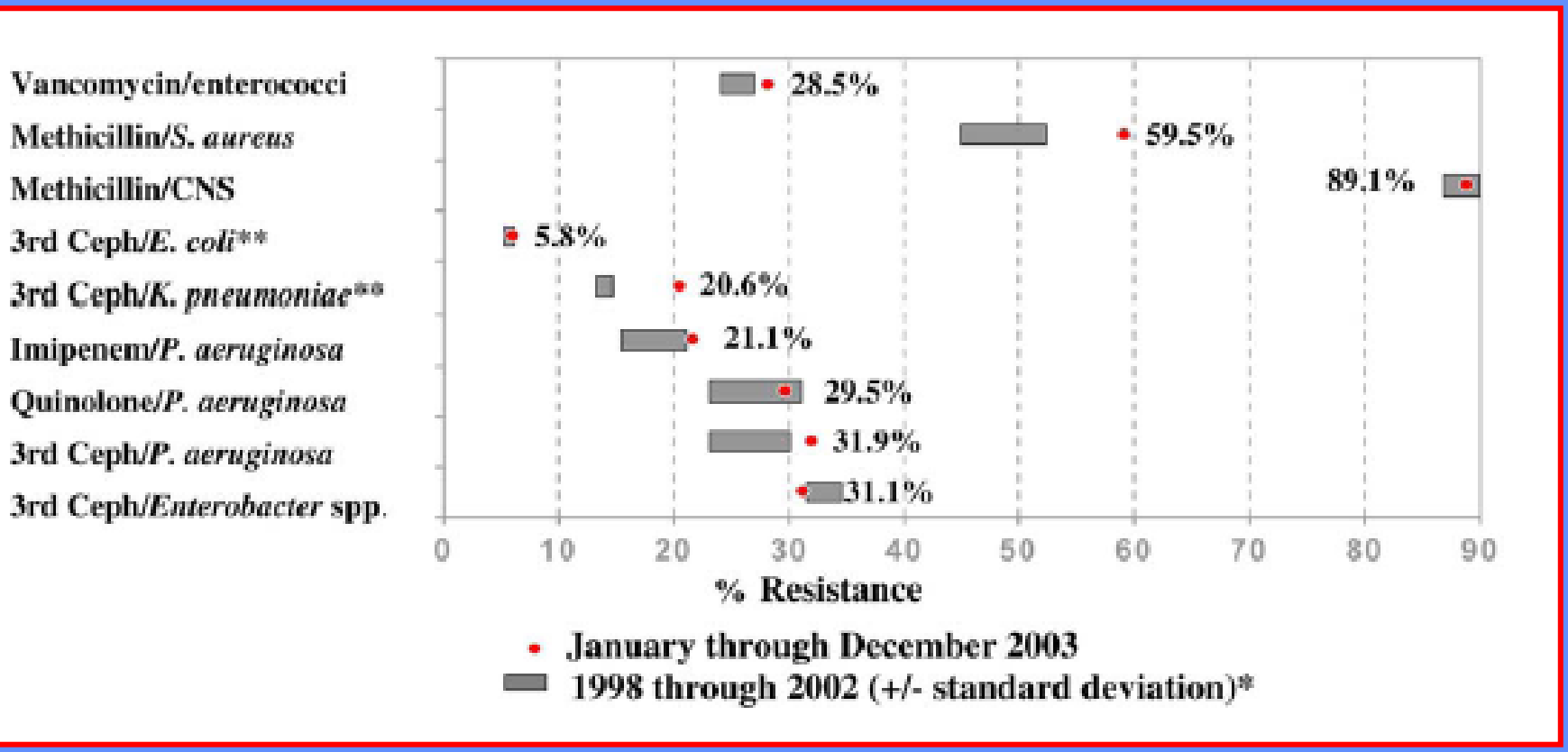
Disclosures

- None

Antimicrobial resistant Nosocomial Infections In ICU Patients

2003 compared with 1998-2002, NNIS

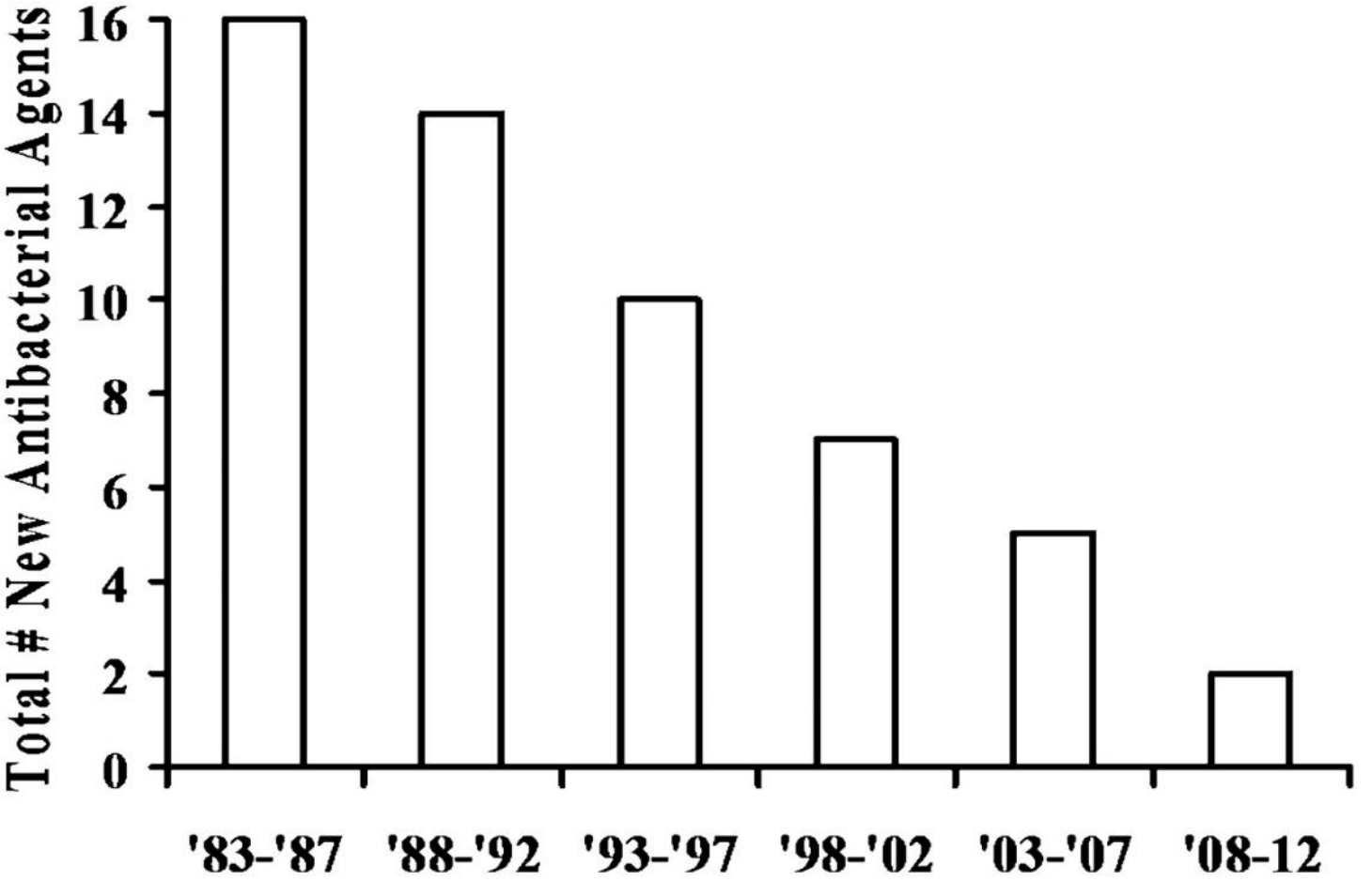


www.cdc.gov/ncidod/dhqp/pdf/nnis/2004NNISreport

ORGANISM >100,000 CFU/ML ACINETOBACTER SPECIES

SENSITIVITY	MSCAN MIC	
AMIKACIN	>32	RESISTANT
AMPICILLIN/SULBACTAM	>16/8	RESISTANT
CEFEPIME	>16	RESISTANT
CEFTAZIDIME	>16	RESISTANT
CIPROFLOXACIN	>2	RESISTANT
GENTAMICIN	>8	RESISTANT
MEROPENEM	>8	RESISTANT
PIPERACILLIN	>64	RESISTANT
TETRACYCLINE	>8	RESISTANT
TOBRAMYCIN	>8	RESISTANT
TMP/SMX	>2/38	RESISTANT
POLYMYXIN B	8	RESISTANT

Number of New Molecular Entity (NME) Systemic Antibiotics Approved by the US FDA Per Five-year Period, Through 3/11.



Clin Infect Dis. 2011;52:S397-S428

Clinical Infectious Diseases


STEWARDSHIP
GOD'S WAY OF LIFE!

Antimicrobial Stewardship
Goals

- Prevent or slow the emergence of antimicrobial resistance
- Optimize selection, dose and duration of Rx
- Reduce adverse drug events including secondary infection (e.g. *C. difficile* AAD)
- Reduce morbidity and mortality
- Reduce length of stay
- Reduce health care expenditures

MacDougall CM and Polk RE. Clin Micro Rev 2005;18(4):638-56.
Ohl CA. *J. Hosp Med*. 2011.
Dellit TH, et. al. Clin Infect Dis. 2007;44:159-177

Level of the patient

Level of
the hospital

Stewardship Guidelines

Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America Guidelines for Developing an Institutional Program to Enhance Antimicrobial Stewardship

Timothy H. Dellit,[1] Robert C. Owens,[2] John E. McGowan, Jr.,[3] Dale N. Gerding,[4] Robert A. Weinstein,[5] John P. Burke,[6] W. Charles Huskins,[7] David L. Paterson,[8] Neil O. Fishman,[9] Christopher F. Carpenter,[10] P. J. Brennan,[3] Marianne Billeter,[11] and Thomas M. Hooton[12]

CID 2007;44:159-77

Clinical Infectious Diseases

IDSA GUIDELINE

Implementing an Antibiotic Stewardship Program: Guidelines by the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America

Tamar F. Barlam,[1,a] Sara E. Cosgrove,[2,a] Lilian M. Abbo,[3] Conan MacDougall,[4] Audrey N. Schuetz,[5] Edward J. Septimus,[6] Arjun Srinivasan,[7] Timothy H. Dellit,[8] Yngve T. Falck-Ytter,[9] Neil O. Fishman,[10] Cindy W. Hamilton,[11] Timothy C. Jenkins,[12] Pamela A. Lipsett,[13] Preeti N. Malani,[14] Larissa S. May,[15] Gregory J. Moran,[16] Melinda M. Neuhauser,[17] Jason G. Newland,[18] Christopher A. Ohl,[19] Matthew H. Samore,[20] Susan K. Seo,[21] and Kavita K. Trivedi[22]

[1]Section of Infectious Diseases, Boston University School of Medicine, Boston, Massachusetts; [2]Division of Infectious Diseases, Johns Hopkins University School of Medicine, Baltimore, Maryland; [3]Division of Infectious Diseases, University of Miami Miller School of Medicine, Miami, Florida; [4]Department of Clinical Pharmacy, School of Pharmacy, University of California, San Francisco; [5]Department of Medicine, Weill Cornell Medical Center/New York-Presbyterian Hospital, New York, New York; [6]Department of Internal Medicine, Texas A&M Health Science Center College of

CID 2016;62:e51

WFUBMC

CDC Core Elements of Hospital Antibiotic Stewardship Programs 2015

1999

Leadership Commitment: Dedicating necessary human, financial and information technology resources

2000

Accountability: Appointing a single leader responsible for program outcomes. Experience with successful programs show that a physician leader is effective

2000

Drug Expertise: Appointing a single pharmacist leader responsible for working to improve antibiotic use.

2000-2001

Action: Implementing at least one recommended action, such as systemic evaluation of ongoing treatment need after a set period of initial treatment (i.e. "antibiotic time out" after 48 hours)

2000-2013, 2017-2023

Tracking: Monitoring antibiotic prescribing and resistance patterns

Reporting: Regular reporting information on antibiotic use and resistance to doctors, nurses and relevant staff

2000

Education: Educating clinicians about resistance and optimal prescribing

http://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html

Prospective audit with intervention and feedback

- Antibiotic support teams
  - ID physician/Clinical Pharmacist
- Determine patients given “problem” antimicrobials
- Survey hospital culture/antibiotic data
- Review sterile body fluid cultures and therapy
- Make one on one interventions and patient specific education to responsible MD
- Has been shown to impact on antimicrobial use in both university and community hospitals
- Disdvantages: Compliance is voluntary. Resource intense

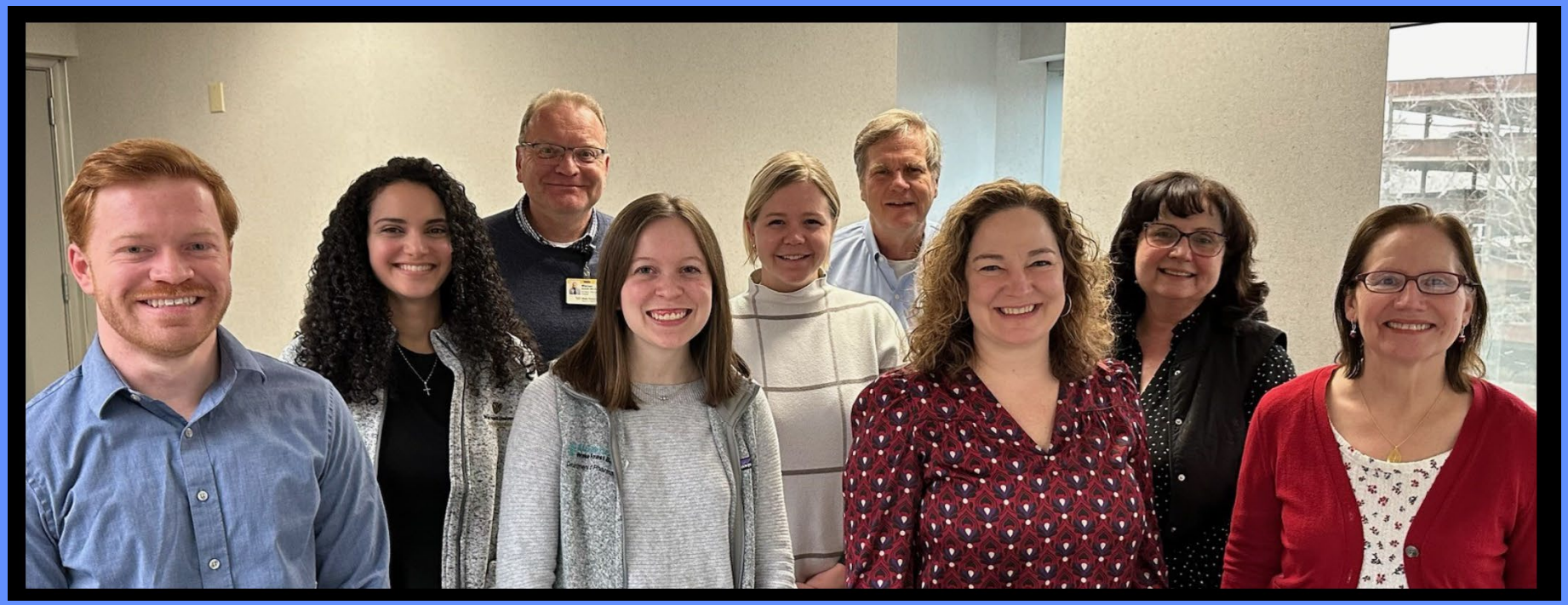
Barlam et al, Clinical Infectious Diseases CID 2016;62:e51
Paterson. Clin Infect Dis 2006; 42(Suppl):S90–5
LaRocco. Clin Infect Dis 2003; 37:742–3

Preauthorization/Restriction

- Formulary restriction vs preauthorization/approval
- Pager/phone call most often used
- Team members: Respected physicians/Clinical pharmacists better than trainees/fellows
- Each intervention a ‘mini-consult’
- Clearly effective in modulating antimicrobial use
- Good for rapidly intervening in use
- Disadvantages: Perceived loss of autonomy for prescribers, inaccurate or misleading information from prescriber, labor intensive, all-hours support?

Paterson. Clin Infect Dis 2006; 42(Suppl):S90–5
Ryback. Pharmacotherapy 2007;27(10 Pt 2):131S–135S)
Barlam et al, Clinical Infectious Diseases CID 2016;62:e51
Linkin. ICHE 2006; 27:688

Your CAUSE Team



Additional Areas for Collaboration

- Nursing
- Geriatrics/Long Term Care
- Graduate Medical Education
- Public Health

Clinics Review Articles

Infectious Disease Clinics

COLLABORATIVE ANTIMICROBIAL STEWARDSHIP

CONSULTING EDITOR
HELEN W. BOUCHER

EDITORS
ELIZABETH DODDS ASHLEY
S. SHAEFER SPIRES

ELSEVIER

March 2020

CDC Core Elements of Hospital Antibiotic Stewardship Programs

Leadership Commitment: Dedicating necessary human, financial and information technology 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 antibiotic use.

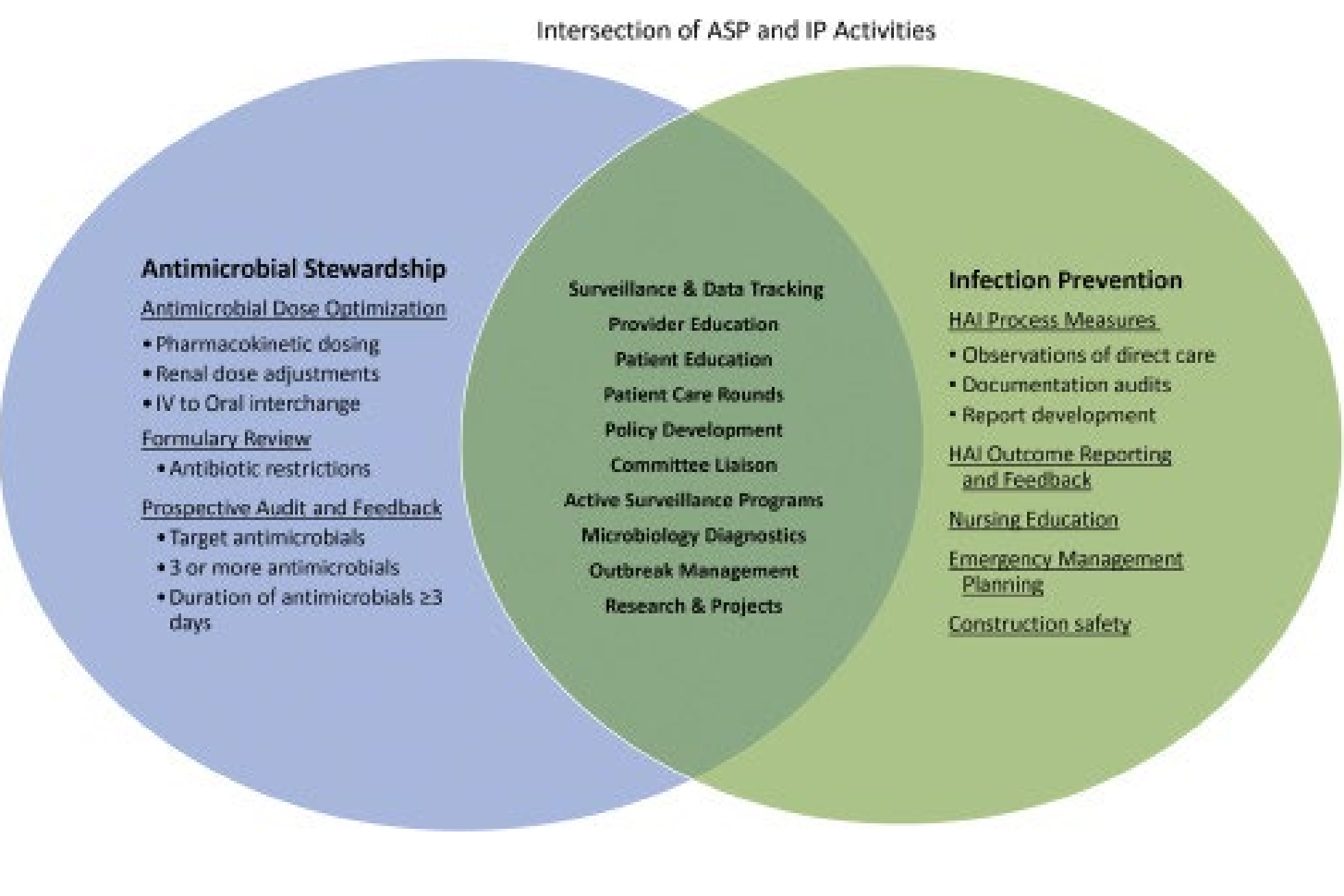
Action: Implementing at least one recommended action, such as systemic evaluation of ongoing treatment need after a set period of initial treatment (i.e. "antibiotic time out" after 48 hours)

Tracking: Monitoring antibiotic prescribing and resistance patterns

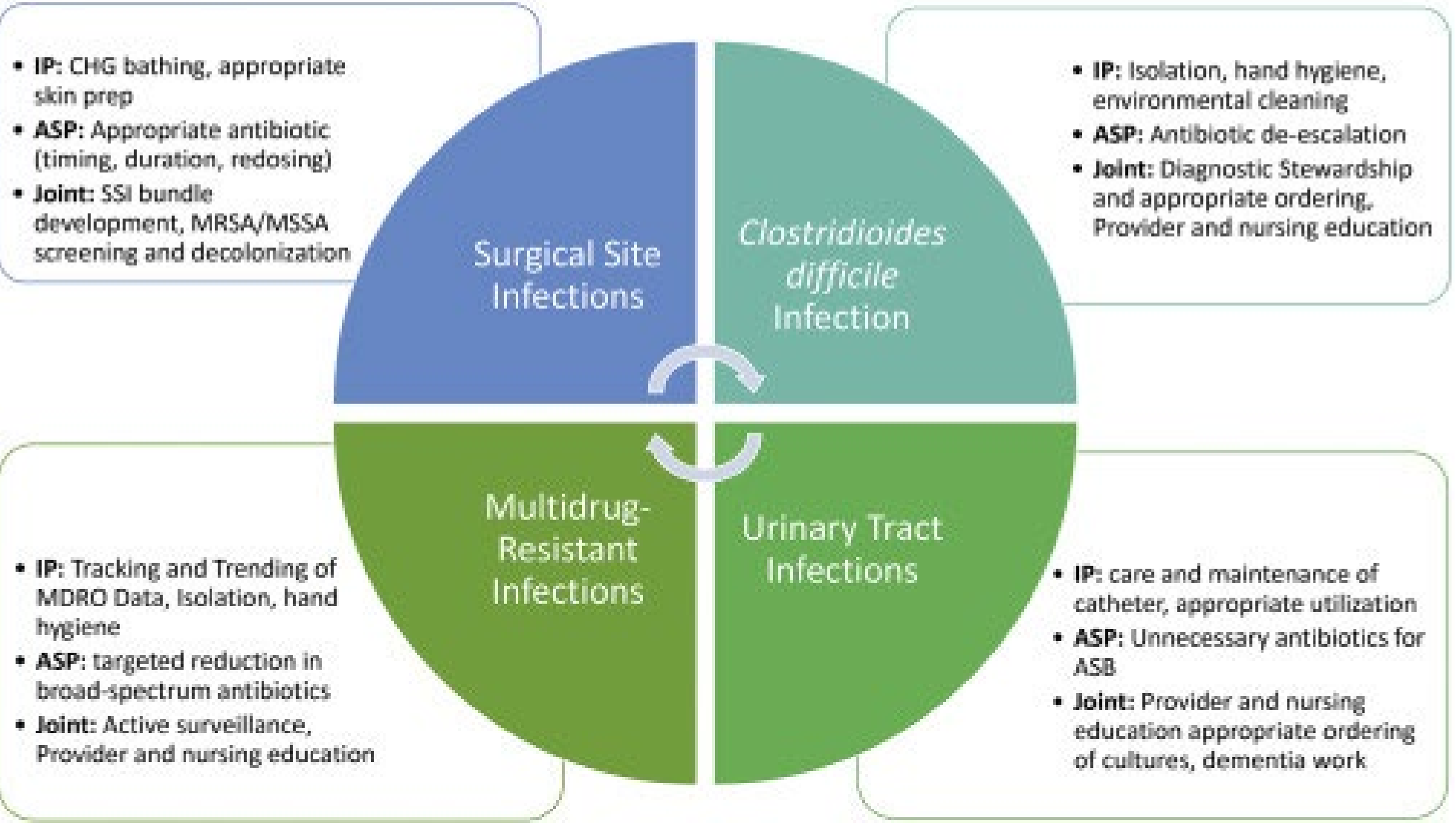
Reporting: Regular reporting information on antibiotic use and resistance to doctors, nurses and relevant staff

Education: Educating clinicians about resistance and optimal prescribing

http://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html

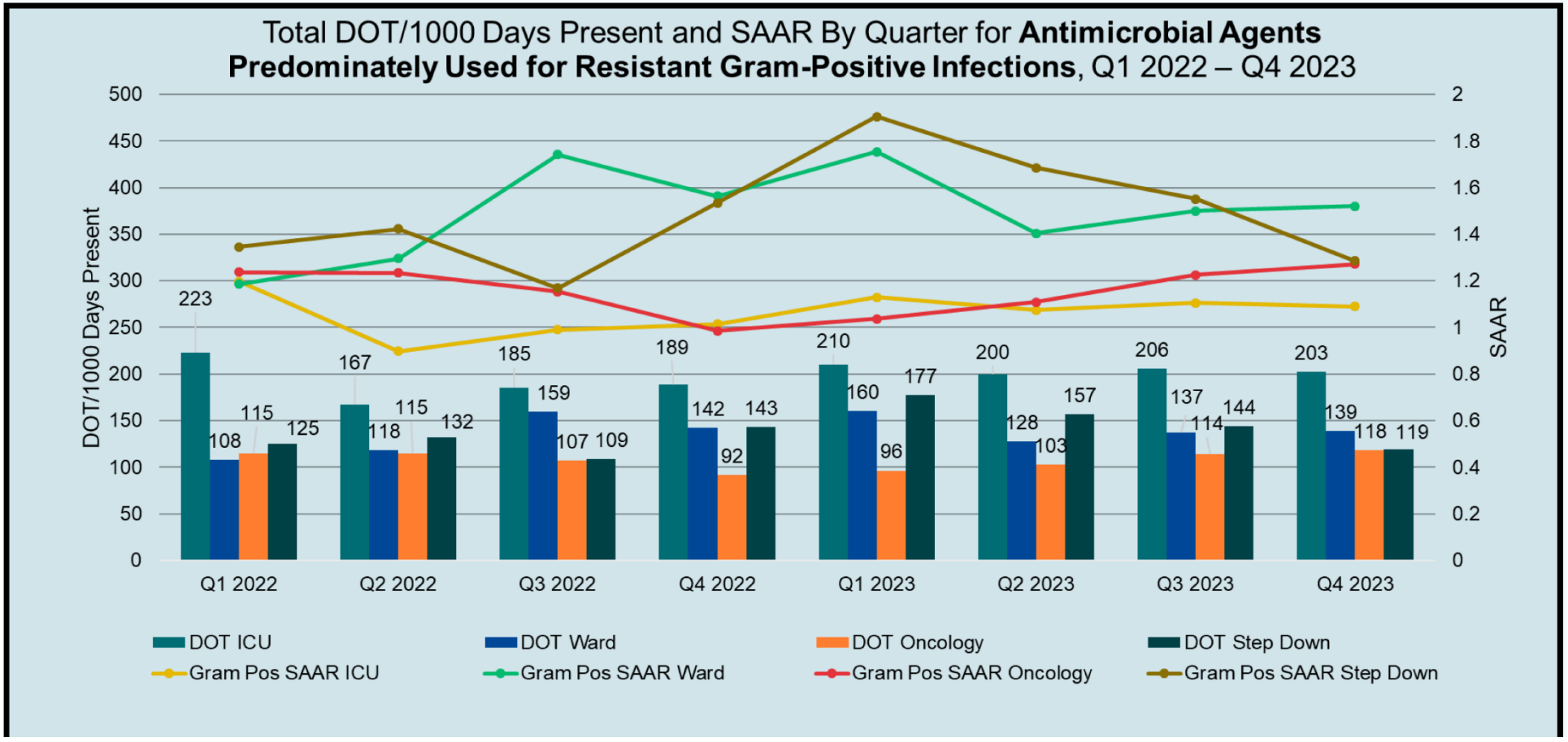

Intersection of ASP and IP Activities
Antimicrobial Stewardship
Antimicrobial Dose Optimization
• Pharmacokinetic dosing
• Renal dose adjustments
• IV to Oral interchange
Formulary Review
• Antibiotic restrictions
Prospective Audit and Feedback
• Target antimicrobials
• 3 or more antimicrobials
• Duration of antimicrobials ≥3 days
Surveillance & Data Tracking
Provider Education
Patient Education
Patient Care Rounds
Policy Development
Committee Liaison
Active Surveillance Programs
Microbiology Diagnostics
Outbreak Management
Research & Projects
Infection Prevention
HAI Process Measures
• Observations of direct care
• Documentation audits
• Report development
HAI Outcome Reporting and Feedback
Nursing Education
Emergency Management Planning
Construction safety

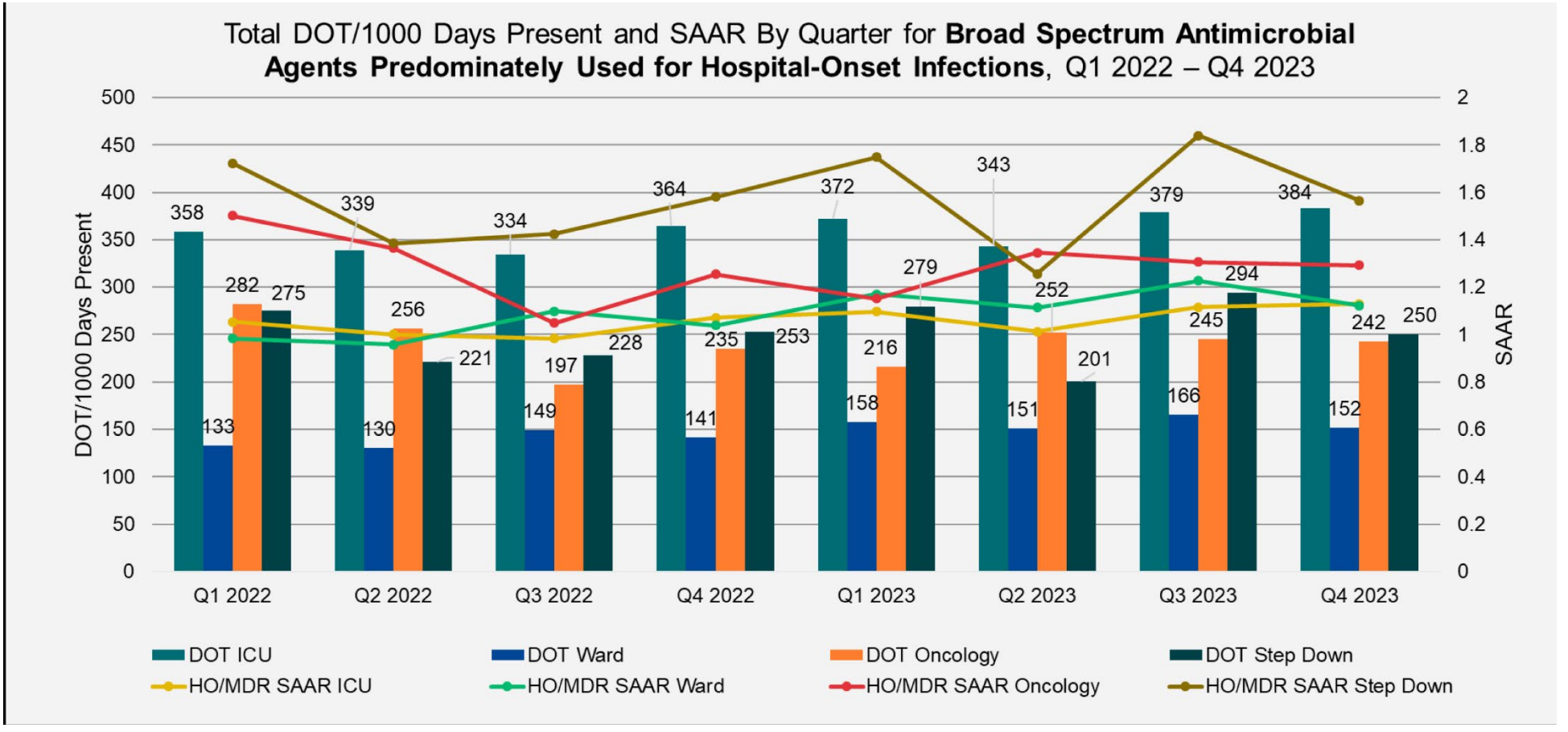
Successful Joint IP-ASP Initiatives

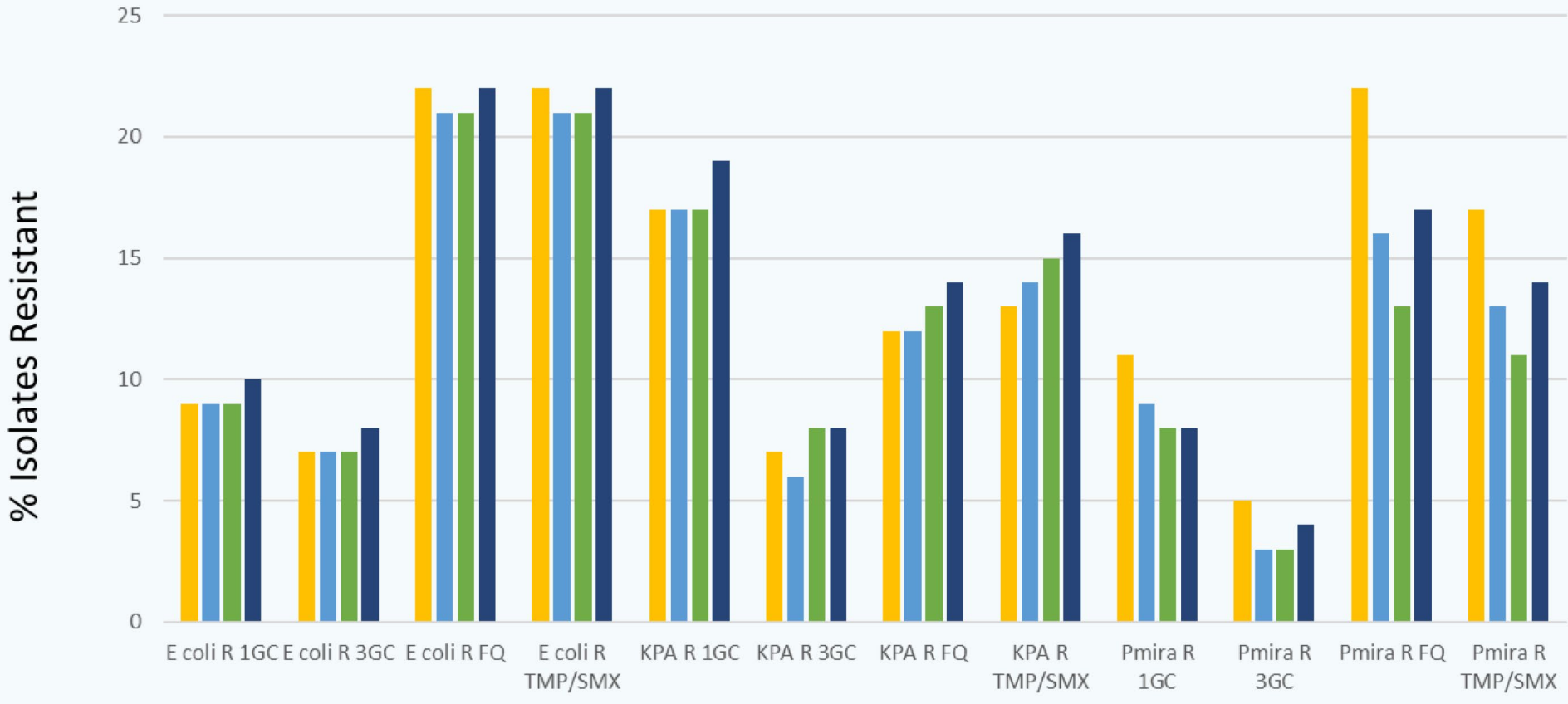


Multidrug-Resistant Infections

- **IP:** Tracking and Trending of MDRO Data, Isolation, hand hygiene
- **ASP:** targeted reduction in broad-spectrum antibiotics
- **Joint:** Active surveillance, Provider and nursing education

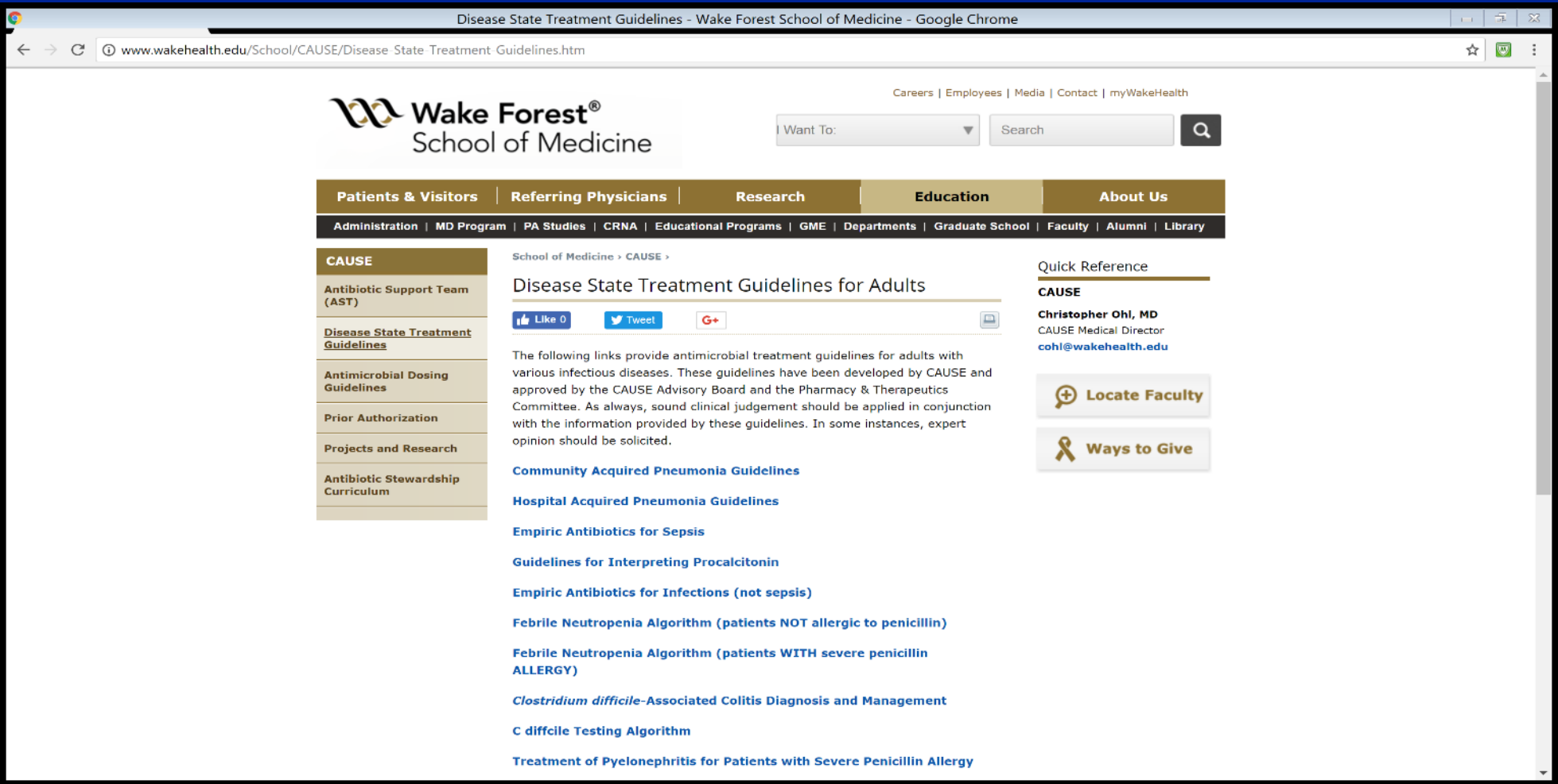

Total DOT/1000 Days Present and SAAR By Quarter for **Antimicrobial Agents Predominately Used for Resistant Gram-Positive Infections**, Q1 2022 – Q4 2023
DOT/1000 Days Present
SAAR
500
450
400
350
300
250
200
150
100
50
0
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
223
108
115
125
167
118
115
132
185
159
107
109
189
142
92
143
210
160
96
177
200
128
103
157
206
137
114
144
203
139
118
119
Q1 2022
Q2 2022
Q3 2022
Q4 2022
Q1 2023
Q2 2023
Q3 2023
Q4 2023
DOT ICU
DOT Ward
DOT Oncology
DOT Step Down
Gram Pos SAAR ICU
Gram Pos SAAR Ward
Gram Pos SAAR Oncology
Gram Pos SAAR Step Down


Total DOT/1000 Days Present and SAAR By Quarter for Broad Spectrum Antimicrobial Agents Predominately Used for Hospital-Onset Infections, Q1 2022 – Q4 2023
DOT/1000 Days Present
SAAR
500
450
400
350
300
250
200
150
100
50
0
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
358
133
282
275
339
130
256
221
334
149
197
228
364
141
235
253
372
158
216
279
343
151
252
201
379
166
245
294
384
152
242
250
Q1 2022
Q2 2022
Q3 2022
Q4 2022
Q1 2023
Q2 2023
Q3 2023
Q4 2023
DOT ICU
DOT Ward
DOT Oncology
DOT Step Down
HO/MDR SAAR ICU
HO/MDR SAAR Ward
HO/MDR SAAR Oncology
HO/MDR SAAR Step Down


% Isolates Resistant
25
20
15
10
5
0
E coli R 1GC
E coli R 3GC
E coli R FQ
E coli R TMP/SMX
KPA R 1GC
KPA R 3GC
KPA R FQ
KPA R TMP/SMX
Pmira R 1GC
Pmira R 3GC
Pmira R FQ
Pmira R TMP/SMX

Local CAUSE Guidelines

http://www.wakehealth.edu/School/CAUSE/Disease-State-Treatment-Guidelines.htm



CHEST

Original Research

PNEUMONIA

Using Local Microbiologic Data To Develop Institution-Specific Guidelines for the Treatment of Hospital-Acquired Pneumonia*

James R. Beardsley, PharmD; John C. Williamson, PharmD; James W. Johnson, PharmD; Christopher A. Ohl, MD; Tobi B. Karchmer, MD, MS; and David L. Bowton, MD, FCCP

Table 3—*Activity of Various Antibiotics Against Gram-Negative Isolates not Susceptible to Piperacillin-Tazobactam or Cefepime**

Variables	Gentamicin	Amikacin	Ciprofloxacin	Meropenem	Piperacillin-Tazobactam	Cefepime
Cefepime nonsusceptible isolates (n = 26)	3 (12)	21 (81)	1 (4)	2 (8)	2 (8)	NA
Piperacillin-tazobactam nonsusceptible isolates (n = 28)	4 (14)	23 (82)	2 (7)	7 (25)	NA	4 (14)

*Data are presented as No. (%). NA = not applicable.

Chest 2006;130:787-93.

MAJOR ARTICLE

The Addition of Intravenous Metronidazole to Oral Vancomycin is Associated With Improved Mortality in Critically Ill Patients With *Clostridium difficile* Infection

Kristina E. E. Rokas,[1] James W. Johnson,[1] James R. Beardsley,[1] Christopher A. Ohl,[2] Vera P. Luther,[2] and John C. Williamson[1]

[1]Department of Pharmacy, Wake Forest Baptist Medical Center, and [2]Wake Forest University School of Medicine, Winston-Salem, North Carolina

(See the Editorial Commentary by Wilcox on pages 942–4.)

Table 2. Treatment Outcomes

Outcome	Monotherapy (n = 44)	Combination (n = 44)	*P* Value
In-hospital mortality	16 (36.4)	7 (15.9)	.03
Time to death, days, median (range)	21 (5–174)	15 (6–32)	.23
Clinical success			
Day 6	9 (20.5)	6 (13.6)	.57
Day 10	27 (61.4)	25 (56.8)	.83
Day 21	33 (75.0)	37 (84.1)	.43
Length of stay after CDI diagnosis, days, median (range)[a]	20.5 (10–64)	18.0 (6–166)	.99
Length of ICU stay after CDI diagnosis, days, median (range)[a]	9 (4–60)	11.0 (3–68)	.93

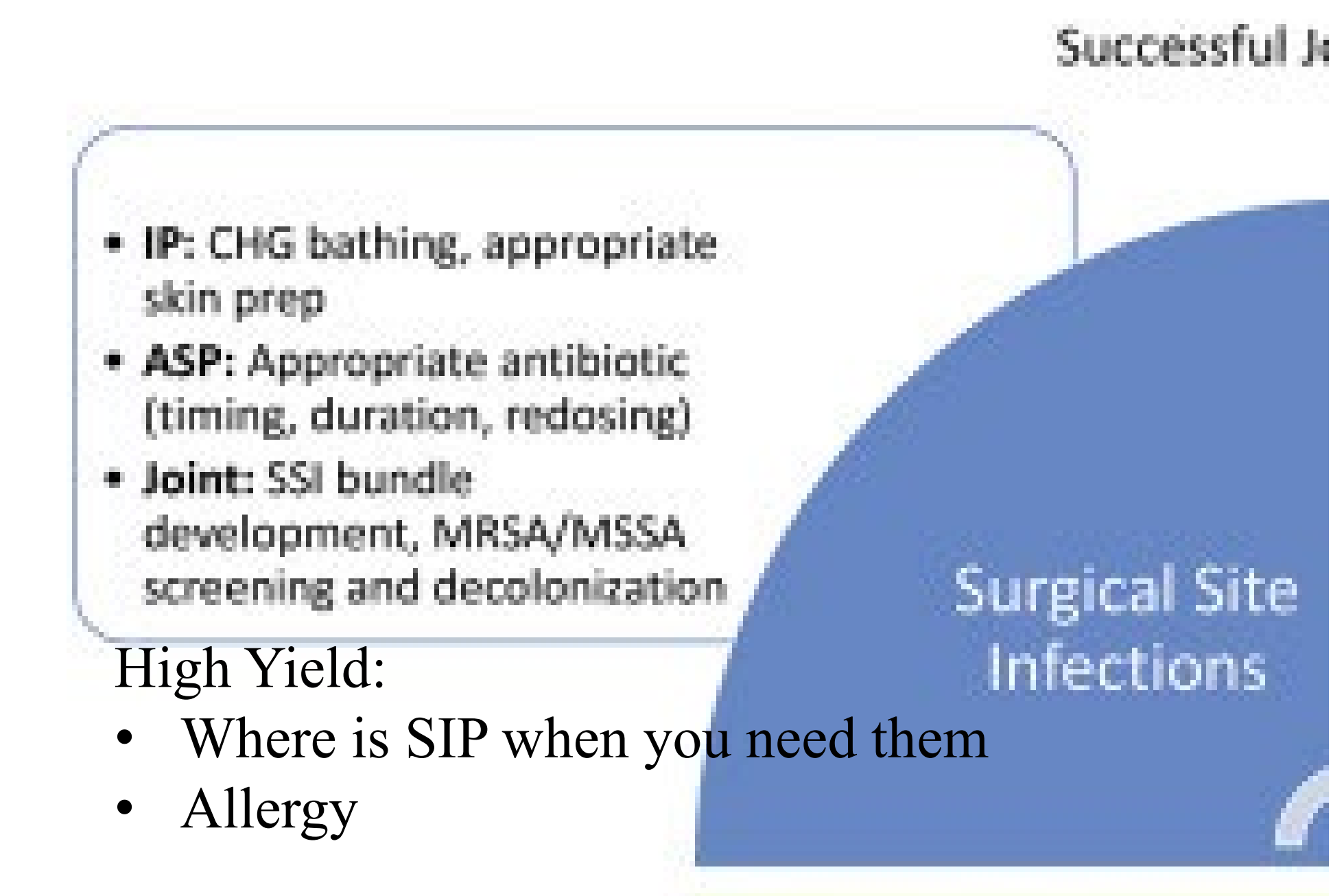
Data are no. (%) of patients, unless otherwise indicated.

Abbreviations: CDI, *Clostridium difficile* infection; ICU, intensive care unit.

[a] Analysis excluded patients who died.

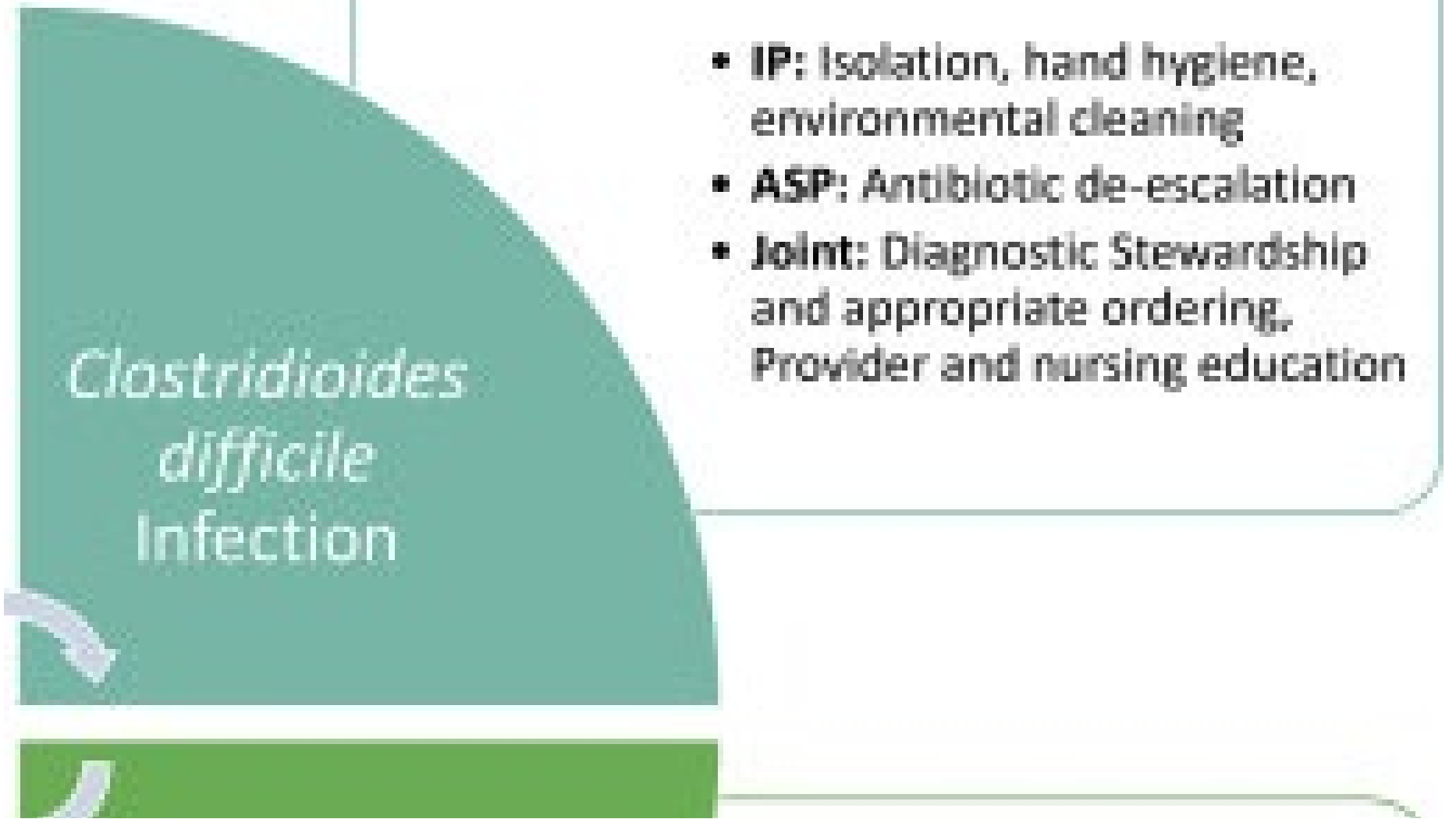
Clin Infect Dis. 2015 Sep 15;61(6):934-41. doi: 10.1093/cid/civ409.29.


Hi, I’m from the Joint Commission, Has Dr. Ohl shared local susceptibility and abx use data with you?
Yes! Dr. Ohl shared some very helpful data with me!



High Yield:

- Where is SIP when you need them
- Allergy

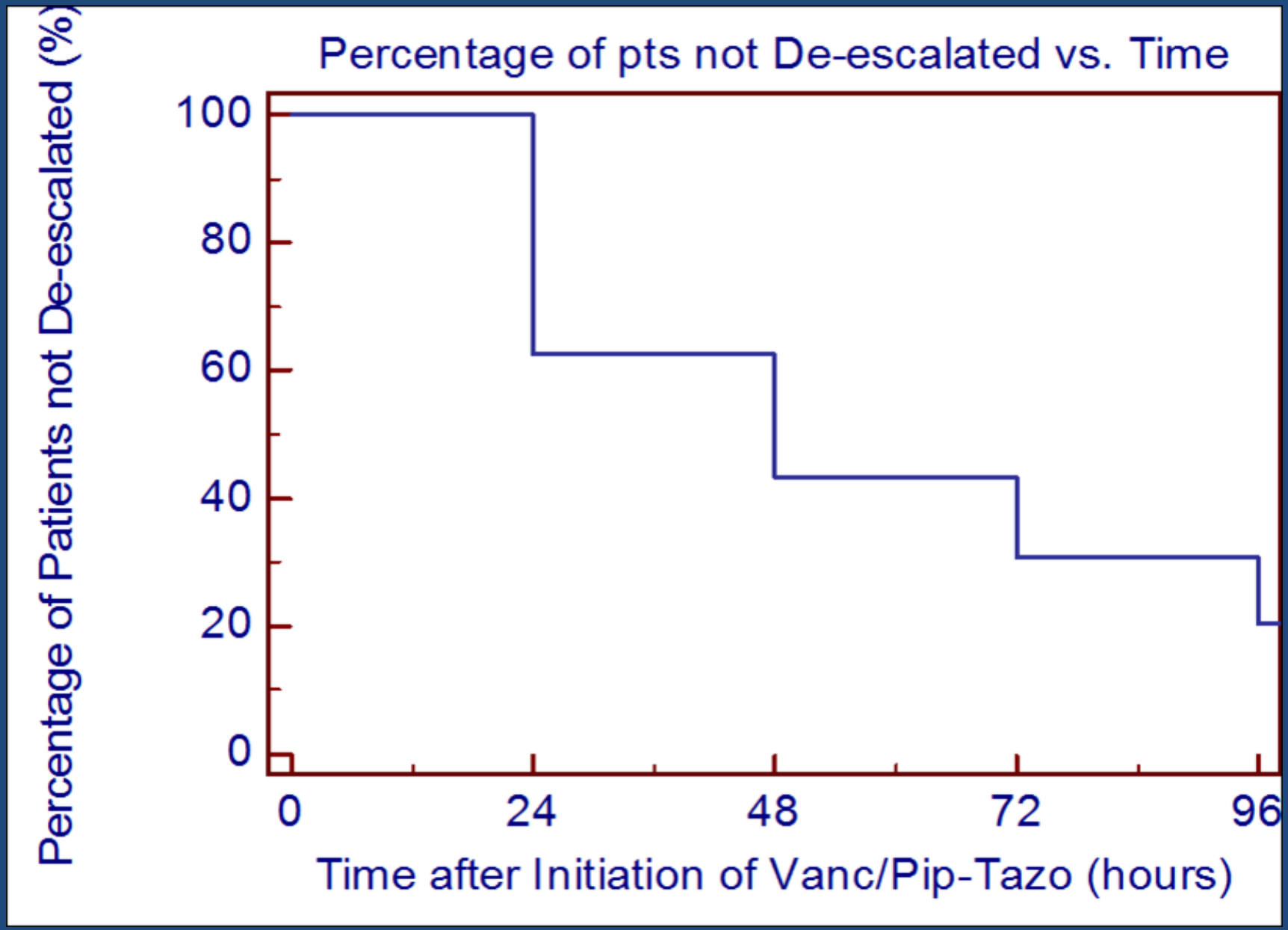

Clostridioides difficile Infection
• **IP:** Isolation, hand hygiene, environmental cleaning
• **ASP:** Antibiotic de-escalation
• **Joint:** Diagnostic Stewardship and appropriate ordering, Provider and nursing education

Antibiotic De-escalation Vanc-Piperacillin tazobactam

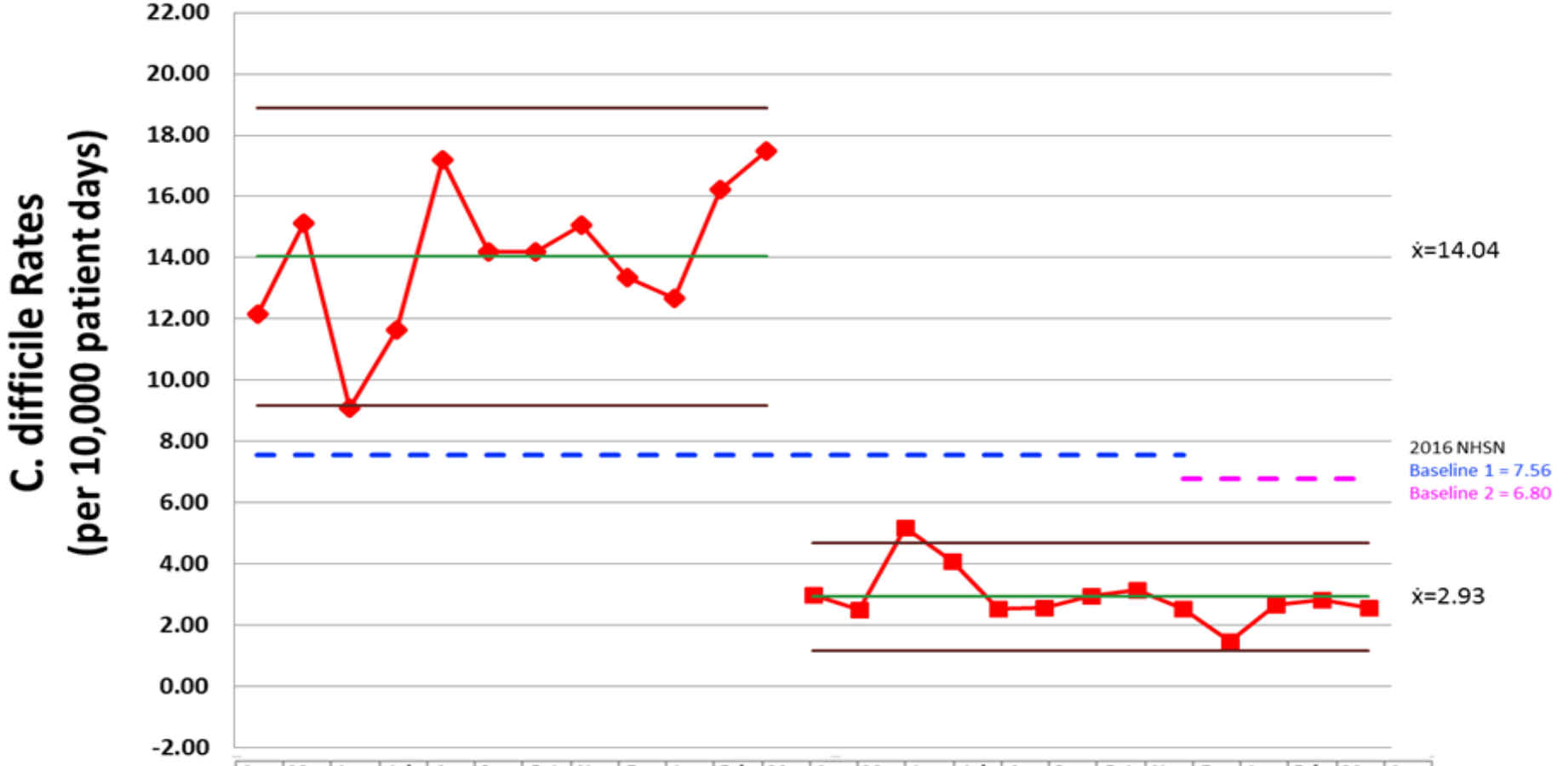
Table 2 Patients with antibiotic regimen de-escalated by service

Time (hours) or Odds Ratio (95% CI)	Total $n = 240$ (%)	Critical Care $n = 58$ (%)	Oncology $n = 21$ (%)	Other $n = 161$ (%)
24	90 (38)	28 (48)	5 (24)	57 (35)
48	136 (57)	31 (53)	9 (43)	96 (60)
72	151 (63)	36 (62)	15 (71)	100 (62)
96	175 (73)	40 (69)	17 (81)	118 (73)
Odds Ratio (95% CI) at 72 h	*N/A*	0.7 (0.2–1.9)	Ref	0.7 (0.2–1.8)

Liu *et al. BMC Infectious Diseases* (2016) 16:751

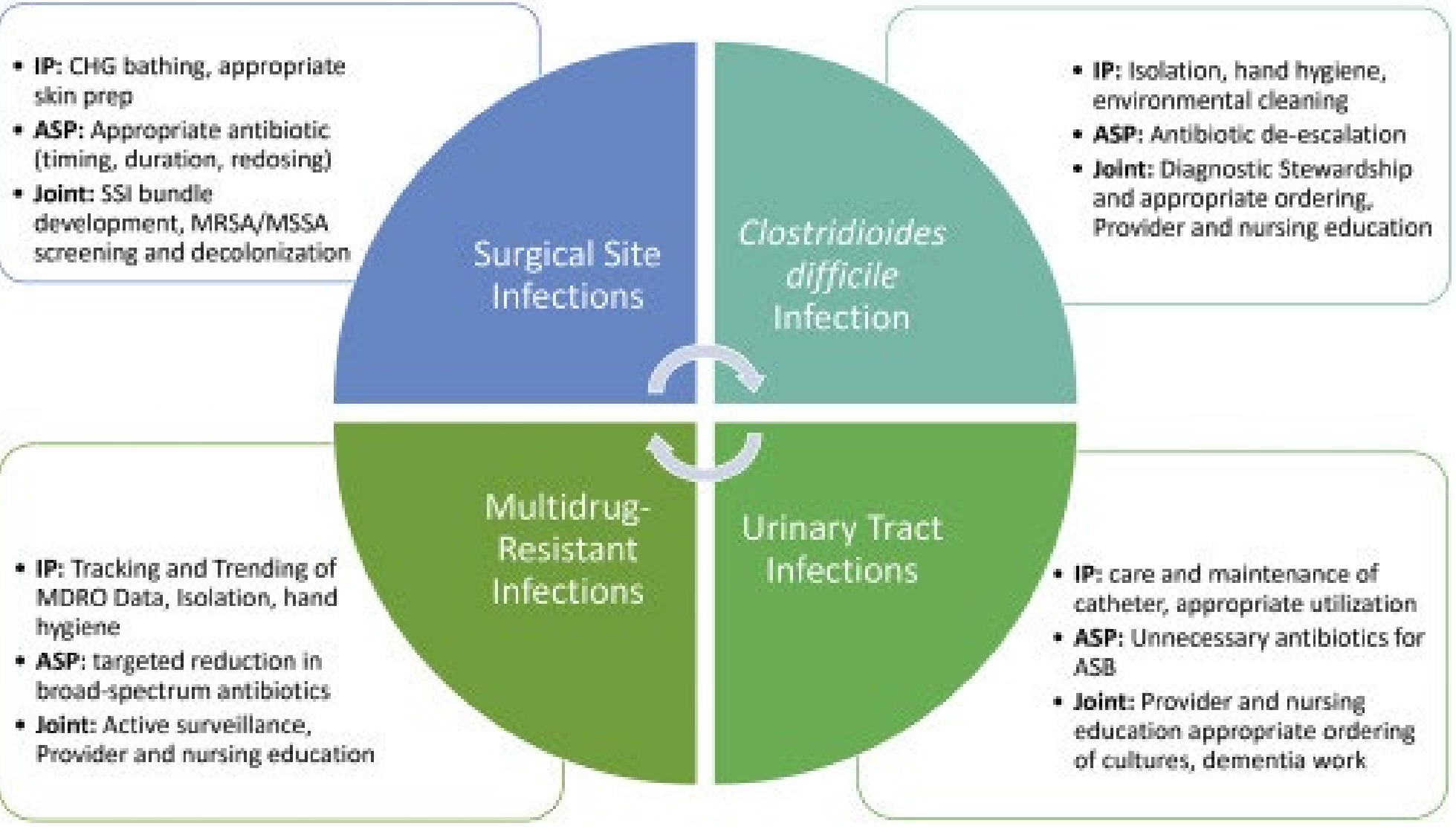

Percentage of pts not De-escalated vs. Time
Percentage of Patients not De-escalated (%)
100
80
60
40
20
0
0
24
48
72
96
Time after Initiation of Vanc/Pip-Tazo (hours)

WFUBMC HO C. Difficile vs NCDPH-predicted Rates
April 2015 to April 2017



	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17
HO	24	30	17	22	33	25	28	28	26	26	31	36	6	5	10	8	5	5	6	6	5	3	5	6	5
CO-HCFA	16	13	5	10	15	14	14	12	11	10	6	16	3	1	7	4	4	2	6	2	4	2	3	4	5
CO	17	30	18	28	23	30	29	26	25	29	24	26	12	12	4	2	3	4	4	3	2	6	1	8	4

Successful Joint IP-ASP Initiatives



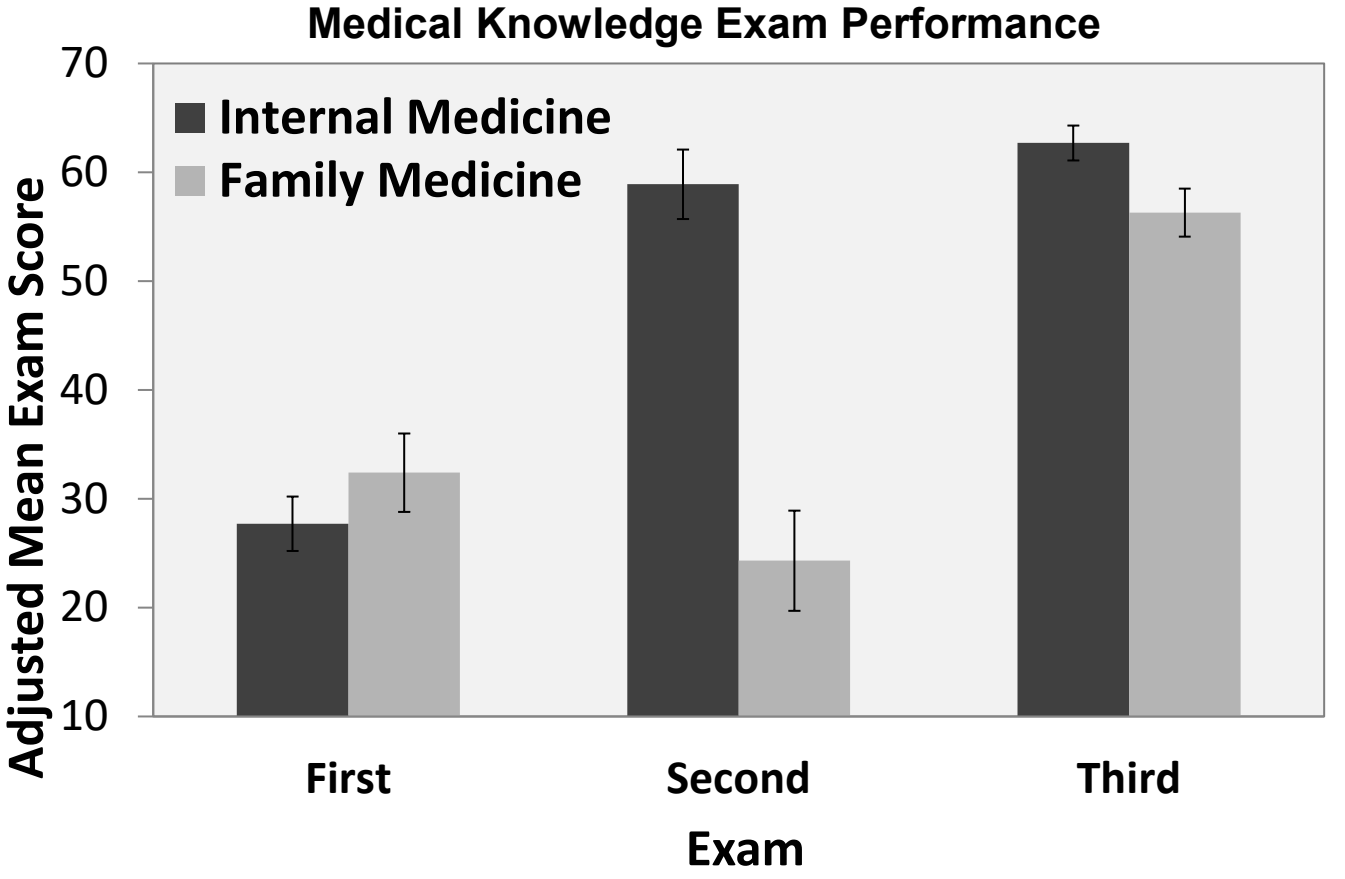
What Should be Included in AS Education for Providers (4)

- Guideline use: Inpatient big 4
  - UTI
  - CAP
  - HAP/VAP
  - Skin and soft tissue
- Guideline use: Outpatient big 4
  - Acute bronchitis
  - Pharyngitis
  - Sinusitis/Otitis media
  - UTI

"I'll be happy to give you innovative thinking. What are the guidelines?"

Ohl, Luther. Infect Dis Clin N Am 28. (2014) 177-93

Small Group Case Conference Emphasizing Stewardship Principles

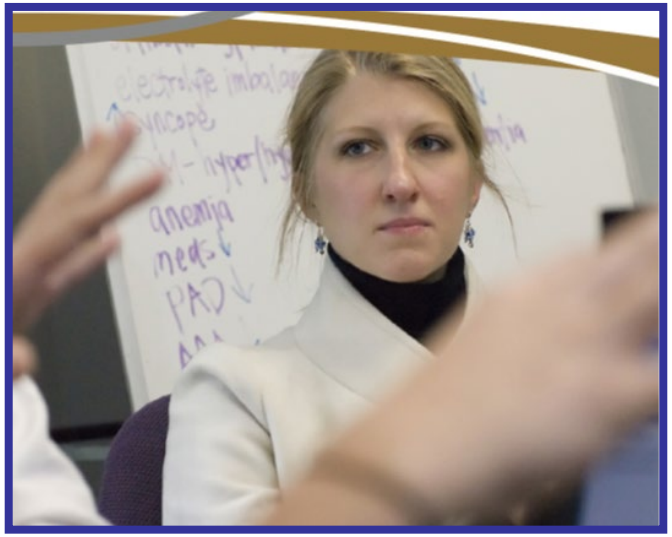


Luther et al. Presented at ID week 2015. Oct 2015, San Diego, CA

Get Smart About Antibiotics: An Antibiotic Stewardship Curriculum for Medical Students

- 3 Large Group PowerPoint Sessions (45 min)
  - Antibiotic Resistance and Its Relationship to Antibiotic Use
  - "Get Smart About Antibiotics." An Introduction to Prudent Antibiotic Use
  - Common Respiratory Tract Infections: Evaluation and Therapy

- Five Small Group Activities
  - Family Medicine Clerkship
  - Internal Medicine Clerkship
  - Surgery Clerkship
  - Pediatrics Clerkship
  - Emergency Medicine Clerkship



http://www.wakehealth.edu/AS-Curriculum/

Beta-lactam allergy is associated with poorer patient outcomes and increased length of stay

- Now confirmed in 4 studies in the past 5 years

Antimicrobial Agents and Chemotherapy 2013;57:5918-23

Antibiotic Stewardship and Allergy

- **XII. In Patients With a Reported History of ß-Lactam Allergy, Should ASPs Facilitate Initiatives to Implement Allergy Assessments With the Goal of Improved Use of First-Line Antibiotics?**

Recommendation

- In patients with a history of β-lactam allergy, we suggest that ASPs promote allergy assessments and penicillin (PCN) skin testing when appropriate (*weak recommendation, low-quality evidence*).
- Comment: Allergy assessments and PCN skin testing can enhance use of first-line agents, but it is largely unstudied as a primary ASP intervention; however, ASPs should promote such assessments with providers. In facilities with appropriate resources for skin testing, the ASPs should actively work to develop testing and treatment strategies with allergists.

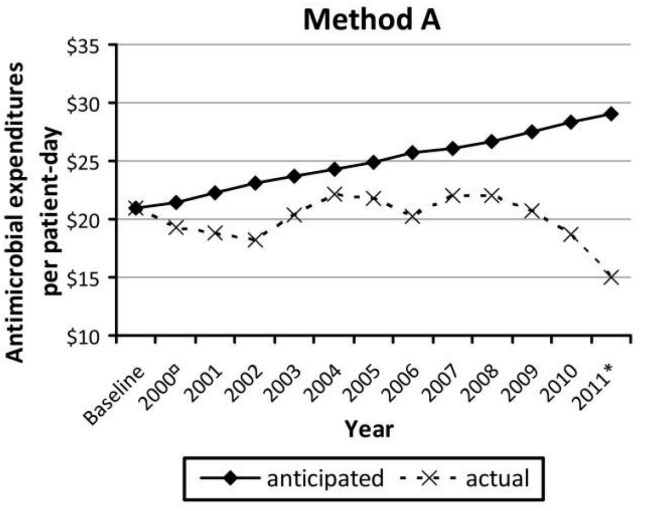
Implementing an Antibiotic Stewardship Program: Guidelines by the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America

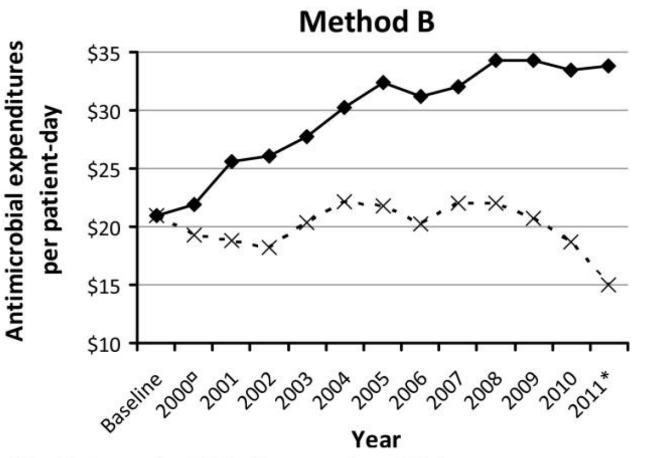
Clinical Infectious Diseases ; 2016 ; 62 : 51 -77

Antimicrobial Cost Savings WFBMC

Year	Method A	Method B
2000[a]	158,161	229,076
2001	548,002	1,267,638
2002	806,393	1,446,883
2003	473,174	1,354,129
2004	244,160	1,555,048
2005	419,613	2,005,202
2006	983,690	2,172,756
2007	675,036	1,990,967
2008	817,503	2,557,972
2009	1,278,301	2,782,519
2010	2,175,927	3,456,373
2011[b]	1,770,827	2,406,399
Yearly average	920,070	2,064,441
Total savings	10,350,787	23,224,961

Infect Control Hosp Epidemiol 2012;33(4):398-400






Hi, I’m from the Joint Commission, Do you have an Antibiotic Stewardship Program?
Yes! We have a wonderful, extremely helpful program

Special Article

A COMPUTER-ASSISTED MANAGEMENT PROGRAM FOR ANTIBIOTICS AND OTHER ANTIINFECTIVE AGENTS

R. Scott Evans, Ph.D., Stanley L. Pestotnik, M.S., R.Ph., David C. Classen, M.D., M.S., Terry P. Clemmer, M.D., Lindell K. Weaver, M.D., James F. Orme, Jr., M.D., James F. Lloyd, B.S., and John P. Burke, M.D.

Abstract

Background and Methods Optimal decisions about the use of antibiotics and other antiinfective agents in critically ill patients require access to a large amount of complex information. We have developed a computerized decision-support program linked to computer-based patient records that can assist physicians in the use of antiinfective agents and improve the quality of care. This program presents epidemiologic information, along with detailed recommendations and warnings. The program recommends antiinfective regimens and courses of therapy for particular patients and provides immediate feedback. We prospectively studied the use of the computerized antiinfectives-management program for one year in a 12-bed intensive care unit.

Results During the intervention period, all 545 patients admitted were cared for with the aid of the antiinfectives-management program. Measures of processes and outcomes were compared with those for the 1136 patients admitted to the same unit during the two years before the intervention period. The use of the program led to significant reductions in orders for drugs to which the patients had reported allergies (35, vs. 146 during the preintervention peri-

FACED with an increasing loss of autonomy in the managed care marketplace, physicians often view the debate about the quality of care as simply about finding ways to reward them for doing less for patients and to control costs by the use of arbitrary rules for clinical care.[1] Skeptics view quality-of-care projects as a disguised form of marketing; this skepticism will not disappear until physicians can see quality-of-care efforts that make difficult decisions easier and more accurate.[2,3] Establishing systems for improving care is difficult, at best, for groups of specialist physicians, but it is next to impossible for physicians working alone or for those who are employees in large bureaucratic organizations.[4] Both the provision of care and the monitoring of its quality depend on data that are often not available either in paper medical records or in administrative and billing data bases. Elaborate clinical computer systems, which are increasingly available, are vital for health care organizations.

The usefulness of clinical computer systems is beginning to be recognized. Perhaps their immediate value can best be demonstrated in terms of the most

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