Antibiotic Stewardship in Skilled Nursing Facilities: Getting into Compliance with the Mega Rule

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Disclosures

- R18HS022465-01A1
- R18HS023779-01

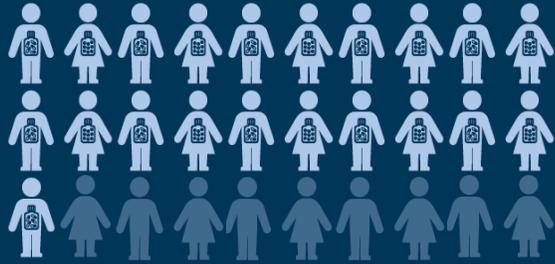- PPO 16-188 (HSR&D Pilot)
- HX001091-01 (HSR&D CREATE)

Consultant Activities:

1. Zurex Pharmaceuticals (Madison, WI): provide strategic advice on development and testing of the company's novel anti-septic platform (<$5,000).

2. Deb Group (SC Johnson Subsidiary, Charlotte, NC): provide strategic advice on evaluating the company's automated hand hygiene monitoring technology (<$5,000).
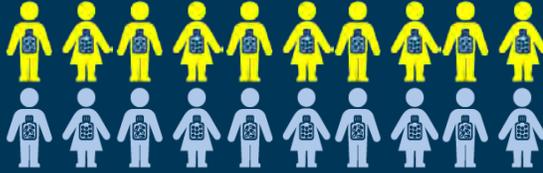
Objectives

- Overview of antibiotic use in SNFs

- Regulatory history & overview

- Reform of CMS Requirements of Participation

- Where to focus your efforts
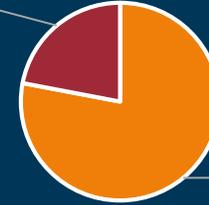
Why Antibiotic Use in SNFs Matters

Up to **70%** of skilled nursing facility residents will receive **one or more** courses of systemic antibiotics in a year

~50% of antibiotics started in skilled nursing facilities are **unnecessary**

Narrow-Spectrum 22%

FQ, Ceph, BL/BLI, Macrol 78%

A majority of antibiotics prescribed in skilled nursing facilities **are broad-spectrum**

50% < 7d > 50%

Half of antibiotic course for treatment of common infections are prescribed for **more than a week.**

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Why Antibiotic Use in SNFs Matters

HARMS AT INDIVIDUAL LEVEL

ADE
- 20% of all adverse drug events (ADEs) in nursing homes caused by antibiotics
- Antibiotic-associated ADEs are one of the most common reasons for transfer to ER

CDI
- *C. difficile* infection (CDI) is a life-threatening intestinal disease caused by antibiotics
- 12% of nursing home residents treated inappropriately for UTI develop CDI

ARO
- ~50% of nursing residents are colonized with antibiotic-resistant organisms (AROs)
- Antibiotic exposure is the single most important risk factor for ARO colonization
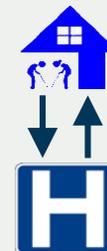
HARMS AT FACILITY LEVEL

Residents in nursing homes with higher antibiotic use have a **24% increased risk** of antibiotic-related harm

Antibiotics account for **1/3 of all survey penalties** for inappropriate medication use in Wisconsin nursing homes

HARMS AT POPULATION LEVEL

- Half of the residents transferred to the hospital are colonized with *C. difficile* and/or antibiotic-resistant bacteria which may be spread to others
- Nursing homes have been repeatedly implicated in the regional spread of resistance
- Mathematical models suggest that antibiotic resistance cannot be controlled in hospitals without controlling resistance in nursing homes

Our Government and Public Health Authorities Are Concerned

NATIONAL ACTION PLAN TO PREVENT HEALTH CARE-ASSOCIATED INFECTIONS: ROAD MAP TO ELIMINATION
APRIL 2013

CHAPTER 8: LONG-TERM CARE FACILITIES

NATIONAL ACTION
PLAN FOR COMBATING
ANTIBIOTIC-RESISTANT
BACTERIA

MARCH 2015

THE WHITE HOUSE
WASHINGTON

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Centers for Medicare & Medicaid Services

42 CFR Parts 405, 431, 447, 482, 483, 485, 488, and 489

[CMS–3260–F]

RIN 0938–AR61

Medicare and Medicaid Programs; Reform of Requirements for Long-Term Care Facilities

AGENCY: Centers for Medicare & Medicaid Services (CMS), HHS.

ACTION: Final rule.

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Evolution of Nursing Homes & the Regulatory Environment

Marion Branch National Home for Disabled Volunteer Soldiers, Indiana

1965 – The Older Americans Act (Medicare & Medicaid)

Nursing Home Reform Act of 1987
OBRA 87

2016 – CMS Updates "Requirements of Participation"
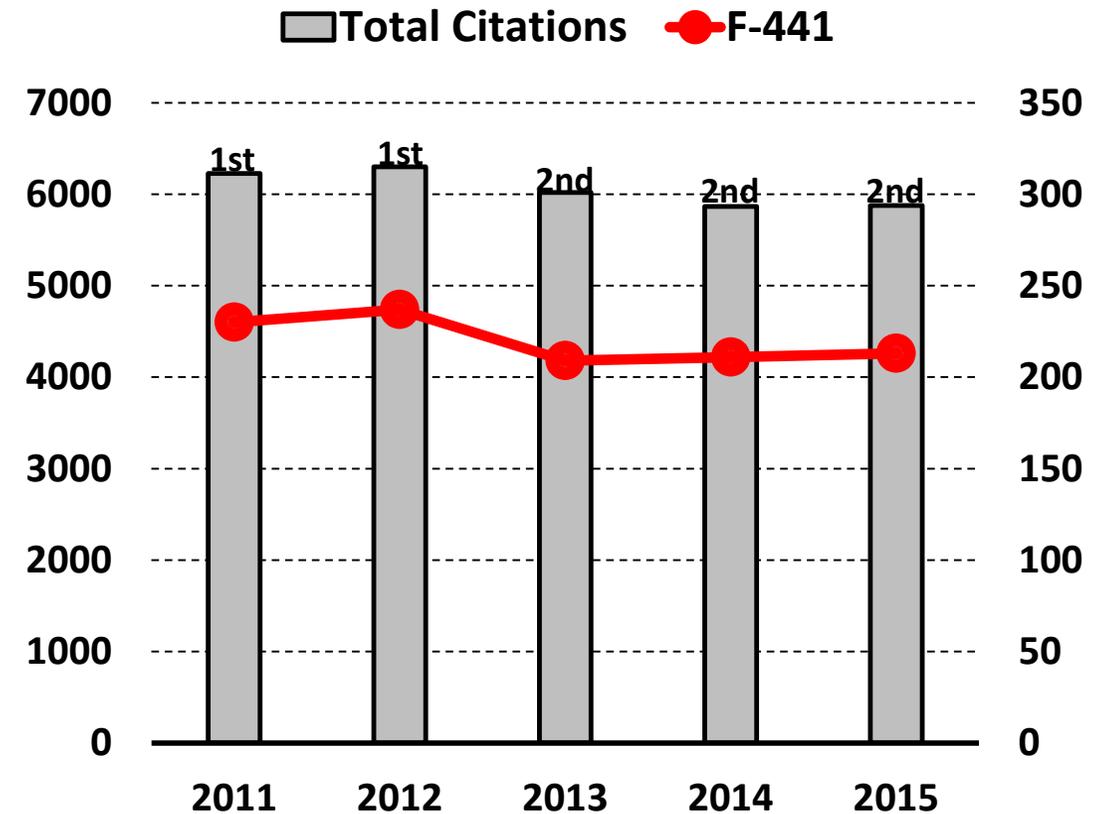
2009 – Infection Control Guidance Updated

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History of Infection Control Regulations

- ## 1990-2009

  - 5 survey tags – *6 pages* ⬅
  - F441 – "Infection Control"
  - F442 – "Preventing Spread of Infection"
  - F443 – "Employees with Communicable Disease"
  - F444 – "Handwashing"
  - F445 – "Linens"

- No clear guidance on how to interpret the regulations
- Antimicrobial stewardship???

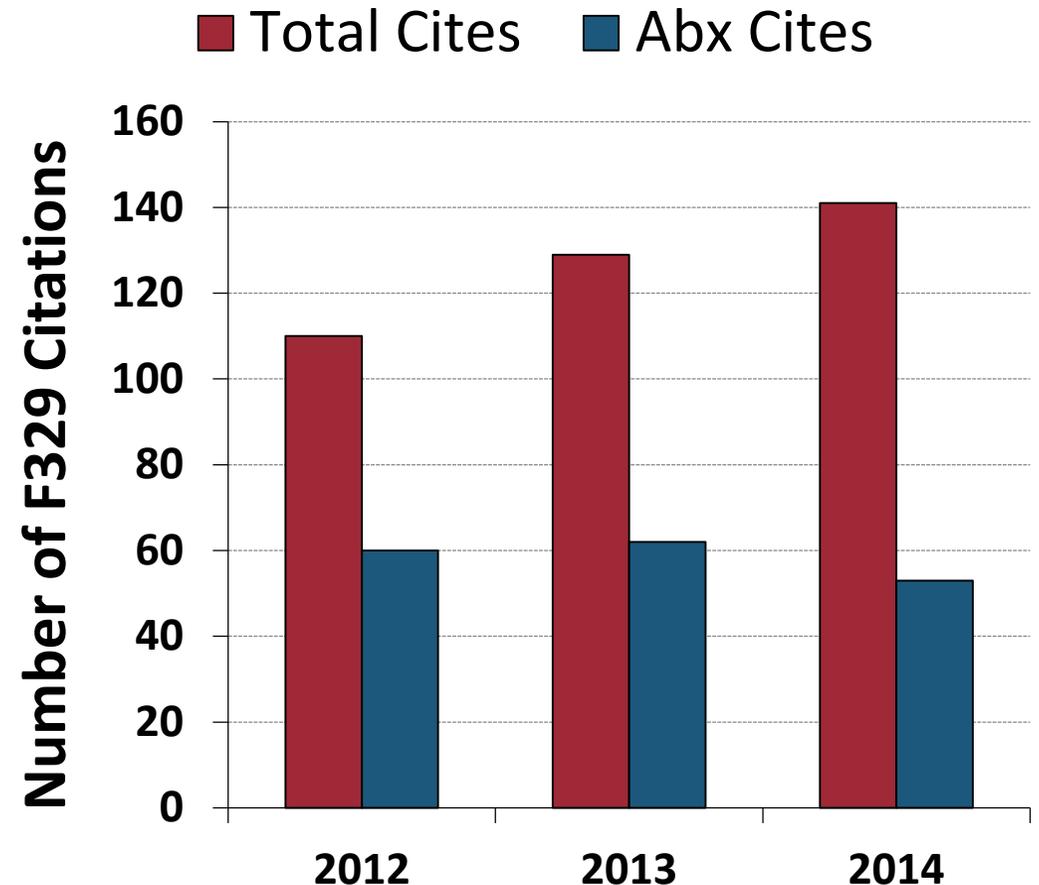**Trends in Survey Deficiencies in Wisconsin Nursing Homes: 2011-2015**

☐ Total Citations ●— F-441

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History of Infection Control Regulations

- **2005**
  - F329 – Unnecessary drugs
    - Often interpreted to apply only to antipsychotic medications
    - Actually applies to any high-risk medication

- **2009**
  - *Surveyor Guidance* updated - ***34 pages***
  - Collapsed tags to F441 – "Infection Control" – Required infection control program
    - Person who oversees, but short of requiring "IP"
    - Oversight not a full FTE
    - Hand hygiene
    - Transmission based precautions
    - Antibiotic review – review data to ensure appropriate use ???

Total Cites ▮ **Abx Cites** ▮

Number of F329 Citations

Year	Total Cites	Abx Cites
2012	110	60
2013	129	62
2014	141	53

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History of Infection Control Regulations

- **2016**
  - Sweeping change to regulations
    - Moved vaccination regs under IC regs
    - Focus expanded to include interrupting transmission in addition to preventing infections
    - Must follow national standards (NHSN or McGeer)
    - Facilities are required to base their IPCP program based on an annual facility assessment
    - Facilities must employ and designate an individual for responsibility the IPCP who has specific training beyond their terminal clinical degree
    - §483.80(a): The facility must establish an antibiotic stewardship program that includes antibiotic use protocols and a system to monitor antibiotic use.

Interpretive guidance is 696 pages (IC-related sections 49 pages)

https://www.federalregister.gov/documents/2016/10/04/2016-23503/medicare-and-medicaid-programs-reform-of-requirements-for-long-term-care-facilities

https://www.ahcancal.org/facility_operations/Documents/SC17-36.03.Appendix%20PP%20with%20Final%20IGs.pdf

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    11/2018
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    11/2017
    - **§483.80(a): The facility must establish an antibiotic stewardship program that includes antibiotic use protocols and a system to monitor antibiotic use.**

https://www.federalregister.gov/documents/2016/10/04/2016-23503/medicare-and-medicaid-programs-reform-of-requirements-for-long-term-care-facilities
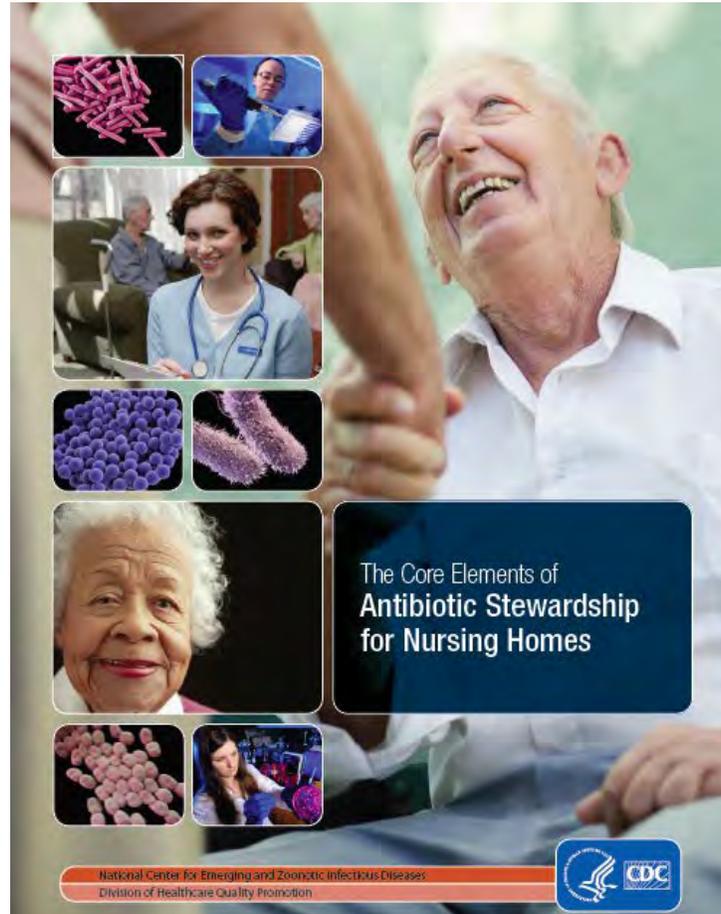
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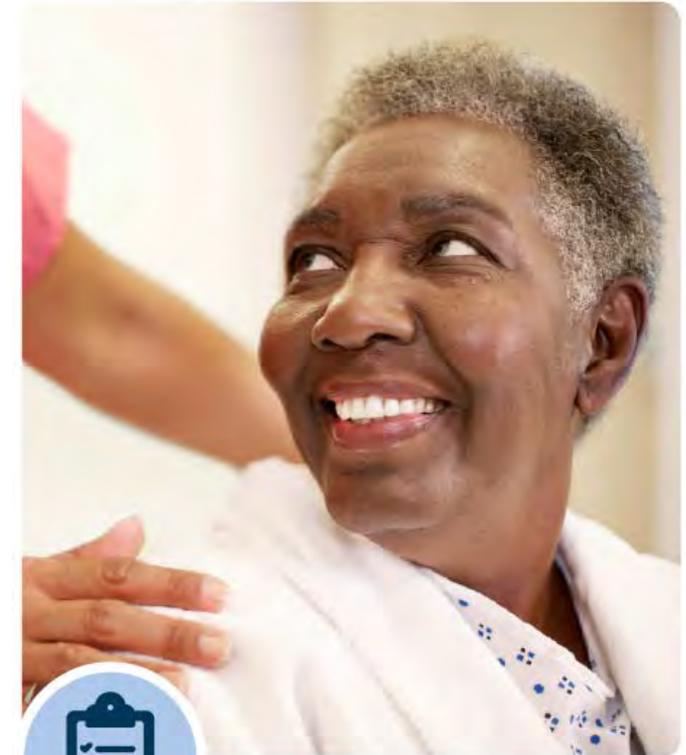
Specific Regulatory Language

- Leadership support
  - Involve medical director, consulting pharmacist, nursing, administrative leadership
  - Involve facility ICPO

- Facilities will develop and implement ASP protocols that address:
  - How program will be integrated into facility IPCP
  - Frequency of program review (at least annually)
  - How antibiotic use and resistance outcomes will be tracked & reported
  - Frequency and mode of use/outcome reporting to prescribers
  - Criteria the facility will employ to determine antibiotic appropriateness
  - Frequency and mode of staff/prescriber education

- Required prescribing (indication, drug, dose, duration) and monitoring practices (notification of test results that may affect treatment decisions)

Regs Modeled on CDC Core Elements

The Core Elements of **Antibiotic Stewardship for Nursing Homes**

National Center for Emerging and Zoonotic Infectious Diseases
Division of Healthcare Quality Promotion

CDC

Leadership commitment
Demonstrate support and commitment to safe and appropriate antibiotic use in your facility

Accountability
Identify physician, nursing and pharmacy leads responsible for promoting and overseeing antibiotic stewardship activities in your facility

Drug expertise
Establish access to consultant pharmacists or other individuals with experience or training in antibiotic stewardship for your facility

Action
Implement **at least one** policy or practice to improve antibiotic use

Tracking
Monitor **at least one process** measure of antibiotic use and **at least one outcome** from antibiotic use in your facility

Reporting
Provide regular feedback on antibiotic use and resistance to prescribing clinicians, nursing staff and other relevant staff

Education
Provide resources to clinicians, nursing staff, residents and families about antibiotic resistance and opportunities for improving antibiotic use
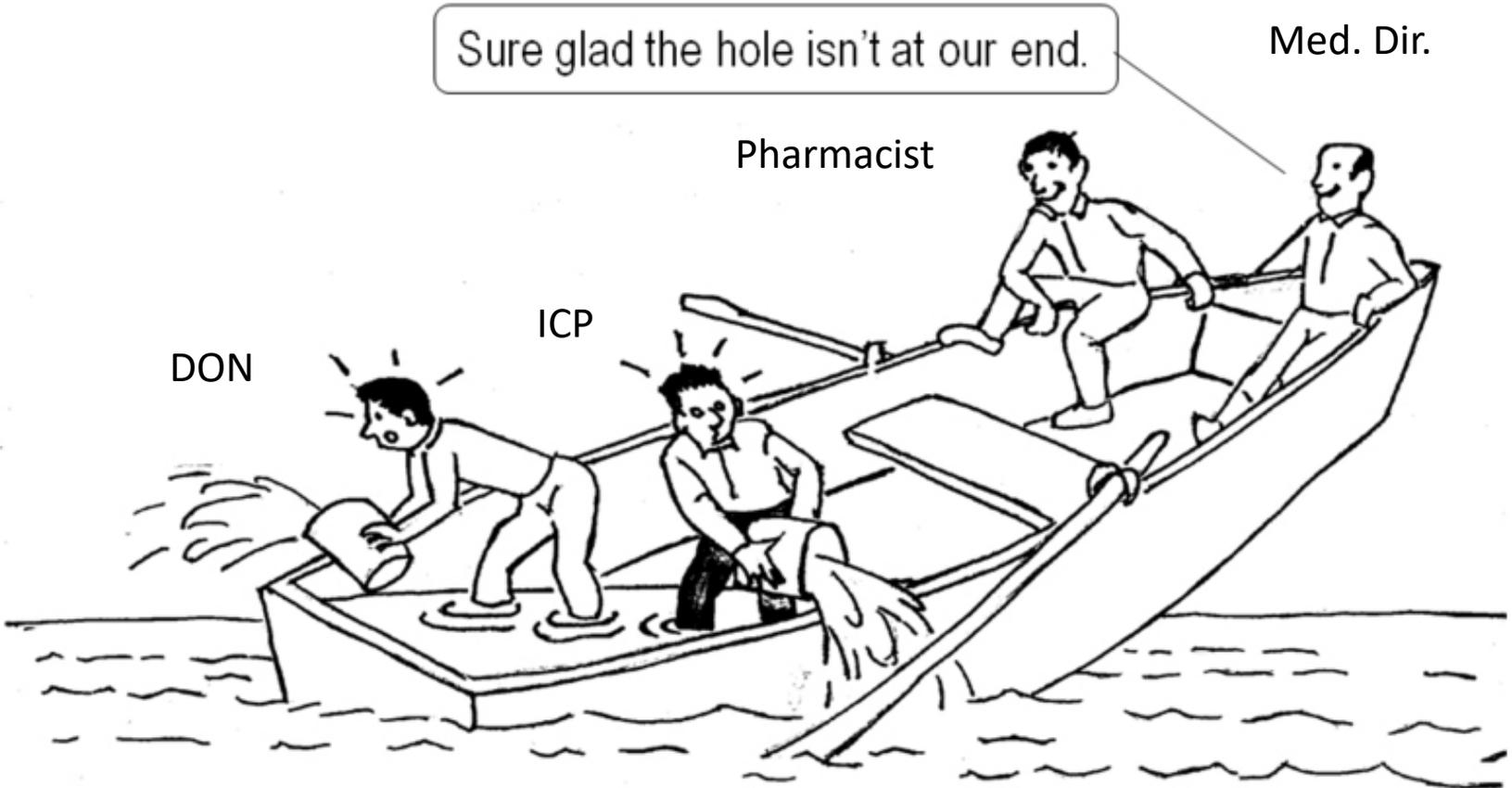
Checklist for Core Elements of Antibiotic Stewardship in Nursing Homes

Identify an individual to be responsible for leading the ASP team

ASP is a team effort

ASP team tasks

Pre-Prescribing

- Policy/procedure development (Core)
- Education & promotion (Core)
- Antibiotic utilization tracking & reporting (Core)
- Facility antibiogram (Advanced)
- Facility-specific prescribing guideline (Advanced)
- Provider feedback reports (Advanced)

Post-prescribing

- Audit & feedback (Advanced)

Nursing Practice

- SBAR (Core)
- Reducing unnecessary urine testing (Core)
- Antibiotic timeout (Core)

ASP team tasks

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Antibiotic stewardship policy template

Special Article

Template for an Antibiotic Stewardship Policy for Post-Acute and Long-Term Care Settings

Robin L.P. Jump MD, PhD [a,b,*], Swati Gaur MD, MBA, CMD [c], Morgan J. Katz MD [d], Christopher J. Crnich MD, PhD [e,f], Ghinwa Dumyati MD [g], Muhammad S. Ashraf MBBS [h], Elizabeth Frentzel MPH [i], Steven J. Schweon RN, MPH, MSN, CIC, HEM [j], Philip Sloane MD, MPH [k], David Nace MD, MPH, CMD [l] on behalf of the Infection Advisory Committee for AMDA—The Society of Post-Acute and Long-Term Care Medicine

Jump et al. *JAMDA* 2017; epub ahead of print

- Eliminate reagent strip testing of urine for the evaluation of resident change-in-condition

- Carefully assess unintended consequences of testing delegation protocols

- Process & tools for assessing and communicating resident change-in-condition

- Eliminate test-of-cure urine cultures

- Discourage use of prophylactic antibiotics

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ASP team tasks

Pre-Prescribing

- Policy/procedure development (Core)

- **Education & promotion (Core)**

- Antibiotic utilization tracking & reporting (Core)

- Facility antibiogram (Advanced)

- Facility-specific prescribing guideline (Advanced)

- Provider feedback reports (Advanced)

Post-prescribing
- Audit & feedback (Advanced)

Nursing Practice

- SBAR (Core)

- Reducing unnecessary urine testing (Core)

- Antibiotic timeout (Core)

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Education & Training

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RESEARCH

Table 3. Random Assignment and Treatment with Parenteral Antibiotics According to Guideline

	Random Assignment of SNFs	
	Multi-Disciplinary Training	Physician-Only Training
	(% of episodes with guideline indication)	
Preintervention	50% (10/20)	64.5% (69/107)
Postintervention	81.8%* (18/22)	69% (29/42)

*P = .06.
SNF = skilled nursing facility.

Naughton et al. *J Am Geriatr Soc* 2001; 49(8): 1020-4

Effectiveness of multifaceted educational programme to reduce antibiotic dispensing in primary care: practice based randomised controlled trial

OPEN ACCESS

Contents lists available at ScienceDirect

American Journal of Infection Control

journal homepage: www.ajicjournal.org

Brief report

Results of a Veterans Affairs employee education program on antimicrobial stewardship for older adults

Barbara Heath MSN [a], Jaime Bernhardt BA [b], Thomas J. Michalski BS [b], Christopher J. Crnich MD, PhD [c], Rebekah Moehring MD, MPH [d], Kenneth E. Schmader MD [d], Danielle Olds RN, MPH, PhD [e,1], Patricia A. Higgins RN, PhD [a,f], Robin L.P. Jump MD, PhD [a,g,h,*]

[a] Geriatric Research Education and Clinical Center, Cleveland, OH
[b] Employee Education System, Louis Stokes Cleveland Veterans Affairs Medical Center, Cleveland, OH
[c] Geriatric Research Education and Clinical Center, William S. Middleton Memorial Veterans Hospital and University of Wisconsin, Madison, WI
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[f] Frances Payne Bolton School of Nursing, Case Western Reserve University, Cleveland, OH
[g] Division of Infectious Diseases and HIV Medicine, Department of Medicine, Case Western Reserve University, Cleveland, OH
[h] Infectious Disease Section, Medical Division, Louis Stokes Cleveland Veterans Affairs Medical Center, Cleveland, OH

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https://www.coursesites.com/webapps/Bb-sites-course-creation-BBLEARN/courseHomepage.htmlx?course_id=_348931_1

Resident & Family Engagement - Passive

AHRQ Antibiotic Stewardship Toolkit – available at https://www.ahrq.gov/nhguide/index.html
Meeker et al. *JAMA Intern Med* 2014; 174(3): 425-31

ASP team tasks

Pre-Prescribing
- Policy/procedure development (Core)
- Education & promotion (Core)
- **Antibiotic utilization tracking & reporting (Core)**
- Facility antibiogram (Advanced)
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Post-prescribing
- Audit & feedback (Advanced)

Nursing Practice
- SBAR (Core)
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Measuring antibiotic utilization

Antibiotic tracking and reporting requirements

- What needs to be tracked?
  - Utilization measure
  - Outcome measure (C. diff rates, MRSA rates, <u>antibiogram</u>)
  - Appropriateness measure

- What type of reporting?
  - QAA meeting
  - Providers

Antibiotic Measures

Utilization	Appropriateness
• Antibiotic start (event)	• Necessity
• Days of therapy (DOT/AUR)	• % of courses exceeding "X" days
• Length of therapy (LOT)	• Appropriateness of spectrum
• Defined daily dose (DDD)	• Appropriateness of dose
• Costs (per a-day/r-day)	

Mylotte J. *J Am Med Dir Assoc* 2016; 17(7): e13-8

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Antibiotic Starts

- Pros
  - Many facilities are already doing this (typically counts only)
  - Aligned with current 24-hour report & infection log processes
  - Relatively easy to marry with treatment indication
  - Not influenced by prophylactic therapy
  - Can be easily modified to exclude hospital-initiated antibiotics

- Cons
  - Current data systems dictate reliance on manual data abstraction methods
    - If automated, could be inflated by intermittent therapy (fosfomycin, vancomycin), treatment interruptions and treatment modifications
    - Suboptimal reliability of 24-hour report/infection logs
  - Does not address prophylactic antibiotics
  - Does not address dimensions of appropriateness (necessity, duration, spectrum)

Days of Therapy (DOT)

- Pros
  - Identical to the hospital AU measure
  - Does provide indirect information on length of therapy (not the case in hospitals)
  - More amenable to automation than antibiotic starts

- Cons
  - May be difficult to parse out hospital-initiate antibiotics
  - May be difficult to parse out prophylactic antibiotics
  - May be difficult to parse out relative contribution of different treatment indications
  - Only captures information on one dimension of appropriateness (duration)

Measures of Appropriateness - Necessity

Revised McGeer (Stone)

(A) Clinical
(Must satisfy one of the following scenarios)

1. Either of the following:
   - ☐ Acute dysuria or
   - ☐ Acute pain, swelling or tenderness of testes, epididymis or prostate

2. If either FEVER* or LEUKOCYTOSIS present need to include ONE or more of the following:
   - ☐ Acute costovertebral angle pain or tenderness
   - ☐ Suprapubic pain
   - ☐ Gross hematuria
   - ☐ New or marked increase in incontinence
   - ☐ New or marked increase in urgency
   - ☐ New or marked increase frequency

3. If neither FEVER or LEUKOCYTOSIS present INCLUDE TWO or more of the ABOVE (Box #2).

+

(B) Lab (At least one of the following must be met)

1. VOIDED SPECIMEN: POSITIVE URINE CULTURE ($\geq 10^5$ CFU/ML) NO MORE THAN 2 ORGANISMS

2. STRAIGHT CATH SPECIMEN: POSITIVE URINE CULTURE ($\geq 10^2$ CFU/ML) ANY NUMBER OF ORGANISMS

Crnich et al. *SHEA* 2014

Loeb Minimum Criteria

(A) Clinical
(Must satisfy one of the following scenarios)

1. Acute dysuria

2. FEVER** plus ONE or more of the following:
   - ☐ New or worsening urgency
   - ☐ New or worsening frequency
   - ☐ Suprapubic pain
   - ☐ Gross hematuria
   - ☐ Costovetebral angle tenderness
   - ☐ Urinary incontinence

* Fever (Revised McGeer): single temp ≥ 100°F <u>or</u> repeated temp ≥ 99°F <u>or</u> 2°F above baseline

** Fever (LMC)x: single temp ≥ 100°F <u>or</u> 2.4°F above baseline

McGeer   55 (22%)   101 (40%)   85 (34%)   **Loeb**

Either Criteria Positive = 251/504 (49.8%)
Agreement = 354/504 (70.2%)

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Measures of Appropriateness - Duration

- 50% of facility-initiated Abx treatment courses exceed 7 days

- 20% of antibiotic utilization can be eliminated by shortening treatment courses to 7 days or less

- Measures
  - DOTs
  - % of facility-initiated treatment courses exceeding 7 days

Crnich et al. APIC Wisconsin 2015
Daneman et al. *JAMA Intern Med* 2013; 173(8): 673-82

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Other Measures of Appropriateness

- % of facility-initiated treatment courses that are guideline concordant

- % of facility-initiated treatment courses in which specific classes of antibiotics utilized (e.g., fluoroquinolones)

- Spectrum Score

- Medication appropriateness index

Suggestions for developing tracking workflows

- Start having conversations with facility pharmacy
  - Most pharmacy services maintain a database that details drug, dispense date and days of therapy that was dispensed
  - They will not often have data on indication or appropriateness

- Offload primary data collection to frontline staff
  - Every facility uses a 24-hour board that can potentially be adapted to capture discrete resident information
  - Can get information on antibiotic starts, duration of therapy and indication
  - Will be difficult to incorporate appropriateness (duration being an exception)

- Integrate into infection surveillance activities
  - IP is required to maintain line-list of infections in the facility
  - It is minimal effort to capture data on antibiotic use
  - Can assess appropriateness

ABCs for Diagnosing Urinary Tract Infection in Long Term Care

Resident Name:_____Date/Time:_____

Nurse:_____MD/NP/PA:_____

Diagnosis of Urinary Tract Infection (UTI) in long term care resident requires clinical signs and symptoms of UTI and a positive culture.

Assessment: Clinical Signs and Symptoms of UTI[1]

☐ CHECK HERE IF CRITERIA ARE MET FOR SIGNS OR SYMPTOMS

Resident without indwelling catheter*		Resident with indwelling catheter

☐ **Acute dysuria alone OR**
☐ **Fever + at least one of the symptoms below (new or increased) OR**
☐ **If no fever, at least two of the symptoms below (new or increased)**
  ☐ Urgency
  ☐ Frequency
  ☐ Suprapubic pain
  ☐ Gross hematuria
  ☐ Costovertebral angle (CVA) pain or tenderness
  ☐ Urinary incontinence
 	
*Mental status changes alone are not specific enough to identify symptomatic urinary tract infection. See reverse side for alternative causes.
	OR	☐ **At least one of the symptoms below (new or increased)**
		
		  ☐ Fever
		  ☐ Costovertebral angle (CVA) pain or tenderness
		  ☐ Rigors (shaking chills)
		  ☐ Delirium
		  ☐ Flank pain (back, side pain)
		  ☐ Pelvic discomfort
		  ☐ Acute hematuria
		  ☐ Malaise or lethargy with no other cause

Blood Pressure_____Pulse_____Temperature_____Respiratory Rate_____

☐ Fever *(oral > 100°F or any site > 2°F above baseline or repeated oral > 99°F / rectal >99.5°F)*

Bacteria (Order urinalysis and culture & sensitivity if above criteria are met)

Collect clean voided specimen if possible; in and out catheter if necessary. For residents with chronic indwelling Foley catheter, change catheter; send urine obtained from new catheter.

Consider CBC, BMP if clinically indicated (e.g., lethargy, fever). The presence of an elevated WBC count suggests infection, with or without a fever.

Urinalysis		Culture and sensitivity
Nitrite	☐ Positive ☐ Negative	☐ Positive urine culture:
		Clean catch specimen: $\geq 10^5$ cfu/mL with ≤ 2 organisms
Leukocyte esterase	☐ Positive ☐ Negative	Catheterized specimen (straight cath or newly placed indwelling cath): $\geq 10^3$ cfu/mL with ≥ 1 organism
Pyuria	☐ > 10 WBC urinalysis	
		☐ Negative urine culture

Care Plan

Criteria met for UTI symptoms **AND** positive urine culture	→	☐ Review for treatment with antibiotics ☐ Monitor vital signs ☐ Monitor fluid intake and increase if indicated
Criteria not met for UTI symptoms (with or without a positive urine culture)	→	☐ Review for alternate diagnosis ☐ Monitor vital signs and symptoms ☐ Monitor fluid intake and increase if indicated ☐ Re-evaluate if above criteria for symptomatic UTI emerge

AT ANY POINT, re-evaluate and review with MD/NP/PA, if symptoms progress or if the resident has any of the following: Fever > 100.5° F, heart rate > 100 or < 50, RR > 28/min or < 10/min, BP < 90 or > 200 systolic, oxygen saturation < 90%, finger stick glucose < 70 or > 300, unable to eat or drink.

Prior to treatment consider review:		
Advance directives for limiting treatment (especially antibiotics):	☐ NO	☐ YES
Medication Allergies:	☐ NO	☐ YES
The resident is on warfarin (Coumadin)	☐ NO	☐ YES

Possible causes for mental status changes include:	
• Constipation	• Infections such as pneumonia
• Pain	• Hypo/hyperglycemia
• Dehydration	• Urinary retention
• Medication or dose change	• Environmental triggers
• Hypoxia	

NOTES

_____
_____
_____
_____
_____
_____
_____
_____

Additional copies available at http://macoalition.org/evaluation-and-treatment-uti-in-elderly.shtml

[1] CID 2010;50:625-663 (IDSA guidelines CA-UTI): ID 2009;48:149-171 (IDSA guidelines LTCF): ICHE 2001;22:120-124 (Loeb criteria) CID 2005;40:643-54 (IDSA guidelines ASB); Interact 3.0 Care Path Symptoms of UTI

http://www.macoalition.org/Initiatives/infections/uti_2013/tools/UTI%20Protocol_final.pdf

Suspected UTI **SBAR**

Complete this form before contacting the resident's physician.

Date/Time _____

Nursing Home Name _____

Resident Name _____ Date of Birth _____

Physician/NP/PA _____ Phone _____

Fax _____

Nurse _____ Facility Phone _____

Submitted by ☐ Phone ☐ Fax ☐ In Person ☐ Other _____

S Situation

I am contacting you about a suspected UTI for the above resident.

Vital Signs   BP _____ / _____   HR _____   Resp. rate _____   Temp. _____

B Background

Active diagnoses or other symptoms (especially, bladder, kidney/genitourinary conditions)

Specify _____

☐ No ☐ Yes The resident has an indwelling catheter

☐ No ☐ Yes Patient is on dialysis

☐ No ☐ Yes The resident is incontinent **If yes,** new/worsening? ☐ No ☐ Yes

☐ No ☐ Yes Advance directives for limiting treatment related to antibiotics and/or hospitalizations

Specify _____

_____

☐ No ☐ Yes Medication Allergies

Specify _____

_____

☐ No ☐ Yes The resident is on Warfarin (Coumadin®)

Nursing Home Name _____ Facility Fax _____

Resident Name _____

A Assessment Input (check all boxes that apply)

Resident **WITH** indwelling catheter	Resident **WITHOUT** indwelling catheter
The criteria are met to initiate antibiotics if one of the below are selected	Criteria are met if one of the three situations are met
No Yes	No Yes
☐ ☐ Fever of 100°F (38°C) or	☐ ☐ 1. Acute dysuria alone
	— OR —

active UTI infection.

cate an

https://www.ahrq.gov/sites/default/files/wysiwyg/nhguide/4_TK1_T1-SBAR_UTI_Final.pdf

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Other suggestions

- Use cross-sectional approaches to identify problem areas

- Design prospective tracking efforts with your improvement activities in mind
  - Focus on tracking UTI treatment if your efforts are only focused on UTI
  - Make sure you have some tool for assessing diagnosis shifting (everyone who used to have UTI now has respiratory tract infection)

- Trend your data using incidence densities (e.g., events per 1,000 resident-days) rather than count data

- Be careful when comparing your data to external data

ASP team tasks

Pre-Prescribing
- Policy/procedure development (Core)
- Education & promotion (Core)
- Antibiotic utilization tracking & reporting (Core)
- Facility antibiogram (Advanced)
- Facility-specific prescribing guideline (Advanced)
- Provider feedback reports (Advanced)

Post-prescribing
- Audit & feedback (Advanced)

Nursing Practice
- **SBAR (Core)**
- Reducing unnecessary urine testing (Core)
- Antibiotic timeout (Core)

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Nursing Influences on Prescriber Decision-Making

- Thoroughness of the initial assessment of resident change-in-condition

- Thoroughness of communicating findings of the assessment

- Nurse recommendations for testing and treatment

- Follow-up assessment of the resident

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Communication/Decision Aid Tool

- Quasi-experimental study in 12 NHs in Texas

- Intervention focused on operationalizing Loeb study (2005) into a communication tool

- Implementation stratified by intensity
  - Control (n = 4)
  - Low-intensity (n = 4)
  - High-intensity (n = 4)

OR = 0.35
95% CI = 0.16 − 0.76

Legend: Pre (red), Post (orange)
Y-axis: Treatment of Asymptomatic Bacteriuria
X-axis: High Fidelity, Low Fidelity

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ASP team tasks

Pre-Prescribing
- Policy/procedure development (Core)
- Education & promotion (Core)
- Antibiotic utilization tracking & reporting (Core)
- Facility antibiogram (Advanced)
- Facility-specific prescribing guideline (Advanced)
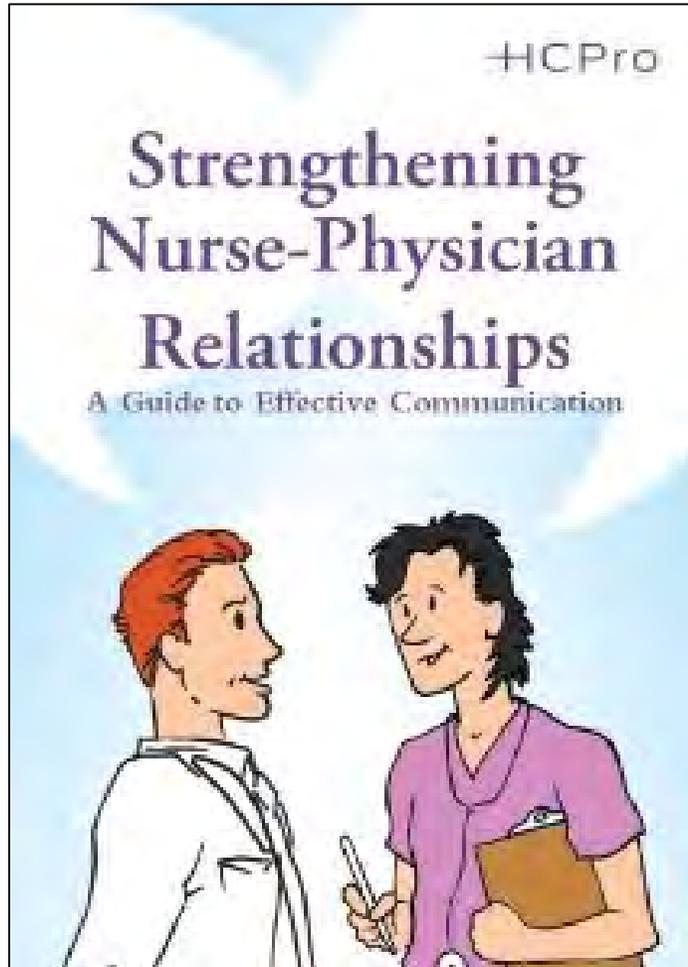- Provider feedback reports (Advanced)

Post-prescribing
- Audit & feedback (Advanced)

Nursing Practice
- SBAR (Core)
- **Reducing unnecessary urine testing (Core)**
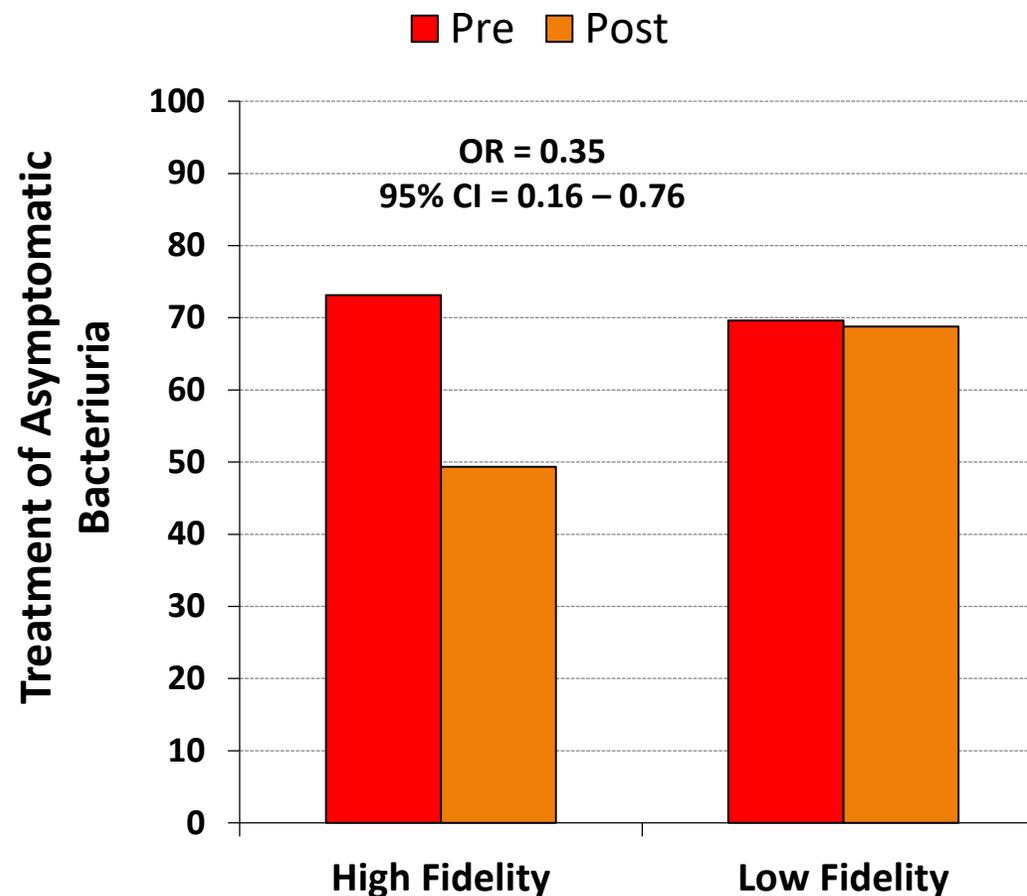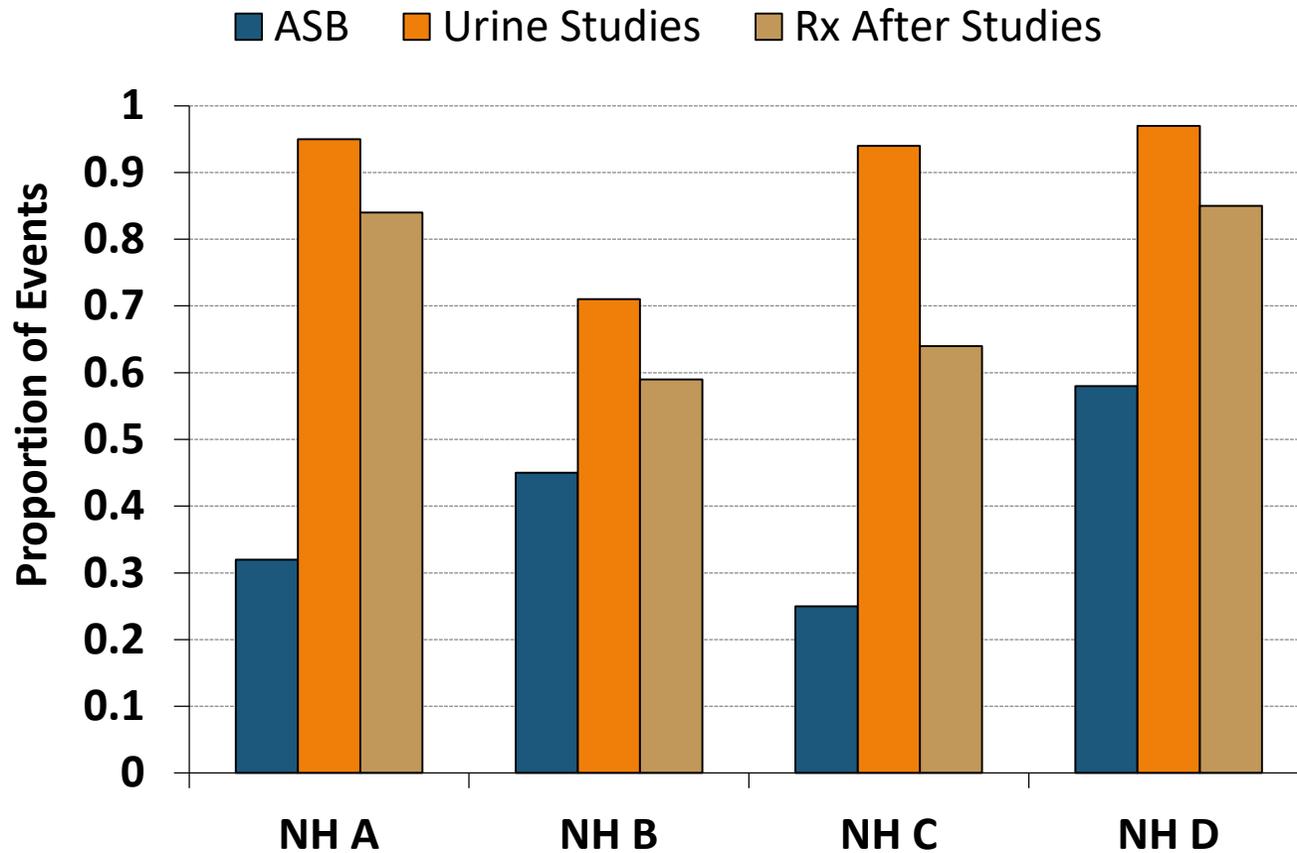- Antibiotic timeout (Core)

Dipstick → UA → Urine culture → Antibiotic Prescription

Chart legend: ■ ASB ■ Urine Studies ■ Rx After Studies

Y-axis: Proportion of Events (0 to 1)
X-axis categories: NH A, NH B, NH C, NH D

- Urine testing automated in many NHs.
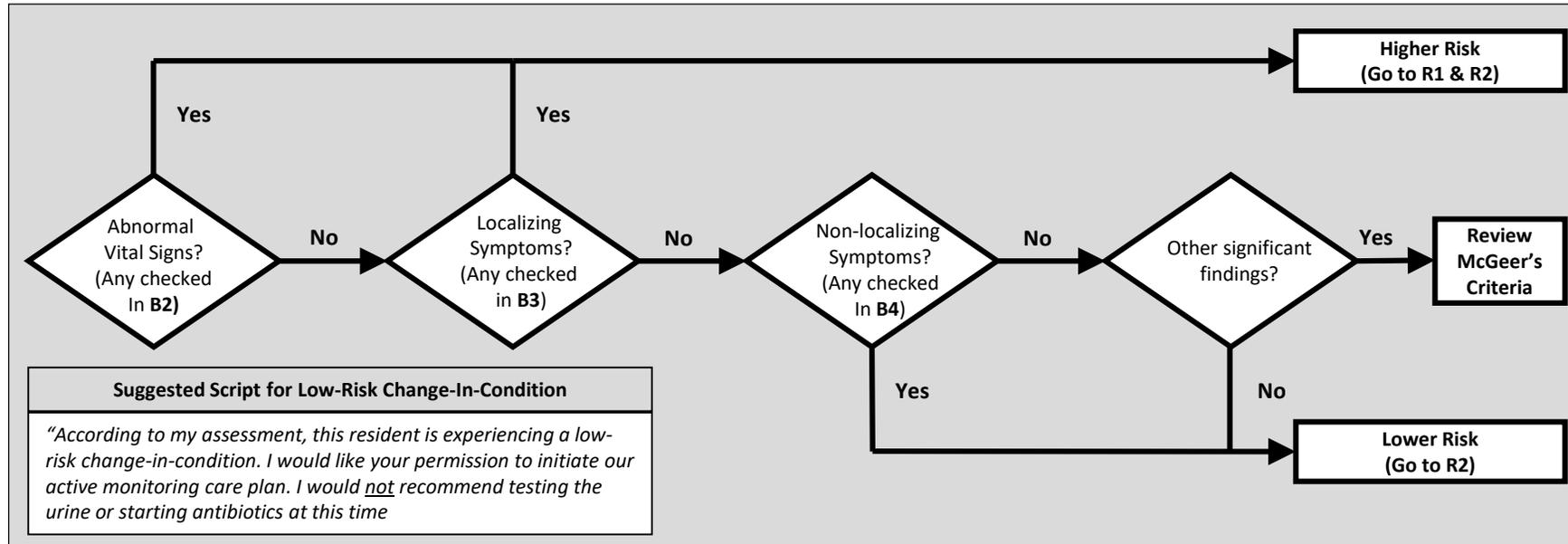
- Average time from recognition of change to antibiotic = 2-3 days

- 60-90% of antibiotics prescribed for UTI started <u>after</u> culture results are back

Juthani-Mehta et al. *J Am Geriatr Soc* 2009; 57(6): 963-70
Phillips et al., *BMC Geriatrics* 2012; 12: 73
Drinka & Crnich, *Ann Long Term Care* 2014; 22(9)

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Active monitoring is doing something

Suggested Script for Low-Risk Change-In-Condition

"According to my assessment, this resident is experiencing a low-risk change-in-condition. I would like your permission to initiate our active monitoring care plan. I would _not_ recommend testing the urine or starting antibiotics at this time

Flowchart:
- Abnormal Vital Signs? (Any checked In **B2**) — Yes → Higher Risk (Go to R1 & R2); No →
- Localizing Symptoms? (Any checked in **B3**) — Yes → Higher Risk (Go to R1 & R2); No →
- Non-localizing Symptoms? (Any checked In **B4**) — Yes → Lower Risk (Go to R2); No →
- Other significant findings? — Yes → Review McGeer's Criteria; No → Lower Risk (Go to R2)

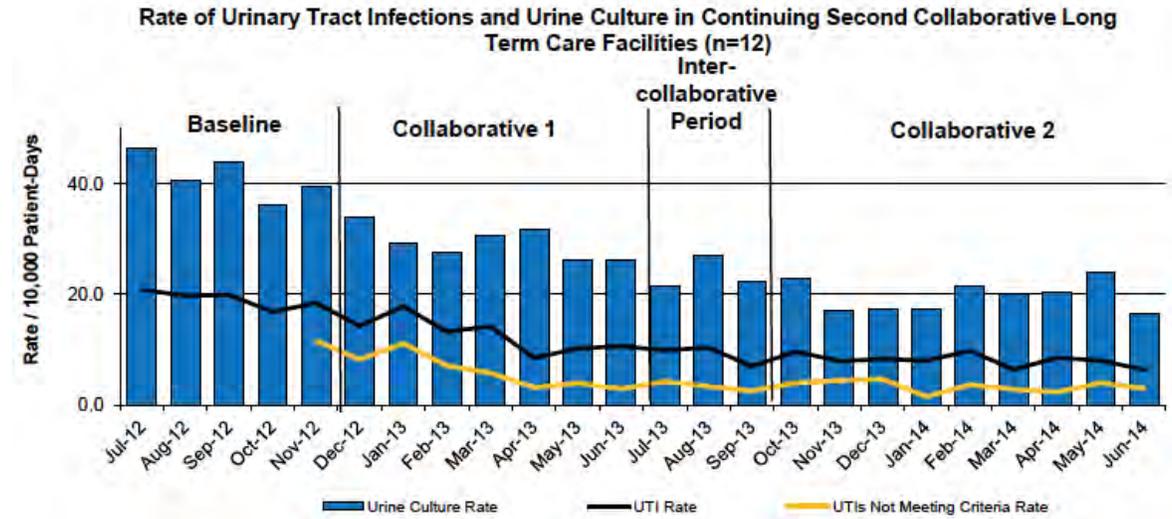---

R1. Diagnostic and Therapeutic Orders

☐ Urinalysis   ☐ Oxygen supplementation
☐ Urine Culture   ☐ Nebulizer treatment
☐ CBC w/Diff   ☐ Cough suppressants
☐ Chest X-Ray   ☐ Other: _____
☐ Start Antibiotic(s) for this indication: _____
  Antibiotic: _____ Dose: _____ Frequency: _____ Days: ____
  Antibiotic: _____ Dose: _____ Frequency: _____ Days: ____
☐ Start these other medications: _____
☐ Other orders: _____
_____

R2. Monitoring and Supportive Care Orders

☐ Monitor vital signs every ____ hours
☐ Oral fluids for hydration: ____ cc _____ hr.
☐ IV fluids for hydration ____ cc _____ hr.
☐ Monitor fluid intake/urine output every ___ hours
☐ Notify provider if symptoms worsen or if unresolved in ____ hours / days
☐ Other orders: _____
_____
_____
_____

Reduced Testing → Reduced Treatment

- 12 NHs in Massachusetts participated

- Intervention
  - Education (NH staff & providers)
  - Pathway (form)
  - Process and outcome measures trended & regularly reviewed by facility staff

Rate of Urinary Tract Infections and Urine Culture in Continuing Second Collaborative Long Term Care Facilities (n=12)

Measure	IRR (95% CI)
Urine Culture Rate	0.47 (0.42 – 0.52)
UTI Rate	0.42 (0.35 – 0.50)
C. Difficile Rate	0.85 (0.45 – 1.68)

Doron et al., *IDWeek* 2014 [poster abstract]

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ASP team tasks

Pre-Prescribing
- Policy/procedure development (Core)
- Education & promotion (Core)
- Antibiotic utilization tracking & reporting (Core)
- Facility antibiogram (Advanced)
- Facility-specific prescribing guideline (Advanced)
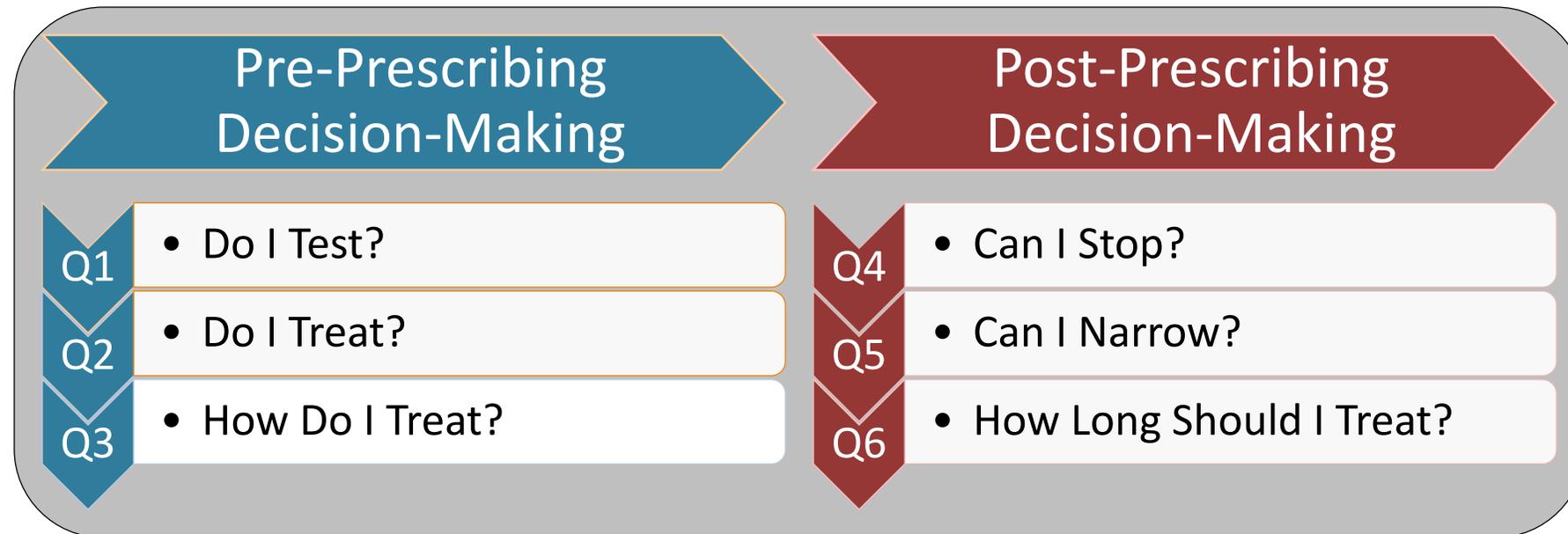- Provider feedback reports (Advanced)

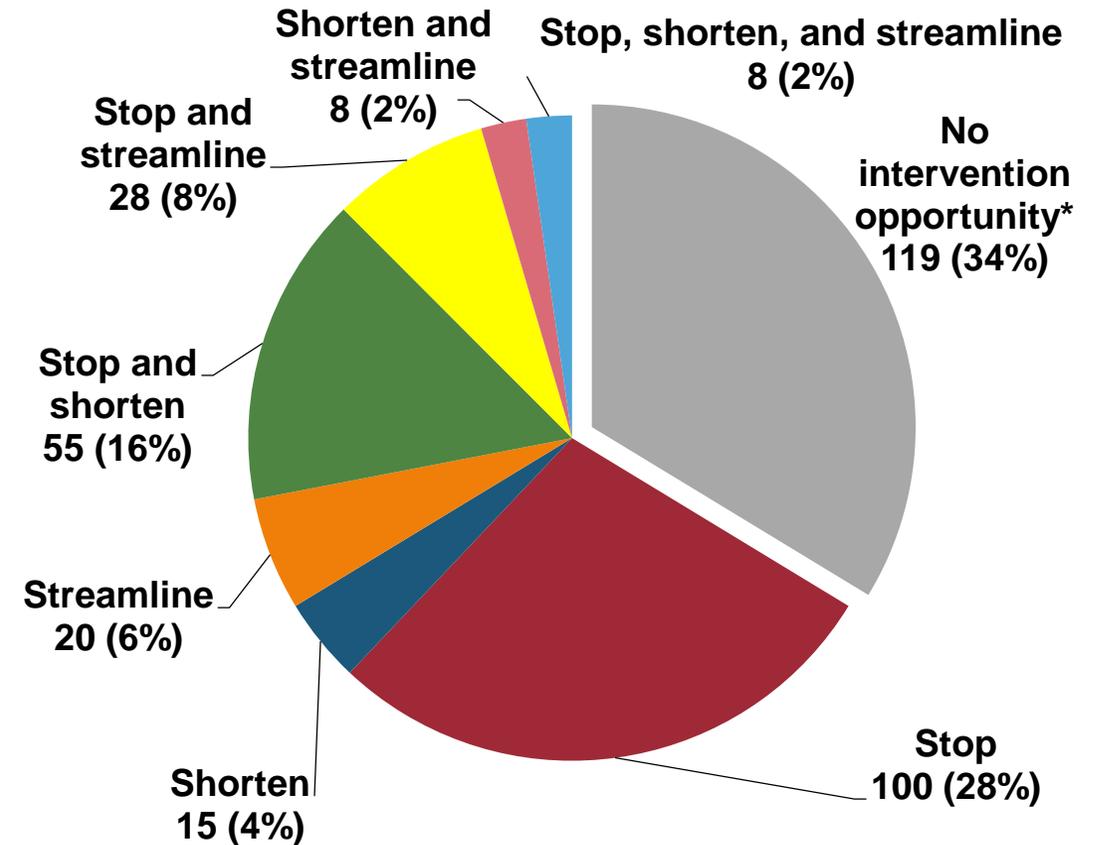**Post-prescribing**
- Audit & feedback (Advanced)

Nursing Practice
- SBAR (Core)
- Reducing unnecessary urine testing (Core)
- **Antibiotic timeout (Core)**

Antibiotic Prescribing is Process with Multiple (Potential) Decisions

Pre-Prescribing Decision-Making

- **Q1** • Do I Test?
- **Q2** • Do I Treat?
- **Q3** • How Do I Treat?

Post-Prescribing Decision-Making

- **Q4** • Can I Stop?
- **Q5** • Can I Narrow?
- **Q6** • How Long Should I Treat?

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Opportunities to Modify Antibiotic Therapy

Subject is being treated for UTI in a nursing home or emergency department setting.

→ Yes

Subject does not meet McGeer or Loeb criteria OR Urine analysis and/or urine culture are negative.

No →

Yes → Discontinue Antibiotics.

Continue Antibiotics.

Duration of effective antibiotic therapy is > 7 days.

Subject receiving a fluoroquinolone AND Urine culture shows susceptibility to a narrow-spectrum alternative.

Yes → Shorten treatment duration.

No → Treatment duration is appropriate.

Yes → Change to appropriate narrow-spectrum antibiotics.

No → No change needed.

Shorten and streamline 8 (2%)

Stop, shorten, and streamline 8 (2%)

Stop and streamline 28 (8%)

No intervention opportunity* 119 (34%)

Stop and shorten 55 (16%)

Streamline 20 (6%)

Shorten 15 (4%)

Stop 100 (28%)

Hossin et al. *IDWeek 2017*

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Post-Prescribing Process

ASP team tasks

Pre-Prescribing
- Policy/procedure development (Core)
- Education & promotion (Core)
- Antibiotic utilization tracking & reporting (Core)
- **Facility antibiogram (Advanced)**
- Facility-specific prescribing guideline (Advanced)
- Provider feedback reports (Advanced)
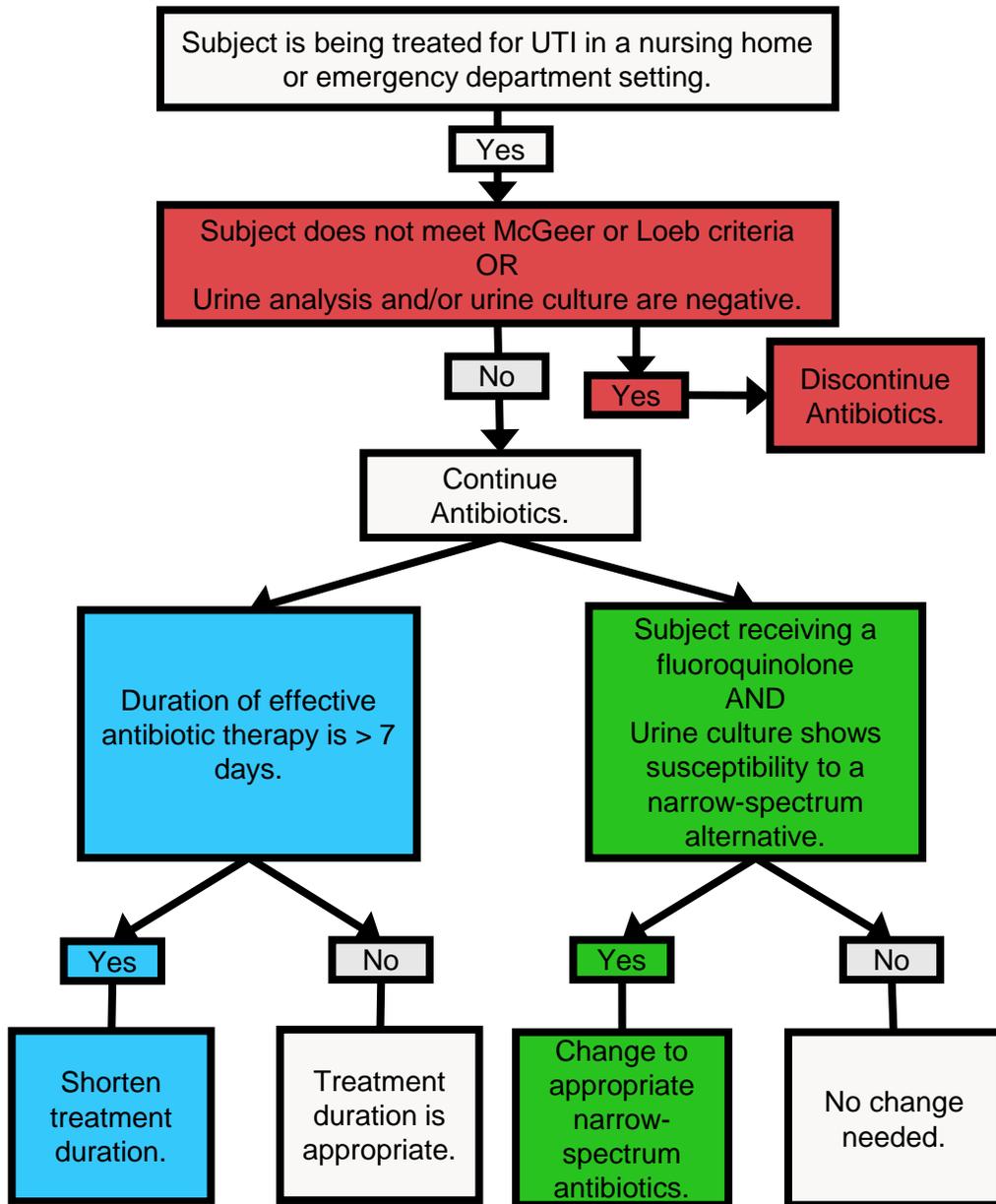
Post-prescribing
- Audit & feedback (Advanced)

Nursing Practice
- SBAR (Core)
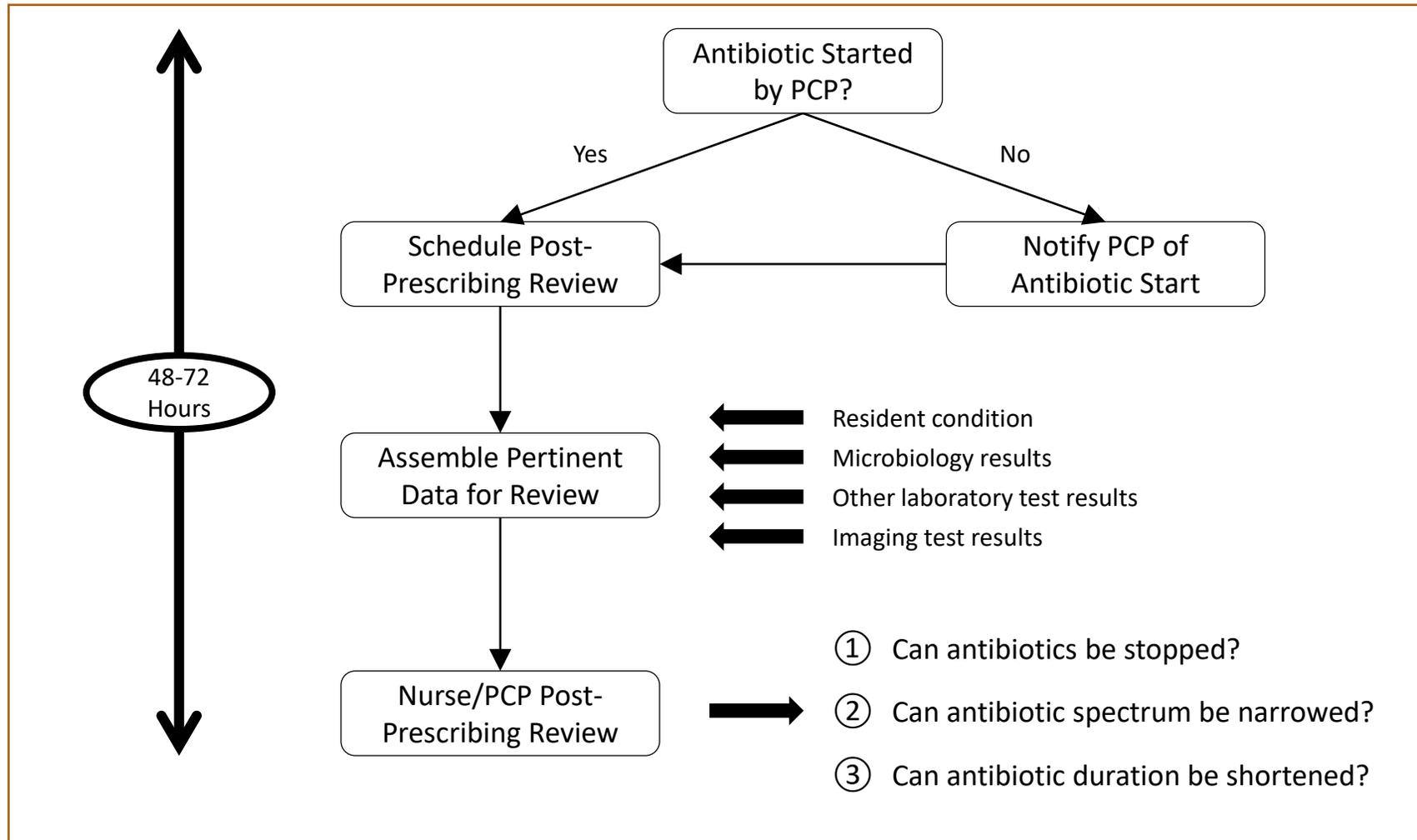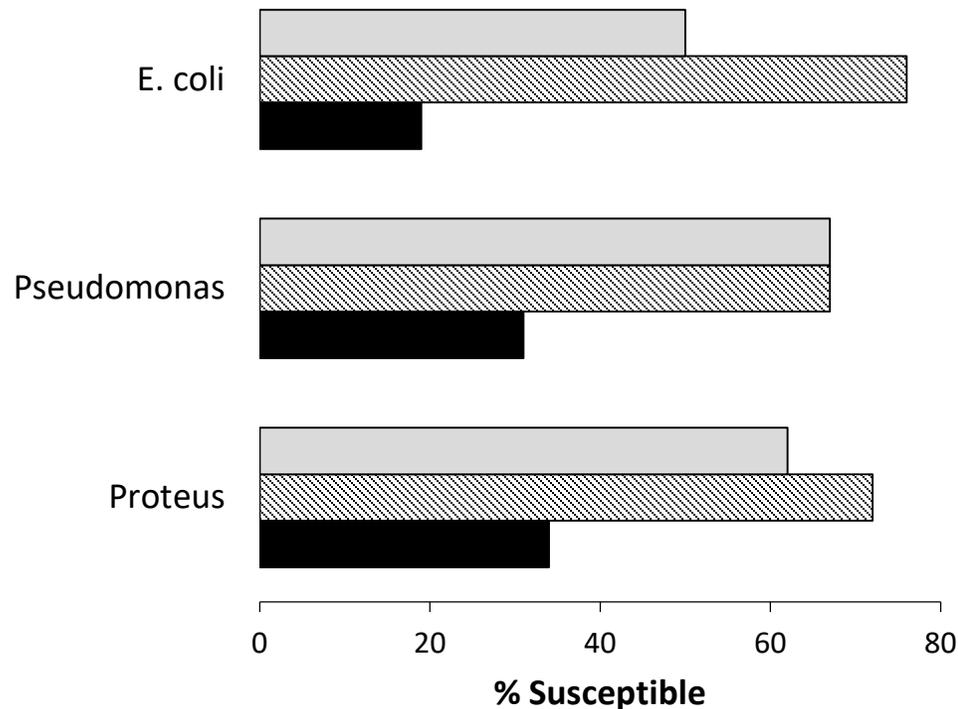- Reducing unnecessary urine testing (Core)
- Antibiotic timeout (Core)

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Make Consequences more Visible

☐ Nurisng Home A ▨ Nursing Home B ■ Nursing Home C

E. coli

Pseudomonas

Proteus

% Susceptible

(x-axis: 0, 20, 40, 60, 80)

Gram (-)	SNF	# of Isolates	Aminoglycosides			B-Lactams			Carbapenems			Cephalosporins					Quinolones			Others			
			Gentamicin	Amikacin	Tobramycin	Ampicillin	Ampicillin-Sulbactam	Pipercillin-tazobactam	Imipenem	Meropenem	Ertapenem	Cefazolin	Cefoxitin	Ceftriaxone	Ceftazidime	Cefepime	Ciprofloxacin	Levofloxacin	Moxifloxacin	Tetracycline	TMP/SMX	Tigecycline	Nitrofurantoin
Escherichia coli	1	13	85	100	92	39		92	100			85	100	100	100		39				39		92
	2	19	84			32	42	100	100		100	84					37	37		58	58		
	3	16	69	100	71	31		100	100	100	100	88		93		93	38		36		50	100	94
Klebsiella sp	1	7	57	71	71			86	86					57	57					71			29
	2	9	100			0	67	89			89	56					67	78		78	89		
	3	0																					
Proteus mirabilis	1	13	83	100	92	92		100				82	100	100			31				69		
	2	17	100			82		94			100	82					53	59		0	88		
	3	10	100	100	100	60				100	100	70		70		70	70		50		70		0
Pseudomonas aeruginosa	1	4	100	100	100			100	100						100		75						
	2	0																					
	3	0																					

- 80% of cultures from a urine sample
- 85% of the antibiotic use in the 3 NHs was empiric (before cultures)
  - 54% involved a fluoroquinolone antibiotics
  - 65% of episodes associated with discordant (inappropriate) therapy
- Making antibiogram available reduced inappropriate use to 55%

Drinka et al. *JAMDA* 2013; 14(6): 443
Furuno et al. *Infect Control Hosp Epidemiol* 2014

ASP team tasks

Pre-Prescribing

- Policy/procedure development (Core)
- Education & promotion (Core)
- Antibiotic utilization tracking & reporting (Core)
- Facility antibiogram (Advanced)
- **Facility-specific prescribing guideline (Advanced)**
- Provider feedback reports (Advanced)

Post-prescribing
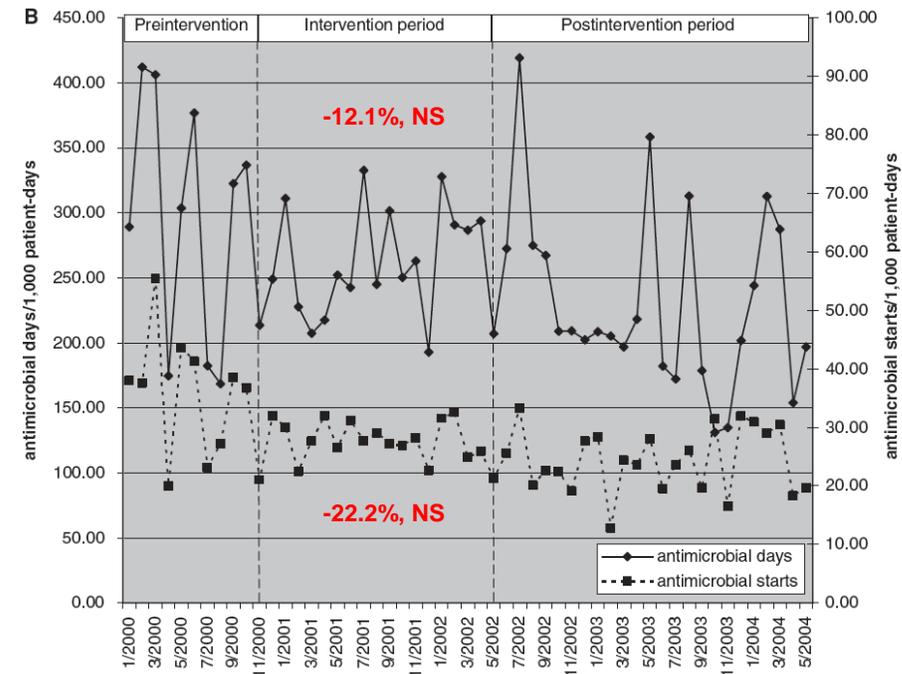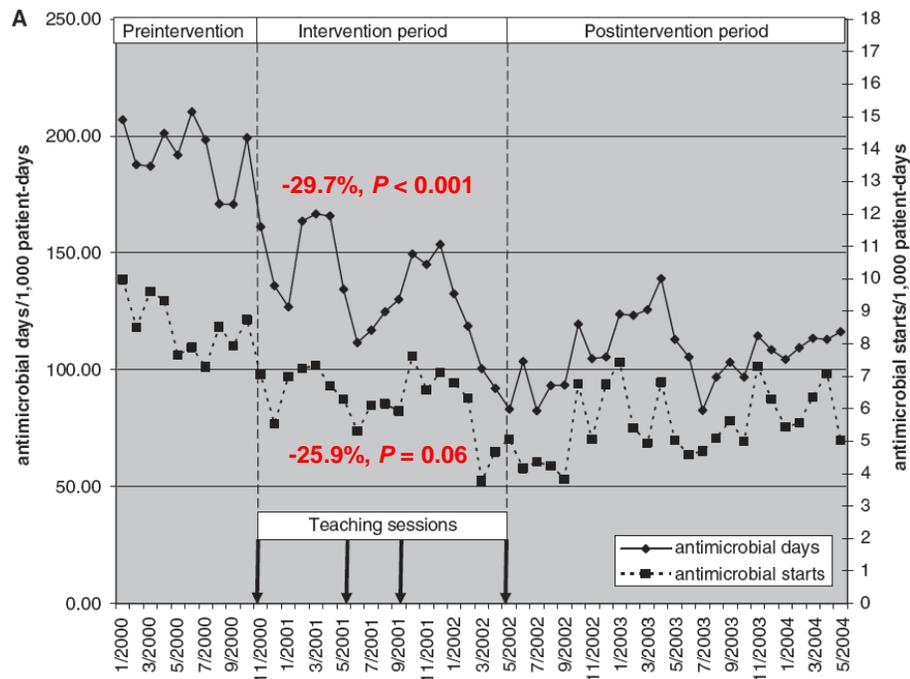
- Audit & feedback (Advanced)

Nursing Practice

- SBAR (Core)
- Reducing unnecessary urine testing (Core)
- Antibiotic timeout (Core)

Impact of local prescribing guidelines

An Educational Intervention to Improve Antimicrobial Use in a Hospital-Based Long-Term Care Facility

David N. Schwartz, MD,*‡ Homer Abiad, MD,‡§ Patricia L. DeMarais, MD,‡§ Emilian Armeanu, MD,*‡ William E. Trick, MD,†‡ Yue Wang, PhD,† and Robert A. Weinstein, MD*‡

J Am Geriatr Soc 2007; 55(8): 1236-42

Antibiotic-resistant infections (per 1,000-days) ⬇ 25%

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ASP team tasks

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- Facility-specific prescribing guideline (Advanced)
- Provider feedback reports (Advanced)

Post-prescribing

- **Audit & feedback (Advanced)**

Nursing Practice

- SBAR (Core)
- Reducing unnecessary urine testing (Core)
- Antibiotic timeout (Core)

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Provider-Led Post-Prescriptive Review

Antibiotic Self-stewardship: Trainee-Led Structured Antibiotic Time-outs to Improve Antimicrobial Use

Todd C. Lee, MD, MPH; Charles Frenette, MD; Dev Jayaraman, MD, MPH; Laurence Green, MD; and Louise Pilote, MD, MPH, PhD*

Background: Antibiotic use is an important quality improvement target. Nearly 50% of antibiotic use is unnecessary or inappropriate. To combat overuse, the Centers for Disease Control and Prevention (CDC) proposed "time-outs" to reevaluate antibiotics.

Objective: To optimize antibiotic use through trainee-led time-outs.

Design: Before–after study.

Setting: Internal medicine (2 units, 46 beds) at a university hospital.

Patients: Inpatients ($n = 679$).

Intervention: From January 2012 until June 2013, while receiving monthly education on antimicrobial stewardship, resident physicians adjusted patients' antibiotic therapy through twice-weekly time-out audits using a structured electronic checklist.

Measurements: Antibiotic costs were standardized and compared in the year before and after the audits. Use was measured as World Health Organization defined daily doses (DDDs) per 1000 patient-days. Total antibiotic use and the use of moxifloxacin, carbapenems, antipseudomonal penicillins, and vancomycin were compared by using interrupted time series. Rates of nosocomial *Clostridium difficile* infection were compared by using incidence rate ratios.

Results: Total costs in the units decreased from $149 743CAD (January 2011 to January 2012) to $80 319 (January 2012 to January 2013), for a savings of $69 424 (46% reduction). Of the savings, $54 150 (78%) was related to carbapenems and $15 274 (22%) was due to other antibiotic classes. Adherence with the auditing process was 80%. In the time-series analyses, the only reliable and statistically significant change was a reduction in the rate of moxifloxacin use, by −1.9 DDDs per 1000 patient-days per month (95% CI, −3.8 to −0.02; $P = 0.048$). Rates of *C. difficile* infection decreased from 24.2 to 19.6 per 10 000 patient-days (incidence rate ratio, 0.8 [CI, 0.5 to 1.3]).

Limitation: Other temporal factors may confound the findings.

Conclusions: An antibiotic self-stewardship bundle to implement the CDC's suggested time-outs seems to have reduced overall costs and targeted antibiotic use.

Primary Funding Source: None.

Point-of-Prescription Interventions to Improve Antimicrobial Stewardship

Keith W. Hamilton,[1,a] Jeffrey S. Gerber,[2,a] Rebekah Moehring,[3,4] Deverick J. Anderson,[3,4] Michael S. Calderwood,[5] Jennifer H. Han,[1] Jimish M. Mehta,[6] Lori A. Pollack,[7] Theoklis Zaoutis,[2] Arjun Srinivasan,[7] Bernard C. Camins,[8] David N. Schwartz,[9] and Ebbing Lautenbach[1]; for the Centers for Disease Control and Prevention Epicenters Program

[1]Division of Infectious Diseases, Hospital of the University of Pennsylvania, Philadelphia; [2]Division of Infectious Diseases, Children's Hospital of Philadelphia, Pennsylvania; [3]Division of Infectious Diseases, Duke University Medical Center, and [4]Duke Antimicrobial Stewardship Outreach Network, Durham, North Carolina; [5]Division of Infectious Diseases, Brigham and Women's Hospital, Boston, Massachusetts; [6]North American Medical Affairs, GlaxoSmithKline, Philadelphia, Pennsylvania; [7]Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention, Atlanta, Georgia; [8]Division of Infectious Diseases, Washington University School of Medicine, St Louis, Missouri; and [9]Division of Infectious Diseases, John H. Stroger Jr Hospital of Cook County, Chicago, Illinois

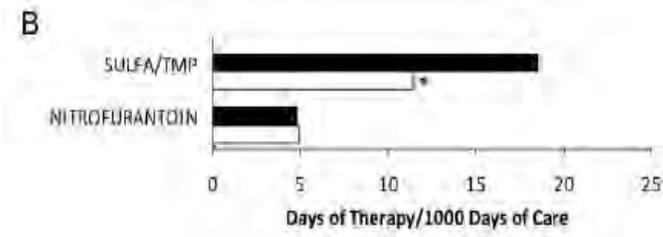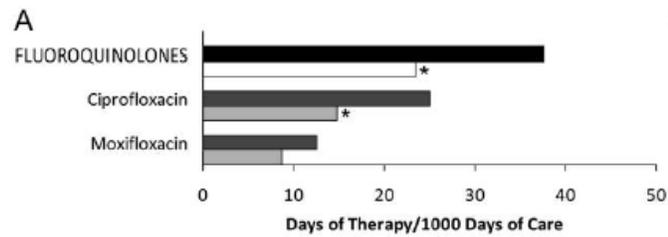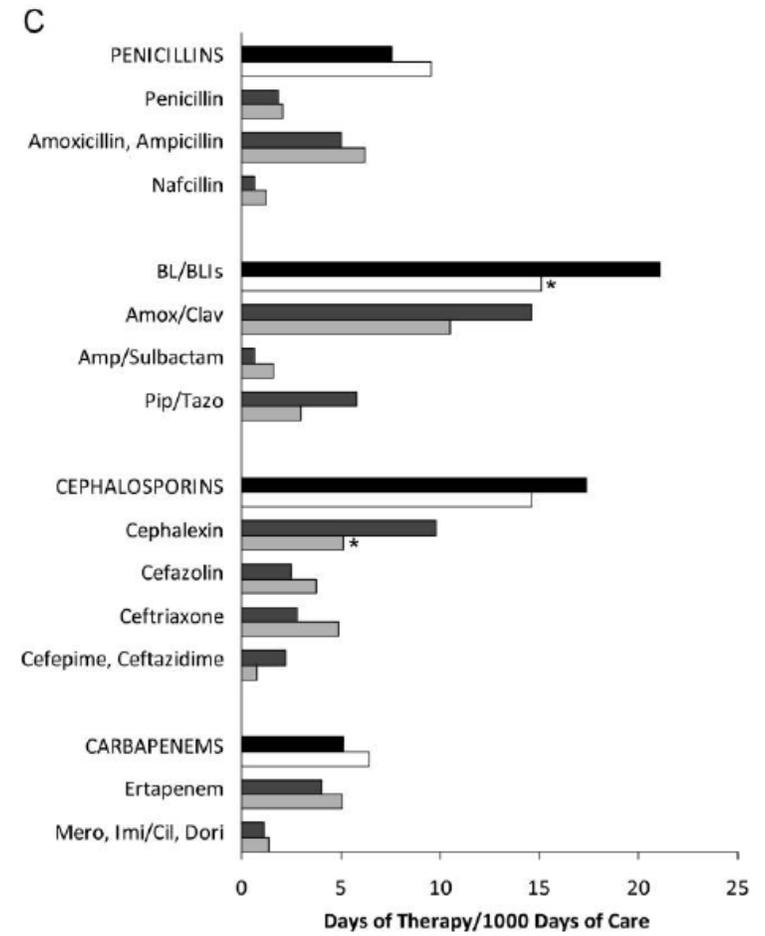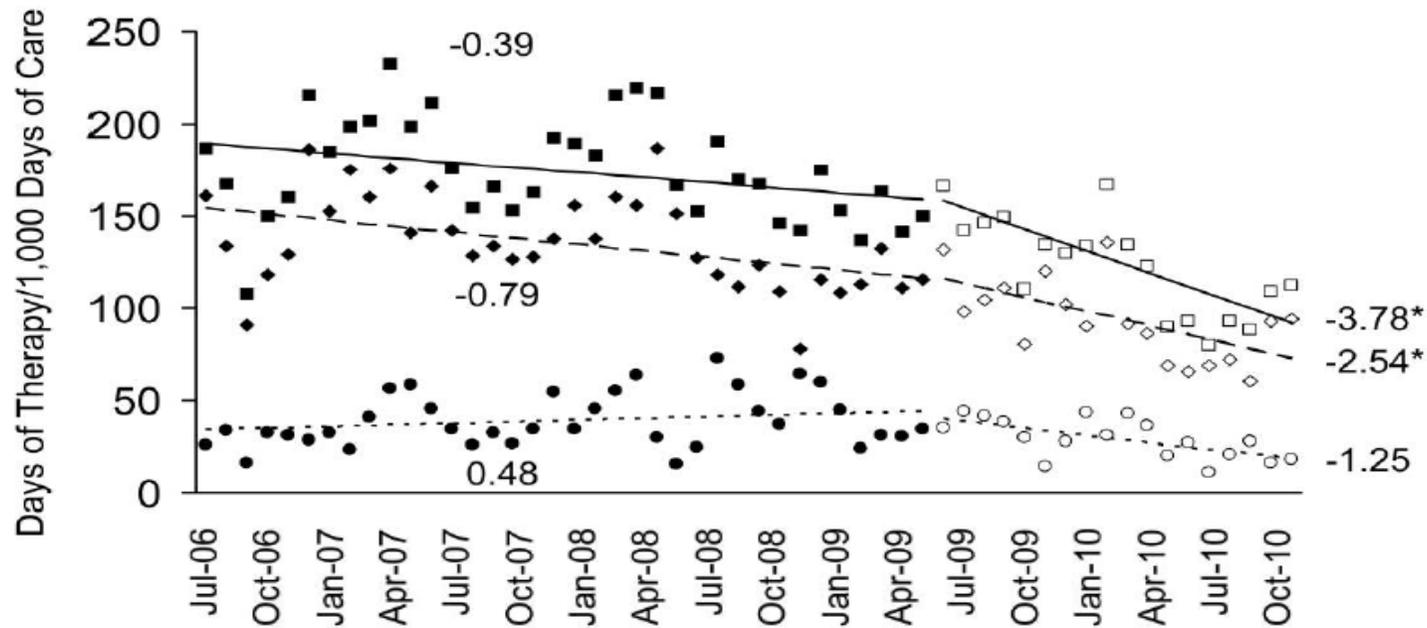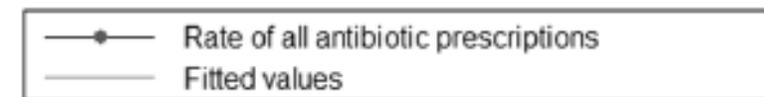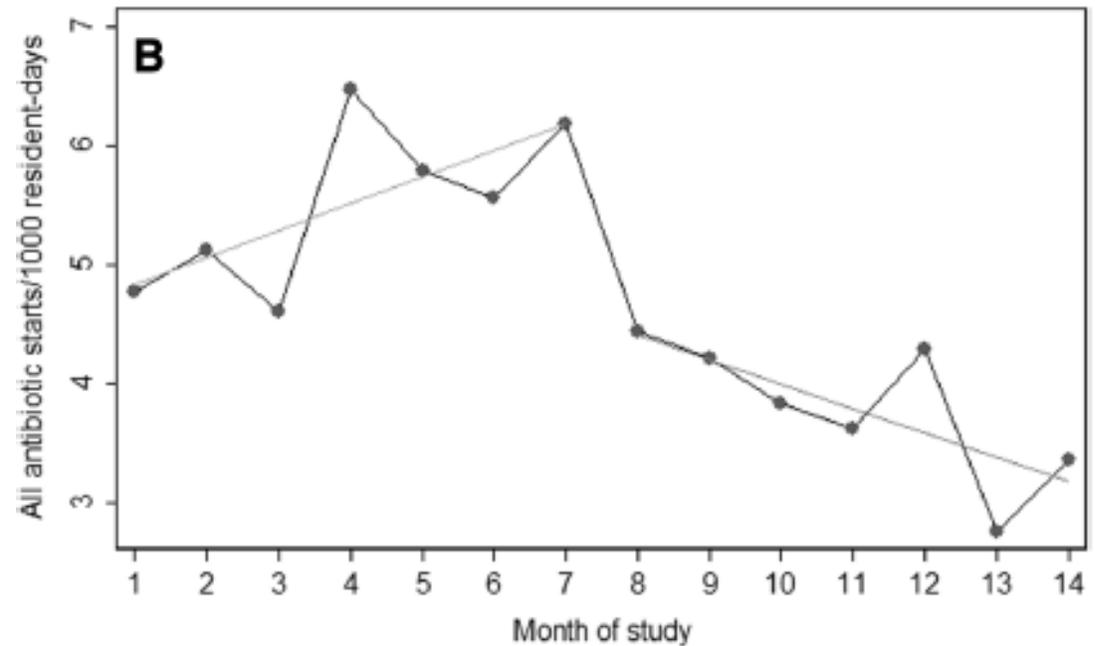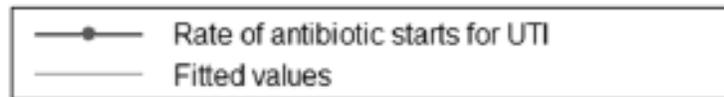(See the Editorial Commentary by Wenzler, Rodvold, and Danziger on pages 1259–61.)

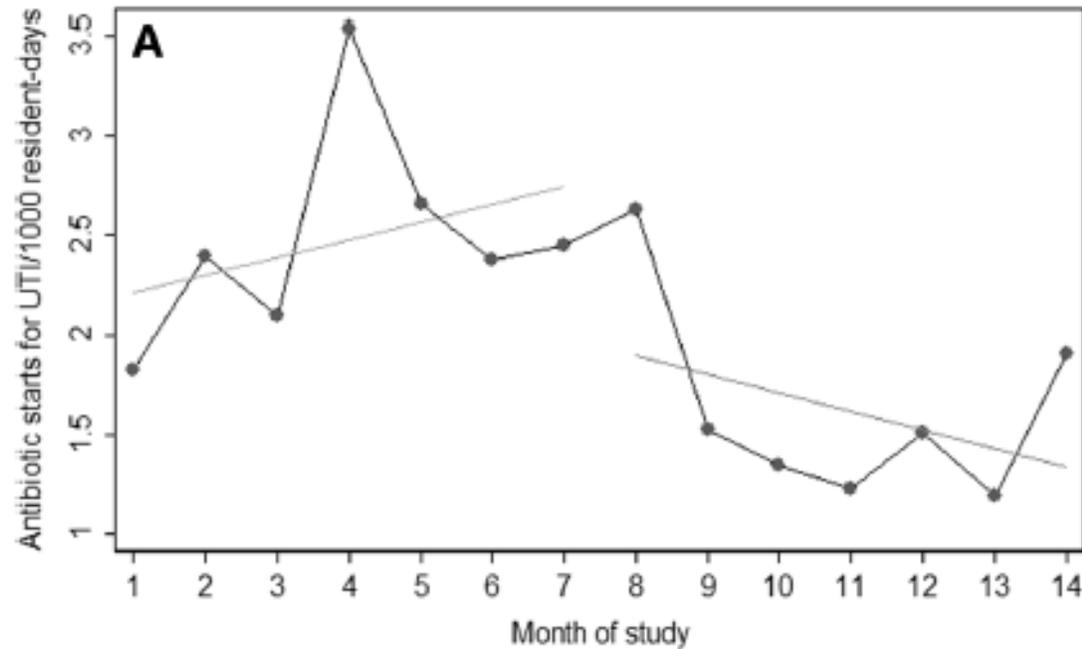School of Medicine and Public Health
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Impact of an ID Consultative Service on Antibiotic Utilization in a NH

Jump et al. *Infect Control Hosp Epidemiol* 2012; 48(1): 82-8

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Pharmacist Led Post-Prescriptive Review and Feedback

Doernberg et al. *Antimicrob Res Infect Control* 2015; 4(1): p. 54

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ASP team tasks

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- **Provider feedback reports (Advanced)**

Post-prescribing
- Audit & feedback (Advanced)

Nursing Practice
- SBAR (Core)
- Reducing unnecessary urine testing (Core)
- Antibiotic timeout (Core)
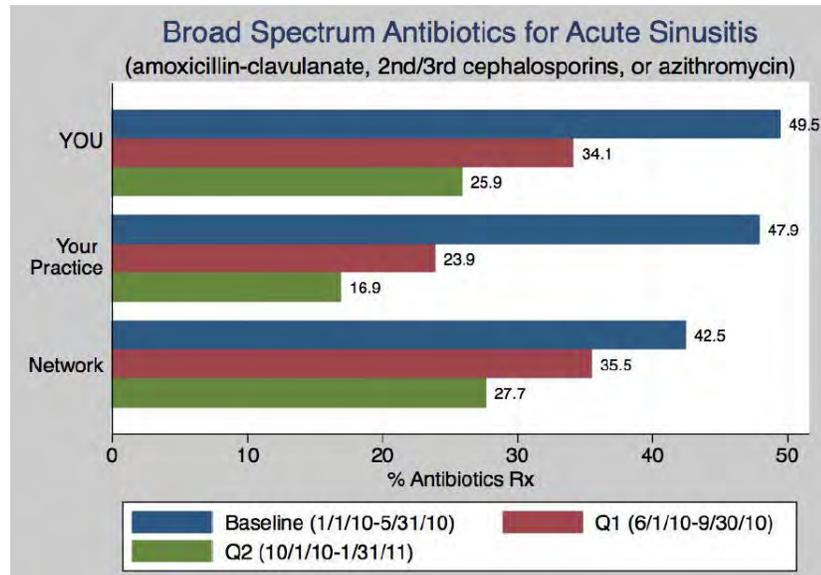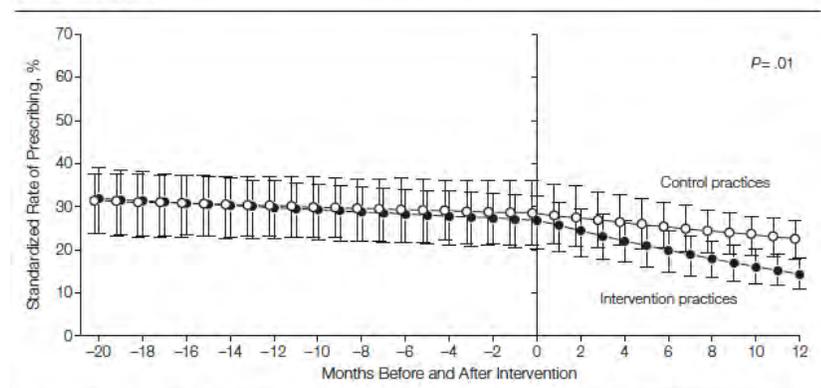
Introducing Normative Influences

Provider Feedback

Broad Spectrum Antibiotics for Acute Sinusitis
(amoxicillin-clavulanate, 2nd/3rd cephalosporins, or azithromycin)

YOU
- 49.5
- 34.1
- 25.9

Your Practice
- 47.9
- 23.9
- 16.9

Network
- 42.5
- 35.5
- 27.7

X-axis: % Antibiotics Rx (0, 10, 20, 30, 40, 50)

Legend:
- Baseline (1/1/10-5/31/10)
- Q1 (6/1/10-9/30/10)
- Q2 (10/1/10-1/31/11)

Figure 2. Standardized Rates of Broad-Spectrum Antibiotic Prescribing at Acute Care Office Visits Over Time

P= .01

Control practices

Intervention practices

Y-axis: Standardized Rate of Prescribing, %
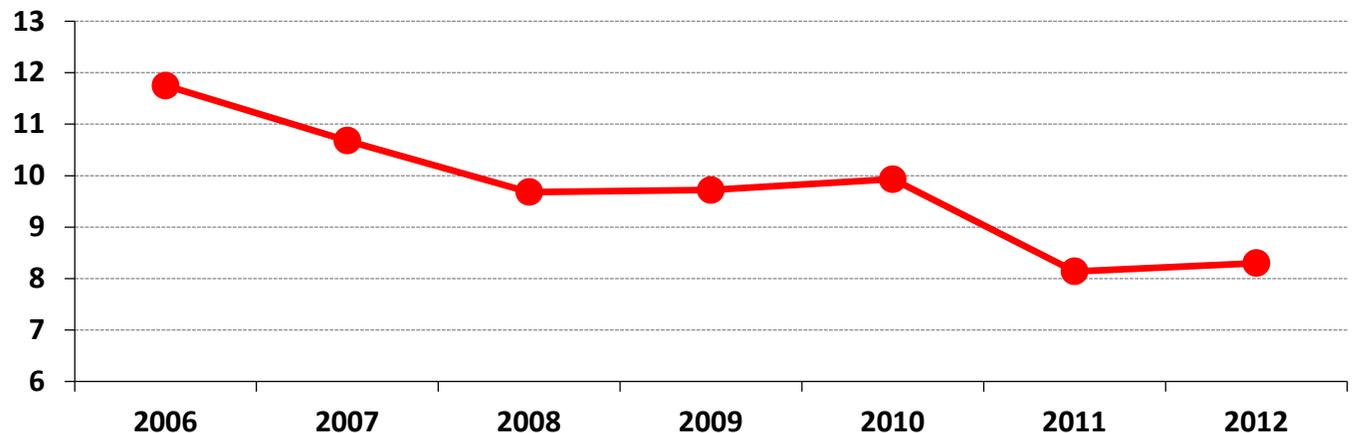X-axis: Months Before and After Intervention

The estimate of interest (and associated P value) is the treatment × time interaction term, representing the relative changes in trajectories before and during the intervention. Error bars indicate 95% CIs.

Gerber et al. *JAMA* 2013; 309(22): 2345-52

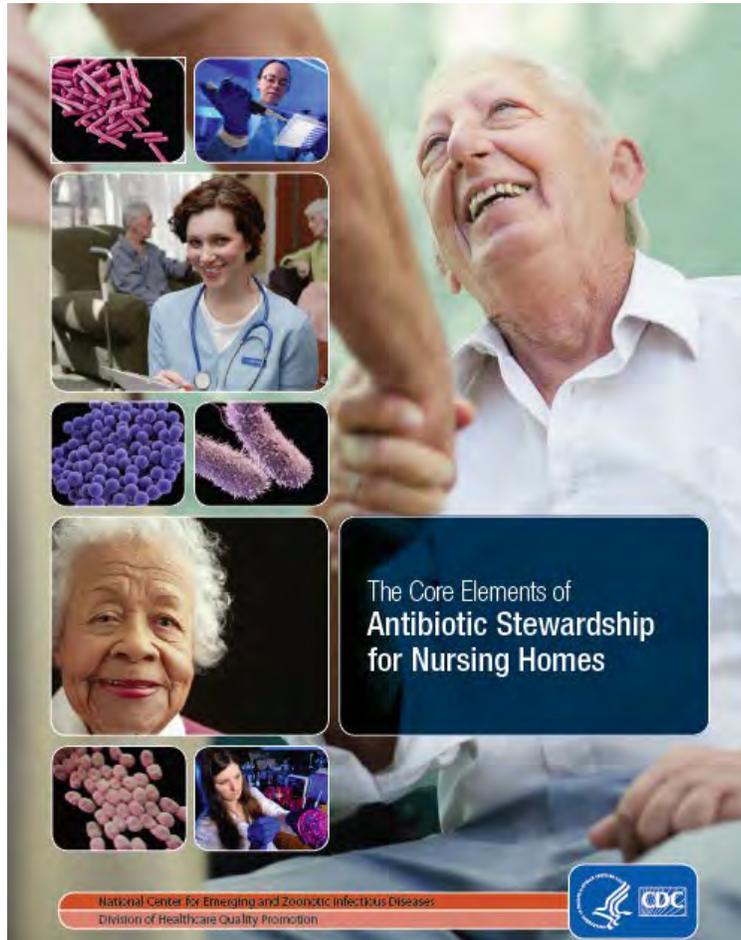Meeker et al. *JAMA* 2016; 315(6): 562-70

- A MRSA outbreak in a 147-bed NH in WI led to an intensive review of facility microbiology and antibiotic prescribing data

- Review of urinary antibiogram identified
  - 31/100 (27%) all isolates were *Enterococcus* sp.
  - 87% of E. coli resistant to ciprofloxacin

- Facility embarked on several interventions:
  - Provided staff with antibiogram results
  - Guideline-concordant prescribing tracked by facility staff
  - Medical director sent out letters to outlier providers

Abx Starts per 1,000 Resident-Days

Y-axis: 6 to 13
X-axis: 2006, 2007, 2008, 2009, 2010, 2011, 2012

The Pew Charitable Trusts – A path to better antibiotic stewardship, 2016

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NH ASP Resources

- Centers for Disease Control and Prevention
  - http://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html
- Wisconsin HAI in Long-Term Care
  - https://www.dhs.wisconsin.gov/regulations/nh/hai-introduction.htm
- UNC Nursing Home Infections
  - https://nursinghomeinfections.unc.edu
- Massachusetts Coalition
  - http://www.macoalition.org/evaluation-and-treatment-uti-in-elderly.shtml
- Minnesota Department of Health
  - http://www.health.state.mn.us/divs/idepc/dtopics/antibioticresistance/asp/ltc/
- Agency for Healthcare Research and Quality ASP Toolkits
  - https://www.ahrq.gov/nhguide/index.html

Thank You