

WI HAI in LTC 2017 Spring Conference
 Kalahari Convention Center, Wisconsin Dells, WI
 May 17th, 2017

Antibiotic Stewardship: Why it Matters in Nursing Homes & Where to Begin

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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

- Antibiotic resistance – the big picture
- Effects of antibiotics on individuals, facilities & communities
- Patterns of antibiotic use in nursing homes
- What is antibiotic stewardship?
- Barriers to stewardship in NHs
- Where to start





The Looming Post-Antibiotic Era

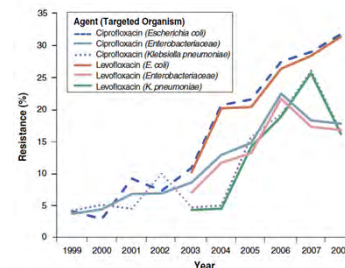


- 35% of CDI cases arise in community
- 25% of CDI cases arise in SNFs

Estimated minimum number of illnesses and deaths caused by antibiotic resistance*:

At least **2,049,442** illnesses,
23,000 deaths

*bacteria and fungus included in this report

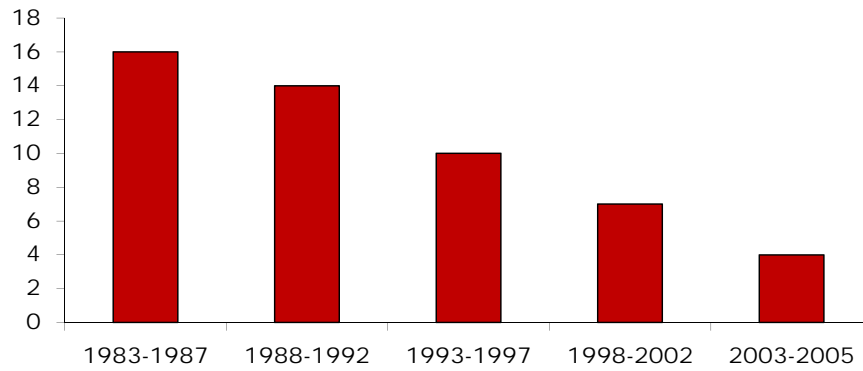


CDC. *Antibiotic Resistant Threats in the United States, 2013*
 Lessa et al. *N Engl J Med* 2015; 372(9): 825-34
 Hunter et al. *Open Forum Infect Dis* 2016; 3(1): ofv196



The Antibiotic Pipeline

FDA, New Drug Approvals: Antibiotics



Spellberg et al. *Clin Infect Dis* 2008; 46(2): 155-64

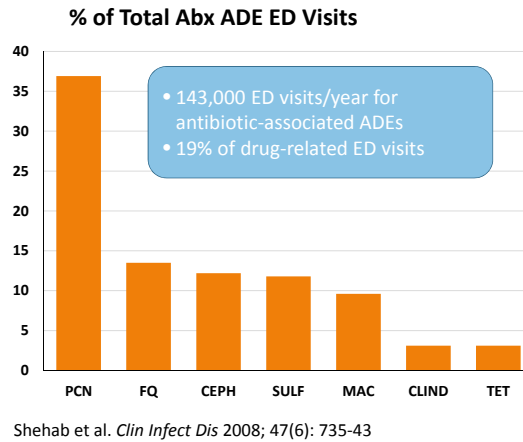
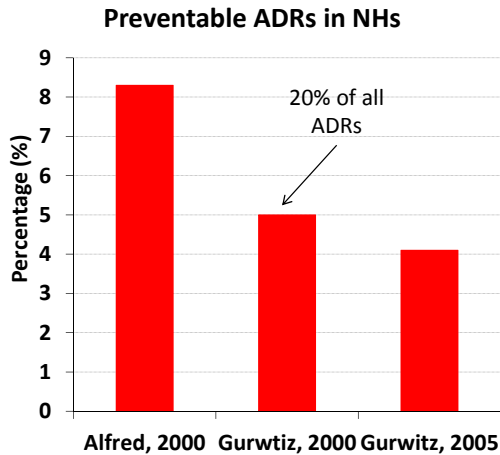


Harmful Effects of Antibiotics: Individual Level

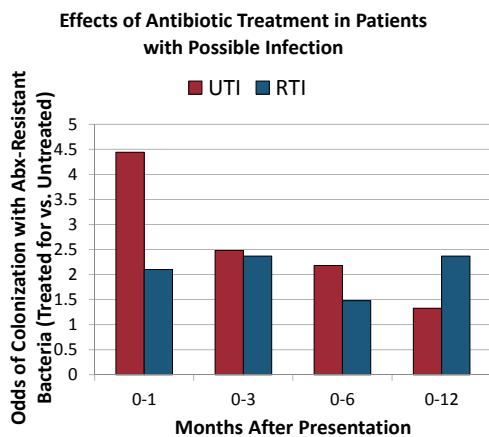
- Adverse drug events (ADEs)
- Antibiotic resistance
- *Clostridium difficile*



Adverse Events from Antibiotics



Antibiotic Treatment (Even When Appropriate) Carries Future Risk of Antibiotic Resistance for the Individual

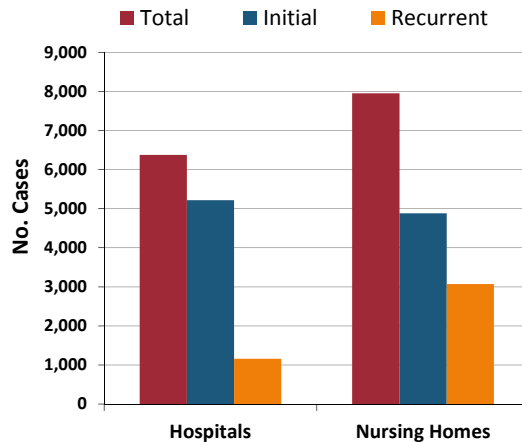
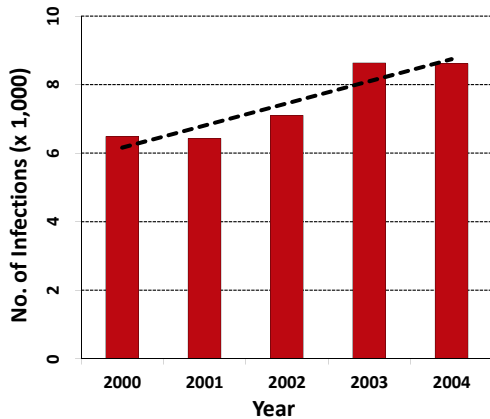


- Inpatient UTIs caused by fluoroquinolone-resistant bacteria strongly associated with recent (1 mo.) fluoroquinolone use (OR = 15.7; 95% CI = 6.2 – 40.3)
- Outpatient UTIs caused by fluoroquinolone-resistant bacteria also associated with recent fluoroquinolone exposure (OR = 17.5; 95% CI = 6.0 – 50.7)
- Outpatient treatment of asymptomatic bacteriuria increases a woman's risk of developing symptomatic UTI threefold (OR = 3.2; 95% CI = 2.6 – 3.9)

Costelloe et al. *BMJ* 2010; 340: c2059
Drinka et al. *JAMDA* 2013; 14(9): 707



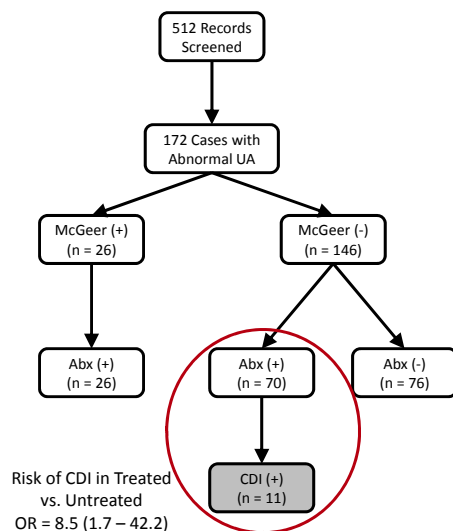
Clostridium difficile in nursing homes



Crnich et al. *Infect Control Hosp Epidemiol* 2007; 28(8): 1006-8
 Campbell et al. *Infect Control Hosp Epidemiol* 2009; 30(6): 526-33



Clostridium difficile in nursing homes

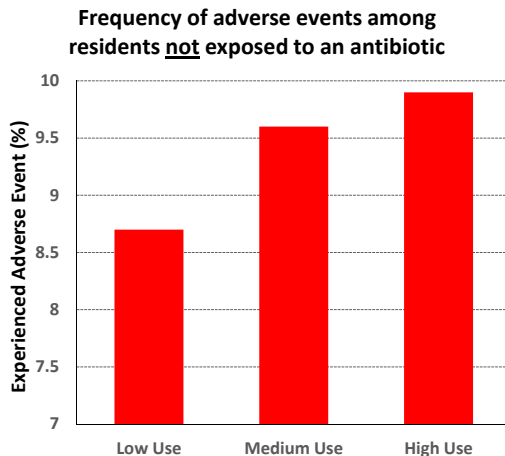


Rotjanapan et al. *Arch Intern Med* 2011; 171(5): 438-443

- **McGeer Criteria (at least 3 of the following)**
 - Temperature $\geq 38^{\circ}$ C
 - N/ \uparrow burning/frequency/urgency
 - New flank/suprapubic pain/tenderness
 - Change in character of urine
 - Blood//smell/sediment
 - Pyuria/hematuria
 - Worsening mental or functional status
- **Inappropriate therapy (independent of decision to start)**
 - Treatment initiated empirically (before culture) in only 27/96 (28%) of residents
 - Empiric antibiotic inappropriate in 56% of cases (FQ when TMP/SMX or NFT reasonable)
 - Dosage (High [21%] / Low [13%] / CI [12%])
 - Duration (Short [3%] / Long [67%])



Harmful Effects of Antibiotics: Facility Level (clinical)



Daneman et al. *JAMA Intern Med* 2015; 175(8): 1331-9
Mody & Crnich et al. *JAMA Intern Med* 2015; 175(8): 1339-41

Setting:

- 607 NHs in Ontario; categorized into tertiles of antibiotic use (low, medium, high)
- 110,000 NH residents followed for 2 years.

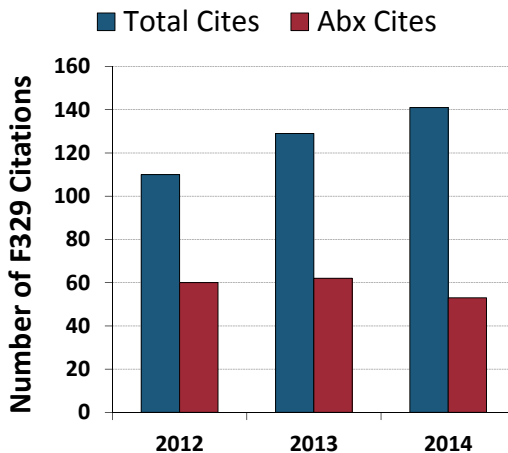
Study Endpoint: Combined rate of *C. difficile*, diarrhea/gastroenteritis, infection with antibiotic-resistant bacteria and adverse drug event (ADE)

Results:

- ~83,000 NH residents received an antibiotic & ~27,000 residents did not receive an antibiotic
- Risk of experiencing the combined endpoint was 24% higher in high-use NHs, even if the resident never received an antibiotic (Figure)



Harmful Effects of Antibiotics: At the Facility Level (regulatory)



- Inappropriate antibiotic use is a common survey citation in Wisconsin.
- In November 2018, nursing homes will be required to have an antibiotic stewardship program which will likely influence the survey process.

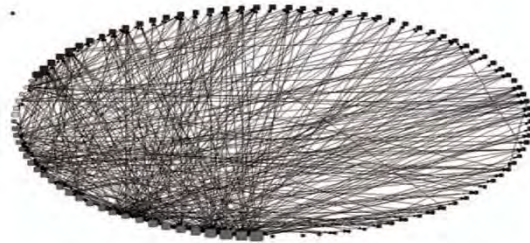


MDROs: The Healthcare Facility STD?

Acute Care Facility
Sociogram



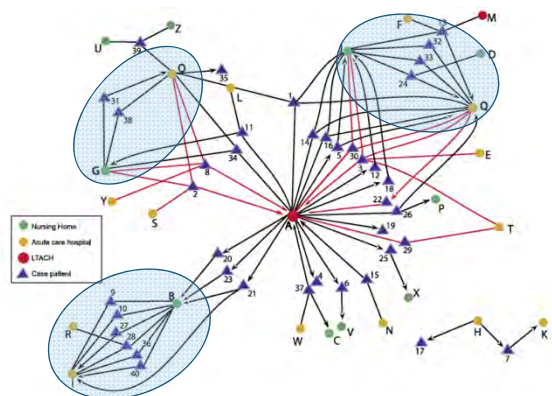
Long-Term & Acute Care
Facility Sociogram



Lee et al. *PLoS One* 2011; 6(12): e29342



Harmful Effects of Antibiotics: Community Level



- NH residents prescribed antibiotics are more likely to be colonized with antibiotic-resistant bacteria which can be spread to other.
- The high rate of transfers between NH and hospitals creates opportunities for the regional spread of resistant bacteria
- **FIGURE:** a recent study in Chicago demonstrated that NHs (green circles) played an important role in the spread (shaded areas) of a highly antibiotic-resistant bacteria* between city hospitals (orange circles).

* carbapenem-resistant *Klebsiella pneumoniae*, a bacteria that commonly causes urinary tract infections.

Won et al. *Clin Infect Dis* 2011; 53(6): 532-40



©Cartoonbank.com

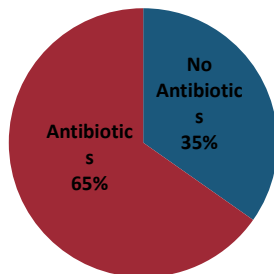


"Don't forget to take a handful of our complimentary antibiotics on your way out."



Antibiotics are Commonly Prescribed in Nursing Homes

2/3rds of residents who stay in a NH for at least 6 months will be prescribed at least 1 course of antibiotics.



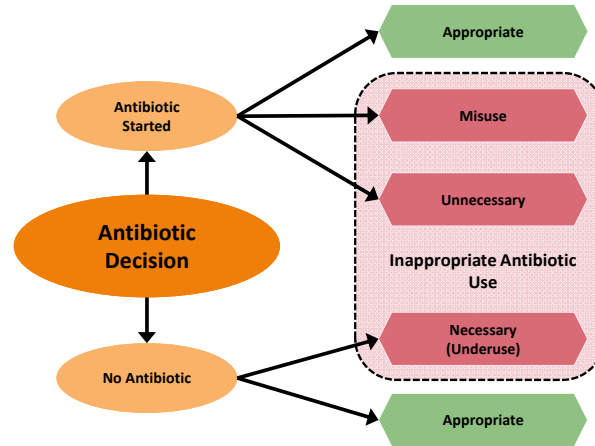
Crnich et al. ID Week 2012, San Diego, CA

Many residents are prescribed multiple courses of antibiotics during their NH stay.

- 60% of all antibiotics prescribed in NHs are administered to 20% of the residents
- In one of our studies, we observed that a single resident received 14 courses of antibiotics over 12 months

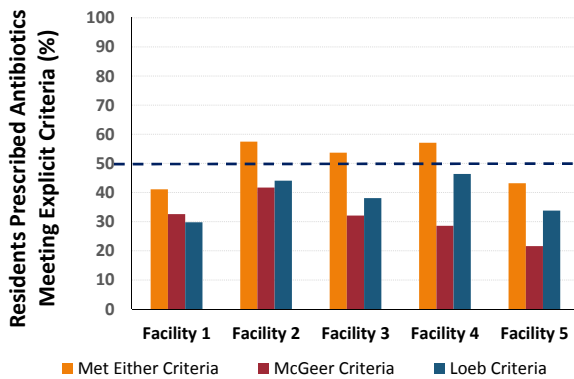


Inappropriate Antibiotic Use in NHs



Much of Antibiotic Use in Nursing Homes is Inappropriate

Necessity of Antibiotic Use in Five Wisconsin Nursing Homes

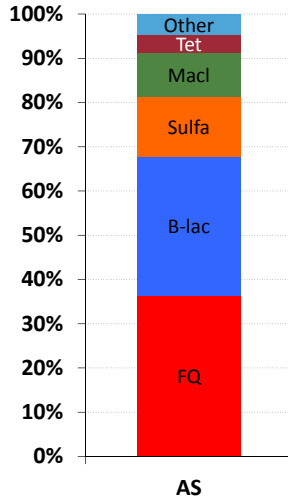


- >50% of antibiotic starts in NHs are not justified (figure)
- Even when justified, the prescribed antibiotic is often:
 - Unnecessarily broad spectrum (e.g., cipro when bactrim would work just as well)
 - Given for too long of a duration (>7 days)

Crnich et al. *Society for Healthcare Epidemiology of America 2015 Spring Conference*. 2015



Broad-Spectrum Antibiotic Use in NHs



Crnich et al. IDWeek 2012, San Diego, CA

Pickering et al. *J Am Geriatr Soc* 1994; 42(1): 28-32

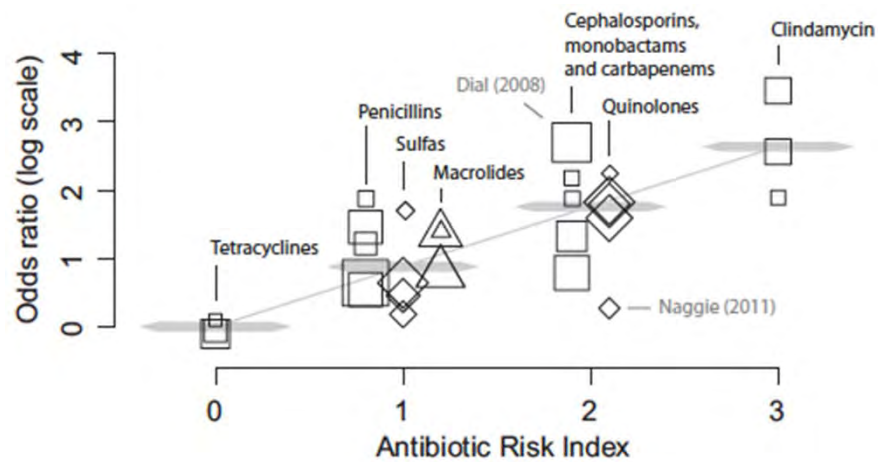
- Random chart review of a sample of all ciprofloxacin orders (100 of 323)
- 72/100 orders deemed inappropriate by implicit review
 - 23/72 due to indication
 - 49/72 due to better alternative

Rotjanapan et al. *Arch Intern Med* 2011; 171(5): 438-43

- Treatment initiation often delayed until culture results available (69/96 starts [72%])
- 56% of starts involved an unnecessarily broad antibiotic (e.g., FQ when TMP/SMX or NFT active)
- Duration: too short [3%] / too ong [67%]



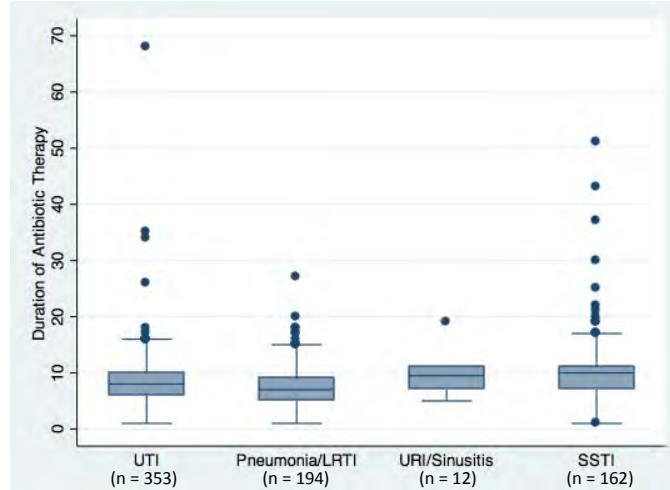
Antibiotics are not All Equal: *Clostridium difficile*



Brown et al. *Antimicrob Ag Chemother* 2013; 57(5): 2326-2332



Duration of Therapy in NHs



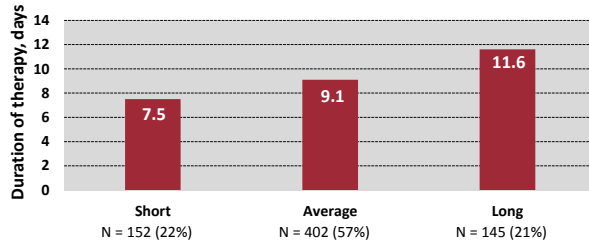
Crnich et al. APIC Wisconsin 2015



Impact of Abx Duration on Overall Utilization

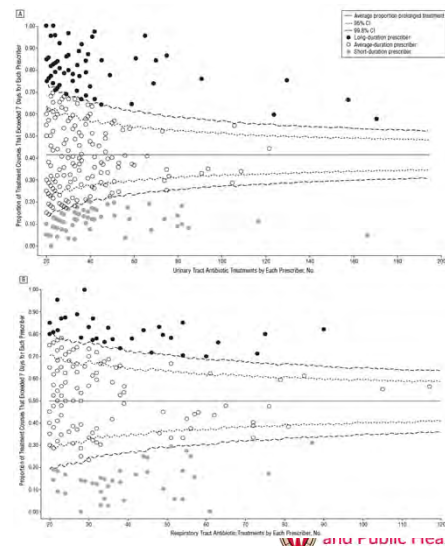
- Analyses focused on 699 providers who prescribed at least 20 antibiotic courses during 2010 in Ontario NHs.

Average Duration of Antibiotic Prescriptions among 699 Ontario NH Providers



- Estimated reduction in antibiotic utilization achievable by prescribing duration state migration:
 - Long ⇒ average: 7% reduction
 - Long & average ⇒ short: 19% reduction

Daneman et al. JAMA Intern Med 2013; 173(8): 673-82



the WHITE HOUSE PRESIDENT BARACK OBAMA

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For Immediate Release September 18, 2014

Executive Order -- Combating Antibiotic-Resistant Bacteria

EXECUTIVE ORDER

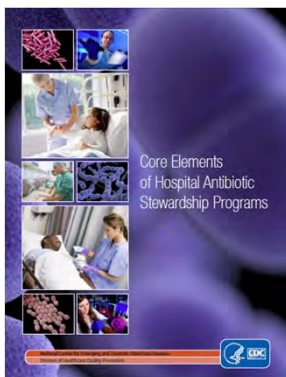
COMBATING ANTIBIOTIC-RESISTANT BACTERIA

By the authority vested in me as President by the Constitution and the laws of the United States of America, I hereby order as follows:

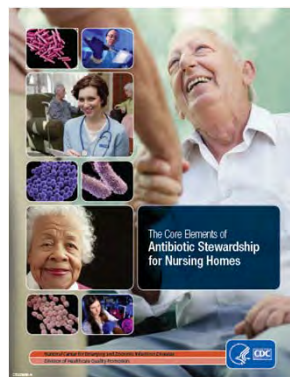
Sec. 5. Improved Antibiotic Stewardship. (a) By the end of calendar year 2016, HHS shall review existing regulations and propose new regulations or other actions, as appropriate, that require hospitals and other inpatient healthcare delivery facilities to implement robust antibiotic stewardship programs that adhere to best practices, such as those identified by the CDC. HHS shall also take steps to encourage other healthcare facilities such as ambulatory surgery centers and dialysis facilities, to adopt antibiotic stewardship programs.

School of Medicine and Public Health
UNIVERSITY OF WISCONSIN-MADISON

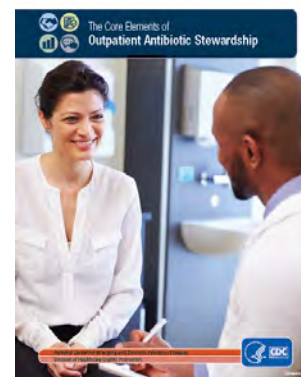
Putting antibiotic stewardship into practice



CDC. Core Elements of Hospital Antibiotic Stewardship Programs. Atlanta, GA: US Department of Health and Human Services, CDC; 2014. Available at <http://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html>.

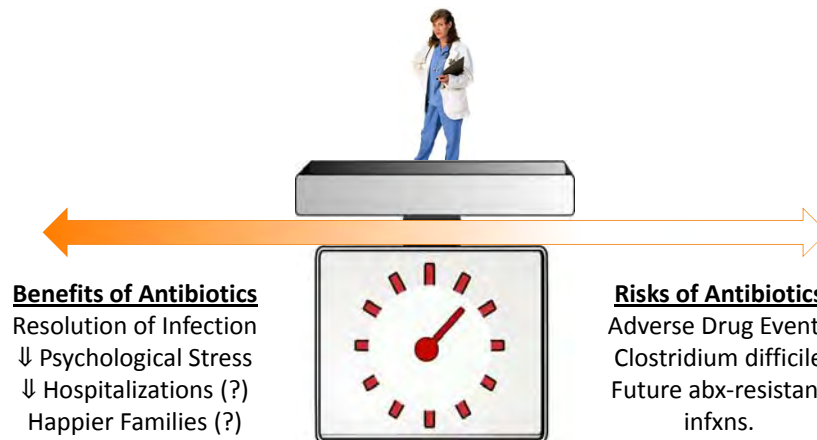


CDC. The Core Elements of Antibiotic Stewardship for Nursing Homes. Atlanta, GA: US Department of Health and Human Services, CDC; 2015. Available at: <http://www.cdc.gov/longtermcare/index.html>



Sanchez, G.V., Fleming-Dutra, K.E., Roberts, R.M., Hicks, L.A. *Core Elements of Outpatient Antibiotic Stewardship*. MMWR Recomm Rep 2016;65(No. RR-6):1-12.

What Is Antibiotic Stewardship?



Comparing ASP in Hospitals and NHs

	Hospitals	Nursing Homes
External pressure for ASP	(Increasingly) Yes	(Increasingly) Yes
ASP cost savings accrue to facility	Yes	Context-dependent
Strong IT infrastructure	(Mostly) Yes	No
In-house pharmacy support	Yes	Context-dependent
Access to ID expertise	(Usually) Yes	(Usually) No
Prescribers directly perform the initial assessment	Yes	Context-dependent
Prescribers <u>able</u> to perform direct reassessments	Yes	Context-dependent

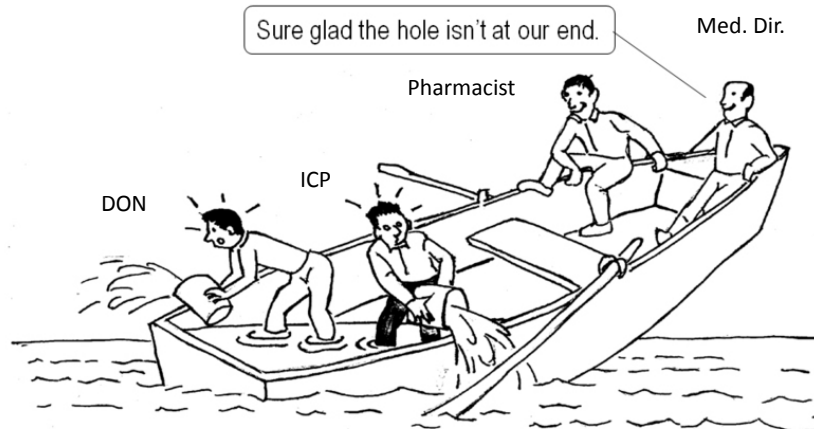
Where Do We Start?



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)
- Facility utilization reports (Core)
- Development of facility antibiogram (Advanced)
- Facility-specific prescribing guideline (Advanced)
- Provider feedback reports (Advanced)

Post-prescribing

- Audit & feedback (Advanced)

Nursing Practice

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

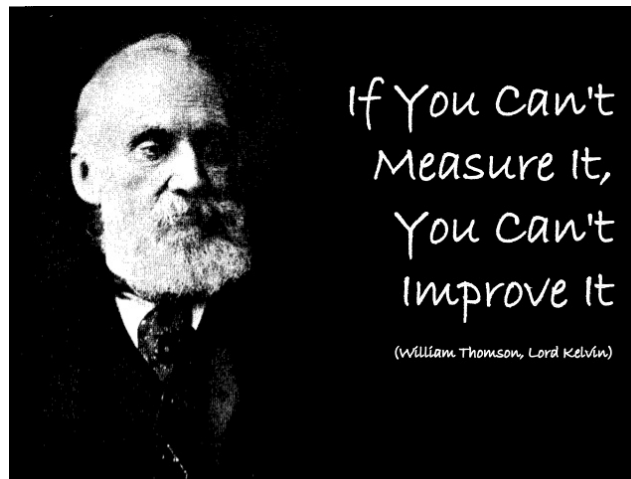


Policies for Infection Diagnosis and Treatment Etiquette

- 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
- All antibiotic orders should stipulate an indication, drug, dose, & duration.
- Eliminate test-of-cure urine cultures
- Discourage use of prophylactic antibiotics



Measure antibiotic utilization



Objectives of Measurement

	Internal Measurement	External Measurement
Where are we?	+	+++
Where do we need to be?	+	+++
What needs to change?	+++	+
Should we change?	++	+++
Is the change working?	+++	++

Issues Related to Measurement of Antibiotic Use in SNFs

- What should be measured?
- How do we obtain these measures?
- Do we risk adjust these measures?

Which 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



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

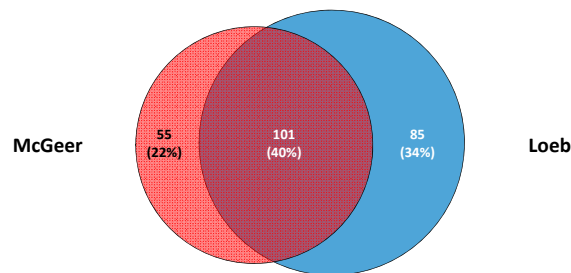
Loeb Minimum Criteria

(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
 - Costovetebreal angle tenderness
 - Urinary incontinence

* Fever (Revised McGeer): single temp $\geq 100^\circ\text{F}$ or repeated temp $\geq 99^\circ\text{F}$ or 2°F above baseline

** Fever (LMC): single temp $\geq 100^\circ\text{F}$ or 2.4°F above baseline

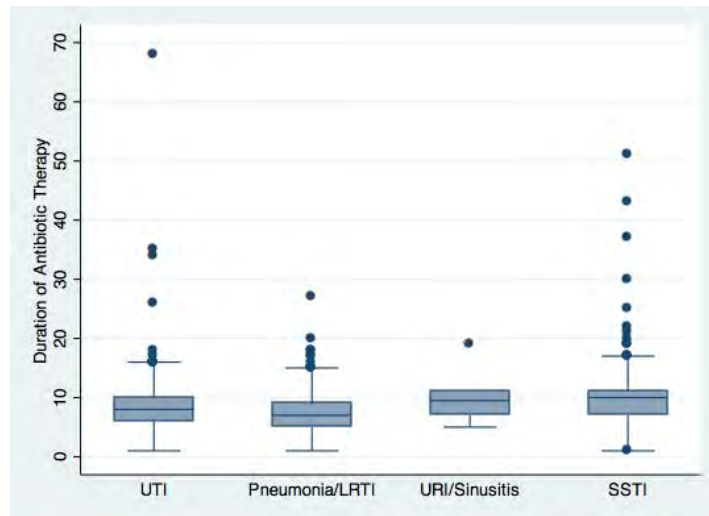


Either Criteria Positive = 251/504 (49.8%)
Agreement = 354/504 (70.2%)



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



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



ANTIBIOTIC TRACKING SHEET

Instructions: Please use this form to track all antibiotics that have been prescribed to a resident. Please note that this sheet represents all antibiotics that have been prescribed to ONE specific resident.

RESIDENT ID:		PRESCRIBING MD:		ADMISSION DATE: / /	
ANTIBIOTIC #1:					
DATE: (MM/DD/YY)		INDICATIONS FOR USE (Please check all that apply)		DIAGNOSTIC TESTS (Please check all tests that were performed)	
START	STOP	YES	NO	YES	NO
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DOES THE PATIENT HAVE ANY OF THE FOLLOWING DEVICES?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IC FACILITY ONLY: DID THIS PATIENT REQUIRE TRANSFER TO HOSPITAL?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
YES	NO	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		IS THE PATIENT COLONIZED WITH RESISTANT ORGANISM?		OTHER (PLEASE SPECIFY):	
		<input type="checkbox"/>	<input type="checkbox"/>		
ANTIBIOTIC #2:					
DATE: (MM/DD/YY)		INDICATIONS FOR USE (Please check all that apply)		DIAGNOSTIC TESTS (Please check all tests that were performed)	
START	STOP	YES	NO	YES	NO
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DOES THE PATIENT HAVE ANY OF THE FOLLOWING DEVICES?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IC FACILITY ONLY: DID THIS PATIENT REQUIRE TRANSFER TO HOSPITAL?		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
YES	NO	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		IS THE PATIENT COLONIZED WITH RESISTANT ORGANISM?		OTHER (PLEASE SPECIFY):	
		<input type="checkbox"/>	<input type="checkbox"/>		

<http://www.gnyha.org/whatwedo/quality-patient-safety/infection-control-prevention>



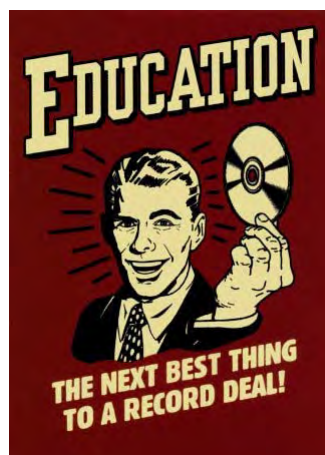
Suggestions for developing tracking workflows

- 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



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



Education & Training

BMJ 2012;344:d8173 doi: 10.1136/bmj.d8173 (Published 2 February 2012)

Page 1 of 13

RESEARCH

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

 OPEN ACCESS

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



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



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[https://www.coursesites.com/webapps/Bb-sites-course-creation-BBLEARN/courseHomepage.htmlx?course_id= 348931 1](https://www.coursesites.com/webapps/Bb-sites-course-creation-BBLEARN/courseHomepage.htmlx?course_id=3489311)

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

Developed by the Massachusetts Infection Prevention Partnership

Suspect a Urinary Tract Infection?
 How Taking Antibiotics When You Don't Need Them Can Cause More Harm Than Good

An Important Message for Seniors and their Families

Did You Know That...

- Up to 50 percent of all antibiotics prescribed are not needed or are not prescribed appropriately?
- Confusion or sudden behavior changes don't necessarily indicate a urinary tract infection (UTI)?
- As many as half of seniors living in long-term care settings will test positive for bacteria in their urine, *without actually having a UTI?*

Learn Why The CDC is Sounding The Alarm About The Overuse of Antibiotics

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Patient Engagement - Active

Articles

Effects of internet-based training on antibiotic prescribing rates for acute respiratory-tract infections: a multinational, cluster, randomised, factorial, controlled trial



Paul Little, Beth Stuart, Nick Francis, Elaine Douglas, Sarah Tonkin-Crine, Sibyl Anthierens, Jochen W L Cals, Hasse Melbye, Miriam Santer, Michael Moore, Samuel Coenen, Chris Butler, Kerenza Hood, Mark Kelly, Maciek Godycki-Cwirko, Artur Mierzecki, Antoni Torres, Carl Llor, Melanie Davies, Mark Mullee, Gilly O'Reilly, Alike van der Velden, Adam W A Geraghty, Herman Goossens, Theo Verheij, Lucy Yardley, on behalf of the GRACE consortium

Little et al. *Lancet* 2013; 382(9899): 1175-82
 AHRQ Antibiotic Stewardship Toolkit – available at <https://www.ahrq.gov/nhguide/index.html>

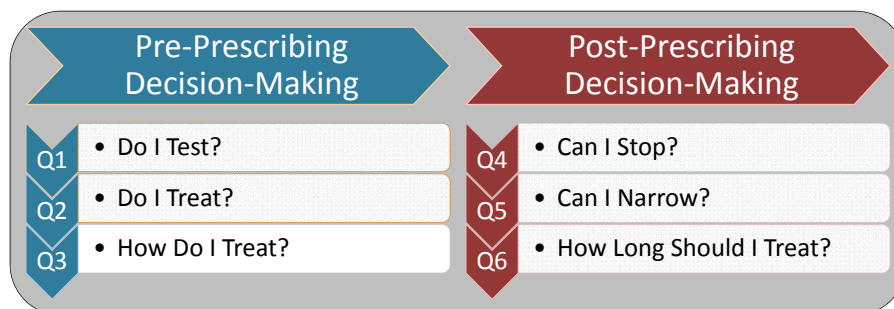
RRR = 32% ; ARR = 9%

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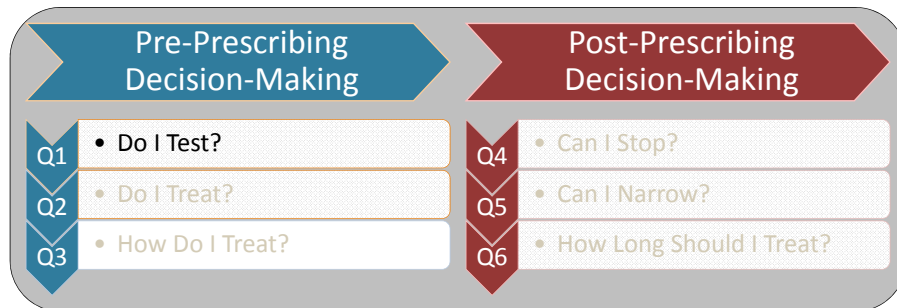
TAKE ACTION !



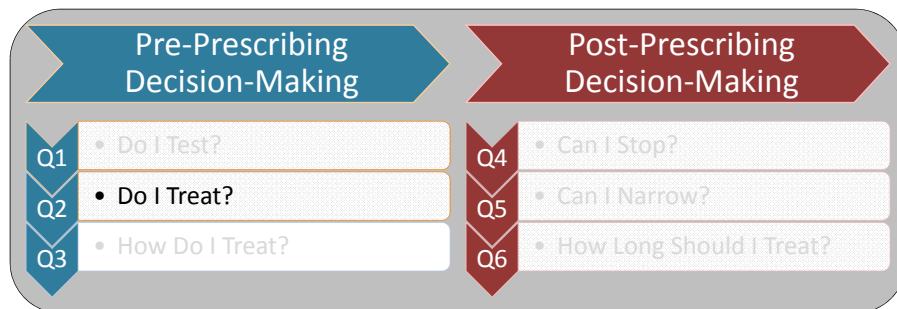
Antibiotic Prescribing is Process with Multiple (Potential) Decisions



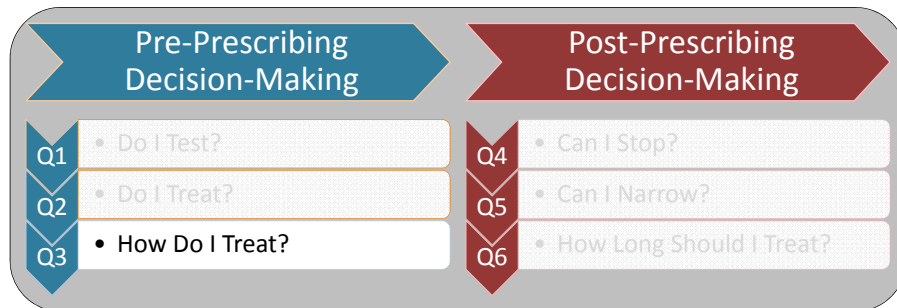
Antibiotic Prescribing is Process with Multiple (Potential) Decisions



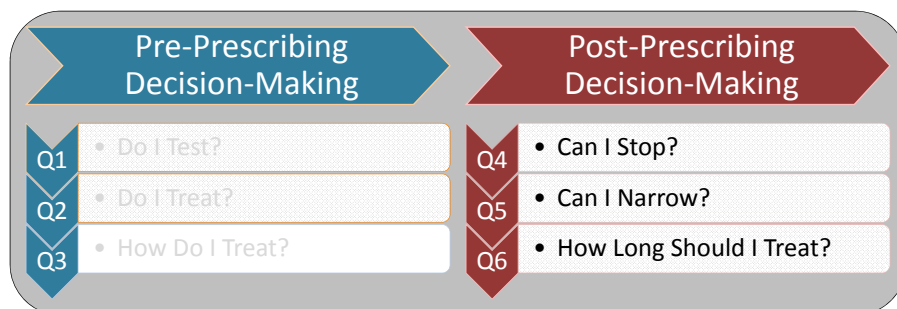
Antibiotic Prescribing is Process with Multiple (Potential) Decisions



Antibiotic Prescribing is Process with Multiple (Potential) Decisions



Antibiotic Prescribing is Process with Multiple (Potential) Decisions



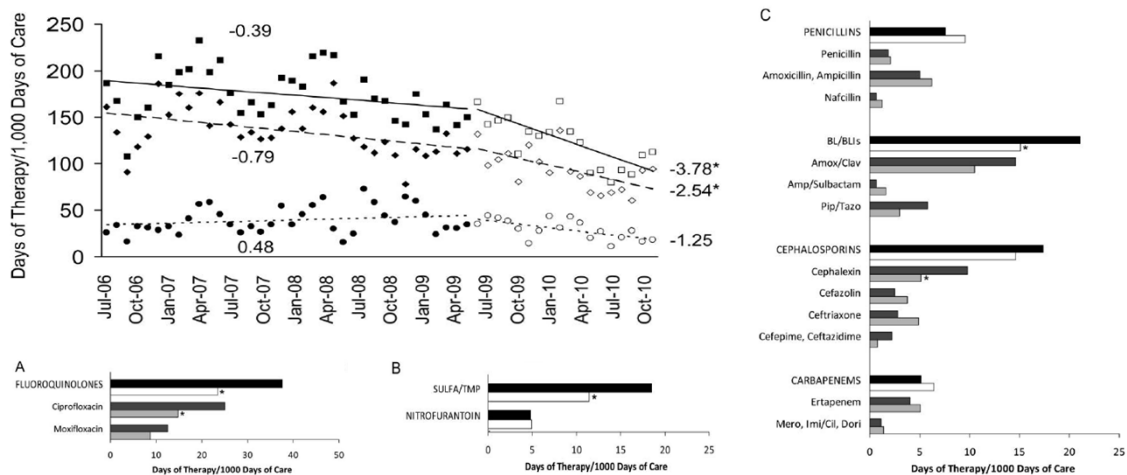
Frequency of Opportunities to Modify Antibiotic Therapy

- 162 antibiotic starts for UTI in 3 Wisconsin NHs were examined in detail.
- Almost 50% of the antibiotic courses initiated for UTI were amenable to change
 - **STOP OPPORTUNITY:** 4/12 (33%) of antibiotic courses initiated for a UTI indication were continued despite negative culture results.
 - **CHANGE (ESCALATE) OPPORTUNITY:** 8/25 (32%) of antibiotics were not modified despite a culture result demonstrating resistance to the empirically-initiated antibiotic regimen.
 - **CHANGE (DE-ESCALATE) OPPORTUNITY:** 36/60 (60%) of the cases treated with a fluoroquinolone (i.e., cipro) could be changed to another antibiotic with a lower risk of side effects and resistance (e.g., nitrofurantoin)
 - **SHORTEN OPPORTUNITY:** 80/162 (49%) of the cases were treated for more than 7 days even though data suggests treatment durations for UTI should rarely exceed this duration.

Crnich et al., unpublished data



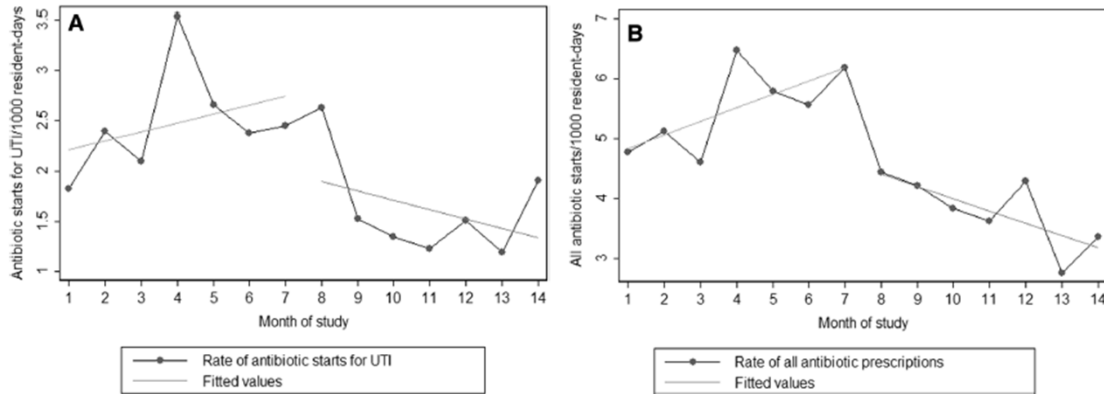
Impact of an ID Consultative Service on Antibiotic Utilization in a NH



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



Pharmacist Led Post-Prescriptive Review and Feedback

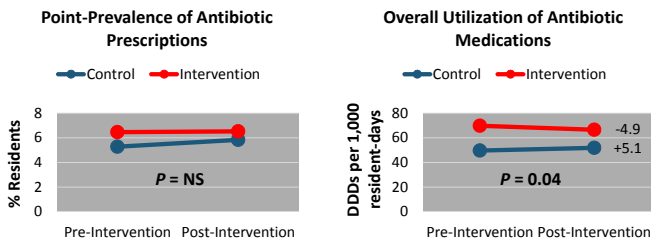


Doernberg et al. *Antimicrob Res Infect Control* 2015; 4(1): p. 54



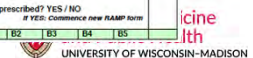
Un-Structured Antibiotic Review in NHs

- Objective:** Improve antibiotic prescribing through increased antibiotic prescribing “etiquette”
 - Documentation of findings
 - Diagnostics prior to Rx
 - Diagnosis, drug, dose, duration
 - Antibiotic review**
- Intervention:** Nurse-completed process checklist (resident antimicrobial management plan [RAMP])
- Design:** Cluster-randomized study in 30 U.K. NHs from January 2010 to May 2011

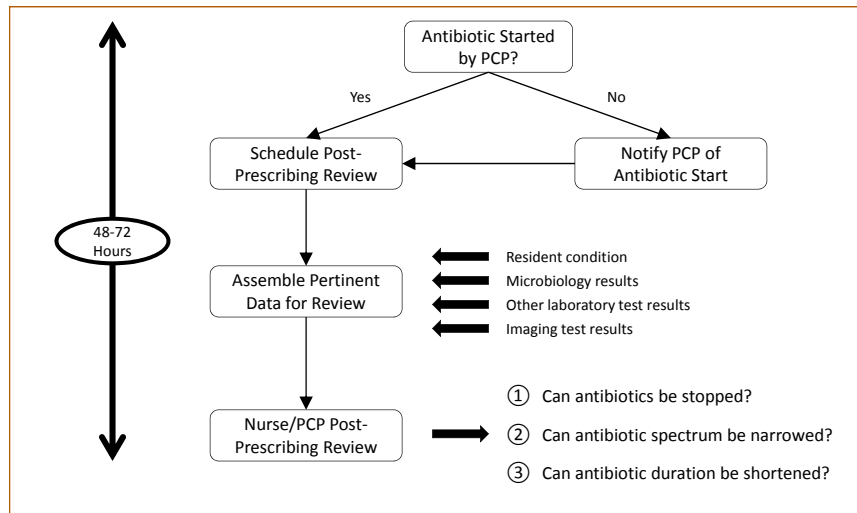


Fleet et al. *J Antimicrob Chemother* 2014; 69(8): 2265-73

RAMP* Form Part B: Review of treatment		
*Resident Antimicrobial Management Plan (part of BAUNCH Project)		
Part B: Start to fill in 48-72 hours after commencing treatment. All sections should be completed by end of treatment period.		
Plan no.	Resident Name	Room no.
Good Practice Points		
1	Review clinical progress after 48-72 hours of treatment Time: ... (24 hr clock) Date: ... / ... / ... The resident: (tick as applicable) <input type="checkbox"/> now has (no) signs or symptoms of infection <input type="checkbox"/> has improved <input type="checkbox"/> remains the same <input type="checkbox"/> has new signs / symptoms [state details] ... Is resident worse? YES / NO # YES: State action taken	Sign & Date
2	Stop date of treatment confirmed or review date planned Treatment STOPPED: Time: ... (24 hr clock) Date: ... / ... / ... OR REVIEW of treatment planned for: Date: ... / ... / ...	Sign & Date
3	Resident re-examined by a doctor YES / NO # YES: was by: <input type="checkbox"/> Scheduled GP visit <input type="checkbox"/> Extra GP visit <input type="checkbox"/> Out of Hours Service visit <input type="checkbox"/> Hospital A&E visit <input type="checkbox"/> Hospital Admission <input type="checkbox"/> Hospital Out-Patients visit Time: ... (24 hr clock) Date: ... / ... / ...	Sign & Date
4	Results of samples / swabs recorded Sample results: (tick as applicable) See section A4 overview <input type="checkbox"/> No new samples or swabs sent before this treatment started <input type="checkbox"/> Results not available yet <input type="checkbox"/> Negative result (no growth) <input type="checkbox"/> Positive result (micro-organisms grown) [state results if known] If positive result: Is this micro-organism sensitive to the antimicrobial prescribed? [tick one option] <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know <input type="checkbox"/> Not tested by laboratory	Sign & Date
5	Outcome of antimicrobial treatment documented Treatment outcome (at end of course) <input type="checkbox"/> Symptoms completely resolved <input type="checkbox"/> Symptoms partly resolved <input type="checkbox"/> No improvement Additional antimicrobial treatment prescribed? YES / NO # YES: Commence new RAMP form	Sign & Date
For Study Use Only Ref. No. B1 B2 B3 B4 B5		



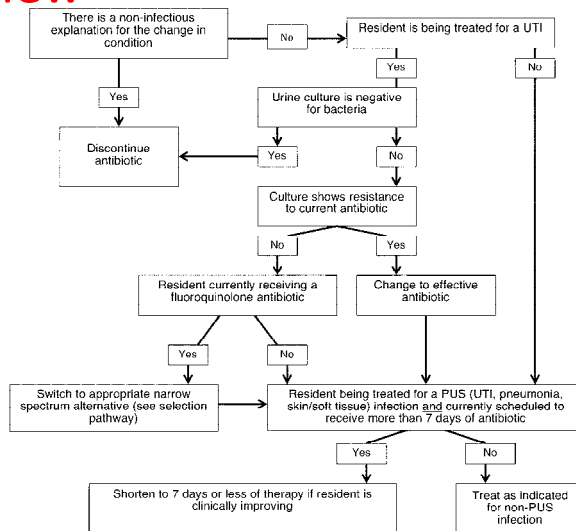
Post-Prescribing Process



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Tools to Support Provider-Led Antibiotic Review

B1. RESIDENT CONDITION		
Original Signs & Symptoms (before antibiotic start) <input type="checkbox"/> Fever <input type="checkbox"/> Localizing symptoms (e.g., pain with urination, cough): _____ <input type="checkbox"/> Non-localizing symptoms (e.g., confusion, fall): _____	Any New Signs & Symptoms (since antibiotic start) <input type="checkbox"/> Fever <input type="checkbox"/> Localizing symptoms (e.g., pain with urination, cough): _____ <input type="checkbox"/> Non-localizing symptoms (e.g., confusion, fall): _____	Today's Vital Signs Max Temp in past 24 hrs _____ Lowest Blood Pressure _____ Highest Pulse Rate _____ Highest Respiratory Rate _____ Lowest Oxygen Saturation _____ Other notes: _____
Have the original signs & symptoms been resolved? <input type="checkbox"/> No <input type="checkbox"/> Yes		
B2. DIAGNOSTIC TEST RESULTS		
Lab Results 1. White blood cell count: _____ 2. Creatinine level: _____ 3. BUN level: _____ 4. GFR: _____ 5. If diabetic, are the resident's blood sugars higher than normal? <input type="checkbox"/> No <input type="checkbox"/> Yes	Cultures Were any cultures ordered? <input type="checkbox"/> No <input type="checkbox"/> Yes If yes, what cultures were performed? (check all that apply) <input type="checkbox"/> Urine culture <input type="checkbox"/> Respiratory culture <input type="checkbox"/> Wound culture Other: _____ Was resistance identified to any tested antibiotics? <input type="checkbox"/> No <input type="checkbox"/> Yes (attach copy of report to this form)	Imaging Were any imaging studies done? <input type="checkbox"/> No <input type="checkbox"/> Yes (attach copy of report to this form)
Narrowing Antibiotic Therapy: consider culture susceptibility and the following guide:		
<input type="checkbox"/> Yes <input type="checkbox"/> No Is the resident's eGFR > 50 and is the UTI confined to the bladder (no concerns of pyelonephritis)?	<input type="checkbox"/> Yes <input type="checkbox"/> No Consider switching to nitrofurantoin	<input type="checkbox"/> Yes <input type="checkbox"/> No Consider switching to Amoxicillin or Cephalosporin
<input type="checkbox"/> Yes <input type="checkbox"/> No Is the resident allergic to Bactrim (sulfa)?	<input type="checkbox"/> Yes <input type="checkbox"/> No Consider switching to Bactrim (sulfa)	



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Thank You

