FOCUS 2014 CONFERENCE

Wisconsin Dells, WI – November 20, 2014

Treating UTI in Nursing Homes: A Toolkit for Improvement

Christopher J. Crnich, MD PhD MS[1, 2]

On Behalf of the Wisconsin Healthcare-Associated Infections (HAIs) in Long-Term Care Coalition

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Outline

- Why Antibiotic Use Matters
- Urinary Tract Infection
  - What it is
  - What it isn't
- Why do we continue to treat bacteriuria?
- UTI Prescribing Improvement Strategies
  - Overview
  - When to test
  - When to treat
  - How to treat

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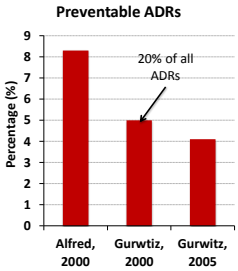
Abx & Adverse Drug Reactions

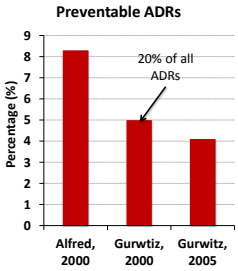


Independent Risk Factors of Adverse Drug Events

Risk Factor	OR	95% CI
New admission	2.8	(1.5 – 5.2)
No. of Scheduled Medications		
<5	1.0	(referent)
5-6	2.0	(1.2 – 3.2)
7-8	2.8	(1.7 – 4.7)
≥9	3.3	(1.9 – 5.6)
Current Medications		
Antibiotic	4.0	(2.5 – 6.2)
Antipsychotic	3.2	(2.1 – 4.9)
Antidepressant	1.5	(1.1 – 2.3)
Supplements	0.4	(0.3 – 0.6)

Field et al. *Arch Intern Med* 2001; 161(13): 1629-34.

Abx & Adverse Drug Reactions



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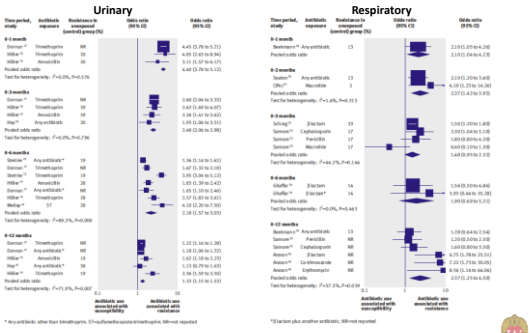
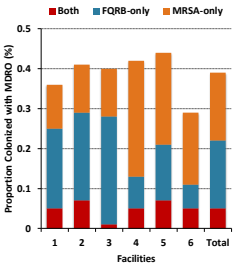
Antibiotic Exposure Duration of Resistance



Costelloe et al. *BMJ* 2010; 340: c2059

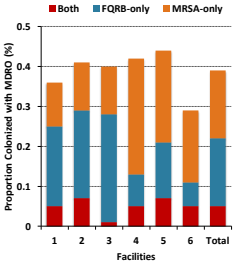
Antibiotic Resistance in Nursing Homes

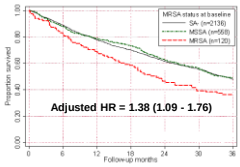
- **NH residents commonly colonized with MDROs**
  - Lautenbach et al. *Emerg Infect Dis* 2005; 11(6): 889-94
  - Mody et al. *Clin Infect Dis* 2008; 46(9): 1368-73
  - Furuno et al. *Infect Control Hosp Epidemiol* 2009; 30(4): 313-8
  - Stone et al. *Infect Control Hosp Epidemiol* 2012; 33(6): 551-7
- **Resistance imported <u>and</u> created in NHs**
  - Furuno et al. *Infect Control Hosp Epidemiol* 2011; 32(3): 244-9
  - Fisch et al. *J Clin Micro* 2012; 50(5): 1698-1703
  - Stone et al. *Infect Control Hosp Epidemiol* 2012; 33(6): 551-7



Crnich et al. *Infect Control Hosp Epidemiol* 2012; 33(11): 1172-4

MRSA Colonization Associated with an Increased Risk of Resident Death

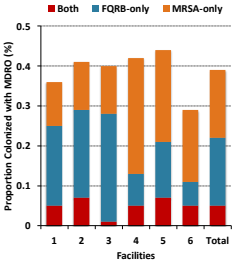




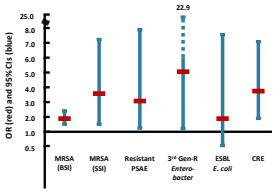
Crnich et al. *Infect Control Hosp Epidemiol* 2012; 33(11): 1172-4
Suetens et al. *J Am Geriatr Soc 2006;* 54(12): 1854-60

Infections Caused by Antibiotic-Resistant Bacteria Increase Resident Risk of Death

Crnich et al. *Infect Control Hosp Epidemiol* 2012; 33(11): 1172-4



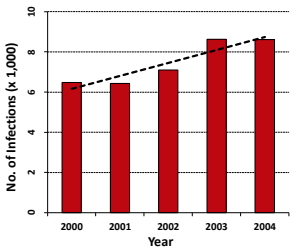
Attributable Mortality of Antibiotic-Resistant Infections:

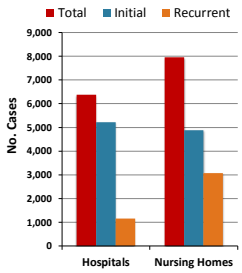


Carmeli et al. *Arch Intern Med* 1999; 159(7): 1127-32
Cosgrove et al. *Arch Intern Med* 2002; 162(2): 185-90
Engemann et al. *Clin Infect Dis* 2003; 36(5): 592-8

Lautenbach et al. *Clin Infect Dis* 2001; 32(8): 1162-7
Cosgrove et al. *Clin Infect Dis* 2003; 36(1): 53-9
Patel et al. *Infect Control Hosp Epidemiol 2008; 29(12): 1099-1106*

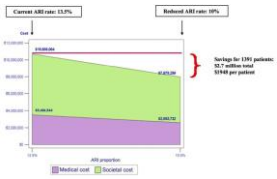
Antibiotic Use Likely Driving NH Rates of *Clostridium difficile* Up

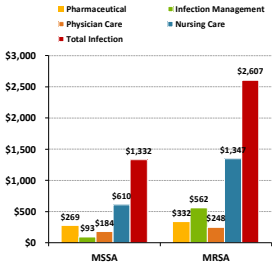




Crnich et al. *Infect Control Hosp Epidemiol* 2007; 28(8): 1006-8
Campbell et al. *Infect Control Hosp Epidemiol* 2009; 30(6): 526-33

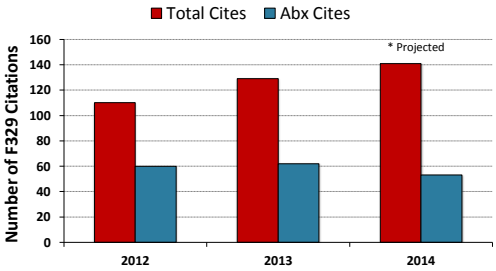
Treating Antibiotic Resistant Infections is More Costly to Hospitals and NHs



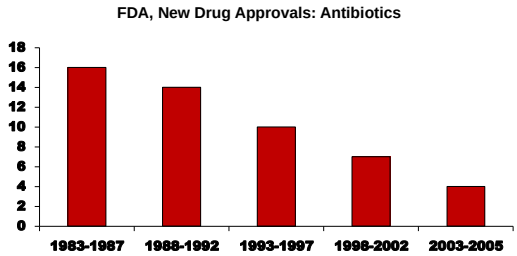


Roberts et al. *Clin Infect Dis* 2009; 49(8): 1175-84
Capitano et al. *J Am Geriatr Soc* 2003; 51(1): 10-16

F-329 Citations



The Antibiotic Pipeline



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

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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.

UTI

- Accounts for 24% of all infections in older adults.
- Account for 12-25% of LTCF infections
- Most common cause of bacteremia in LTCF
- Responsible for 20-60% of antimicrobial use in LTCF

UTI is a Clinical Diagnosis

- **Non-Catheterized Patients:** Affected residents generally have fever and/or localizing urinary symptoms
  - Dipstick can usually be used to ruled-out UTI
  - Dipstick should not be used as criteria for getting UCx
- **Catheterized Patients:**
  - Localizing symptoms often absent
  - Delirium plus fever/leukocytosis in absence of alternative explanation
- Cultures are used to guide ***antibiotic selection*** decisions not ***treatment initiation*** decisions

Revised McGeer: Without Indwelling Catheter

(A) Clinical (At least one of the following must be met)	+	(B) Lab (At least one of the following must be met)
1. Either of the following: ☐ Acute dysuria or ☐ Acute pain, swelling or tenderness of testes, epididymis or prostate		1. Voided specimen: Positive urine culture ($\geq 10^5$ cfu/mL) no more than 2 organisms
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		2. Straight cath specimen: Positive urine culture ($\geq 10^2$ cfu/mL) any number of organisms
3. If neither FEVER or LEUKOCYTOSIS present INCLUDE TWO or more of the ABOVE (Box #2).		

Stone et al. *Infect Control Hosp Epidemiol* 2012; 33:965-977

Revised McGeer Resident With Indwelling Catheter

(A) Clinical (At least one of the following must be met with no alt. explanation)	+	(B) Lab (Must be met)
☐ Fever		☐ Positive urine culture ($\geq 10^5$ cfu/mL) of any organism(s)
☐ Rigors		
☐ New onset hypotension		
☐ Either acute change in mental status or acute functional decline, with no alternate diagnosis AND leukocytosis		
☐ New onset costovertebral angle pain or tenderness		
☐ New onset suprapubic pain		
☐ Acute pain, swelling or tenderness of the testes, epididymis or prostate		
☐ Purulent drainage from around the catheter		

Stone et al. *Infect Control Hosp Epidemiol* 2012; 33:965-977

Minimum Criteria for Initiating Antibiotics

(Note: Culture Results Not Part of Decision-Making)

No Indwelling Catheter	Chronic Indwelling Catheter
• Acute dysuria OR • Fever* plus at least one of following (new or worsening): ❑ Urgency ❑ Frequency ❑ Suprapubic pain ❑ Gross hematuria ❑ Costovertebral angle tenderness ❑ Urinary incontinence	• Must have at least one of the following ❑ Fever* ❑ New costovertebral angle tenderness ❑ Rigors (shaking chills) ❑ New onset delirium

* Fever > 100° or 2.4° F above baseline

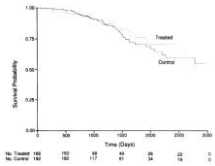
Loeb et al. *Infect Control Hosp Epidemiol* 2001; 22:120-124

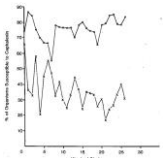
UTI is not…

- A positive urine culture
- Pyuria
- Smelly or cloudy urine
- Non-localizing change in condition
  - Behavior change
  - Decreased oral intake
  - Mental status change
  - Functional status change
  - Fall or new gait instability

Asymptomatic Bacteriuria

- Definition: (+) urine culture in the absence of symptoms
- Prevalence
  - Community: 6 – 17%
  - Institutionalized: 19 – 57%
- Treatment of ASB
  - Does not reduce episodes of symptomatic UTI
  - Promotes resistance
  - Increases risk of *C. difficile*





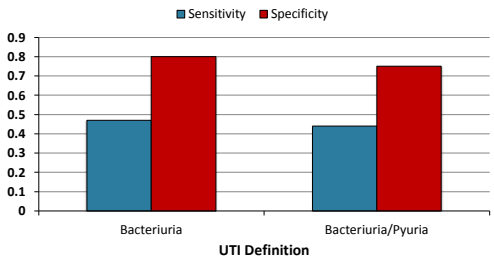
Warren et al., *JAMA* 1982; 248(4): 454-8
Nicolle et al. *N Engl J Med* 1983; 309: 1420-5
Nicolle et al. *Am J Med* 1987; 83: 27-33
Abrutyn et al., *Ann Intern Med* 1994; 120(10): 827 – 33
Ouslander et al. *Ann Intern Med* 1995; 122: 749-54

Pyuria ≠ UTI

- 90% of NH subjects **with** asymptomatic bacteriuria have pyuria
- 30% of NH residents **without** bacteriuria have pyuria
- Level of pyuria does not correlate with presence of bacteriuria
- Predictive value is poor
  - PPV: 18 – 75%
  - NPV: 75 – 100%

Nicolle et al., *Infect Control Hosp Epidemiol* 2001; 22(3): 167-75

Urine Odor Not Predictive of Bacteriuria/Pyuria Let Alone UTI



Midthun et al., *J Gerontol Nurs* 2004; 30(1): 4-9

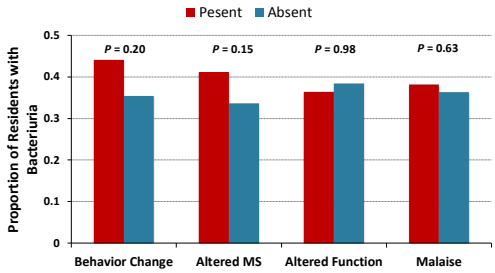
Non-Localizing Change in Condition

- UTI, as well as a large number of other conditions, can result in resident change-in-condition (Table)
- Non-localizing signs often (>60%) the only reason provided by clinicians when asked why they suspect UTI

D	Drugs Dementia Discomfort	BEERS Criteria (e.g., anticholinergic, benzodiazepines, hypnotics) OR dose change Dementia Lewy bodies: Fluctuations in alertness and attention Pain
E	Eyes, ears, environment	Sensory deprivation; vulnerability to environment
L	Low oxygen states	Myocardial infarction, stroke, pulmonary embolus
I	Infection	Pneumonia, sepsis, symptomatic UTI
R	Retention	Urinary retention, constipation
I	Ictal states	Seizure disorder
U	Underhydration/nutrition	Dehydration
M	Metabolic Causes	Low or high blood sugar, sodium abnormalities
S	Subdural hematoma	Head trauma

Juthani-Mehta et al., *J Am Geriatr Soc* 2007; 55(7): 1072-7
Juthani-Mehta et al. *Infect Control Hosp Epidemiol* 2008; 29(5): 446-9
D'Agata et al. *J Am Geriatr Soc* 2013; 61(1): 62-6

Non-Localizing Change-in-Condition not Predictive of Bacteriuria (let alone UTI)



Juthani-Mehta et al., *J Am Geriatr Soc* 2009; 57(6): 963-70

Bacteriuria in Residents with Cognitive Impairment: the Chicken or Egg Phenomenon

- Probability of asymptomatic bacteriuria inversely correlated with resident's baseline cognitive status.
- Residents with cognitive impairment also experience more frequent and severe fluctuations in mental status with physiological perturbations (infectious or non-infectious).
- THEREFORE, resident with cognitive impairment and change in mental status.
  - MORE LIKELY to have a positive urine culture
  - Independent of whether infection is the cause of clinical decline,
  - OR if infection is present, whether urinary tract is the source.

Nicolle L. *J Am Geriatr Soc* 2009 57:1113-1114

Overtreatment of UTI

- Up to 75% of the prescriptions for UTI in NHs is inappropriate.
- Overuse clearly linked to adverse effects
  - Colonization & infection with antibiotic resistance
  - *Clostridium difficile*
- Why?
  - Clinical uncertainty
  - Risk Aversion
  - Prescribing habits
  - Ease of diagnostic testing

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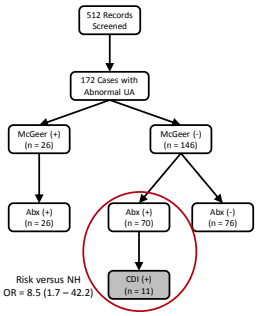
Inappropriate Abx Use and *C. difficile*

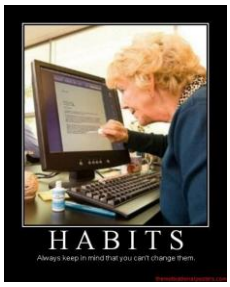


Risk versus NH OR = 8.5 (1.7 – 42.2)

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

- **McGeer Criteria (at least 3 of the following)**
  - Temperature ≥ 38° C
  - N/↑ 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%])

Why?



UTI is not … but …

- Some NH residents are non-verbal (but most are)
- Some NH residents do not mount fever (but most do)
- UTI can manifest with non-localizing symptoms (although most have additional findings)

High et al. *Clin Infect Dis* 2009; 48(2): 149-71
D'Agata et al. *J Am Geriatr Soc* 2013; 61(1): 62-6
Nace et al. *J Am Med Dir Assoc* 2014; 15(2): 133-9

Factors that Influence Risk Aversion

- Frail NH residents can get sick quickly
- Family member preferences
- Nursing home staff preferences
- Health system preferences
- Internal hard-wiring

Present-Biased Decision-Making

- Human beings are hard-wired to focus on the current costs/benefits of a decision
  - Dollar today or five dollars next week?
  - Next month, next year?
- Costs of antibiotic therapy are non-visible
  - Resistance and CDI can be delayed months
  - What about when cross-covering a resident?

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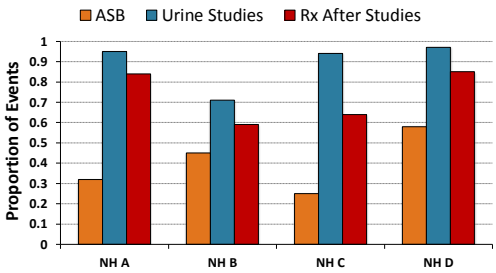
Dipstick → UA → Urine culture → Antibiotic Prescription

- Testing the urine is one of the easiest things we do in the NH (what if it was as hard as getting a respiratory specimen?)
- Automating urine testing is done in many facilities for the sake of efficiency
  - Standing orders for dipstick and urinalyses
  - Pan-"everything" workups
- Ignoring culture results is hard (particularly if you do not know the resident)

Drinka & Crnich, *Ann Long Term Care* 2014; 22(9)

Culturing Drives Prescribing



Phillips et al., *BMC Geriatrics* 2012; 12: 73

How Do We Improve?

WI HAI in LTC Coalition UTI Toolkit

- 1 - Overview
- 4 – When to Treat
- 2 – How to Prevent
- 5 – How to Treat
- 3 – When to Test
- 6 – Organizational Tools

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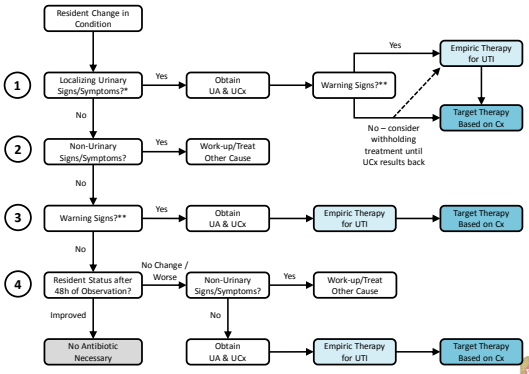

Drinka & Crnich, *Ann Long Term Care* 2014; 22(9)

WI HAI in LTC Coalition UTI Toolkit

- 1 - Overview
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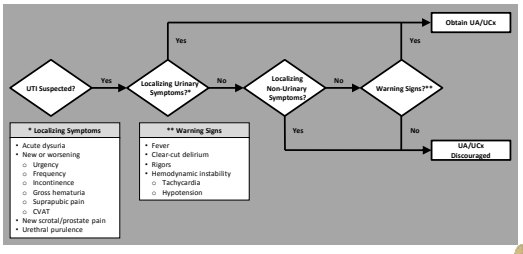
Reduce Unnecessary Testing

- Reduce reflexive use of dipstick
- Limit UA/Ucx to situations were UTI likely



Drinka & Crnich, *Ann Long Term Care* 2014; 22(9)

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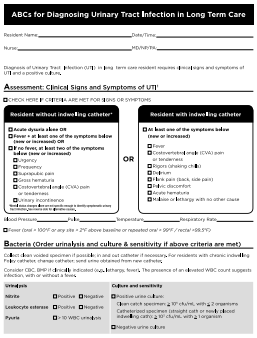
Pathway + QI Approach = Success

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

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



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

☐ CHECK HERE IF CRITERIA ARE MET FOR SIGNS OR SYMPTOMS

Resident without indwelling catheter*		Resident with indwelling catheter
☐ Acute dysuria (due to UTI)		☐ At least one of the symptoms below (new or increased)
☐ Fever + at least one of the symptoms below (new or increased) OR		☐ Fever
☐ No fever, at least two of the symptoms below (new or increased)		☐ Cardiovertebral angle (CVA) pain or tenderness
☐ Urgency		☐ Rigors (shaking chills)
☐ Frequency		☐ Delirium
☐ Suprapubic pain		☐ Back pain (back, side pain)
☐ Gross hematuria		☐ Pelvic discomfort
☐ Costovertebral angle (CVA) pain or tenderness		☐ Gross hematuria
☐ Urinary incontinence		☐ Malaise or lethargy with no other cause

*Do not treat asymptomatic bacteriuria except in sterile-urinary-tract procedures, pregnancy, and neutropenia. Do not treat asymptomatic urinary incontinence, pyuria alone, or nonspecific complaints.

OR

Blood Pressure _____ Pulse _____ Temperature _____ Respiratory Rate _____

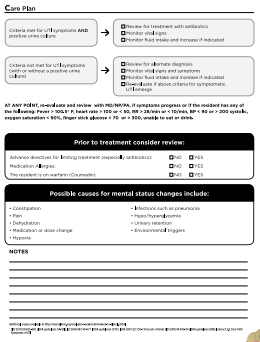
☐ Fever (oral > 100°F or any site > 2°F above baseline or repeated oral > 99°F / rectal >98.5°F)

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 CDC BMP if clinically indicated (sepsis, 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:
Leukocyte esterase	☐ Positive	☐ Negative	☐ Clean catch specimen ≥ 10⁵ cfu/mL with ≤ 2 organisms
Pyuria	☐ >10 WBC urinalysis		Catheterized specimen (straight cath or newly placed indwelling cath) ≥ 10³ cfu/mL with ≤ 2 organisms
			☐ 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 > 100.4° 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

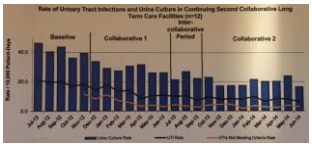
Possible causes for mental status changes include:

- Constipation
- Pain
- Dehydration
- Medication or dose change
- Hypoxia
- Infections such as pneumonia
- Hypo/hyperglycemia
- Urinary retention
- Environmental triggers

NOTES

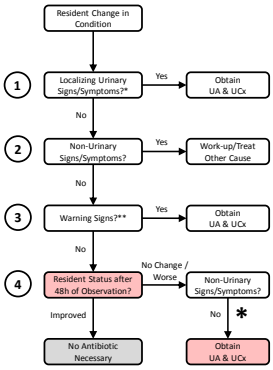
Pathway + QI Approach = Success

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



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]



Drinka & Crnich, *Ann Long Term Care* 2014; 22(9)

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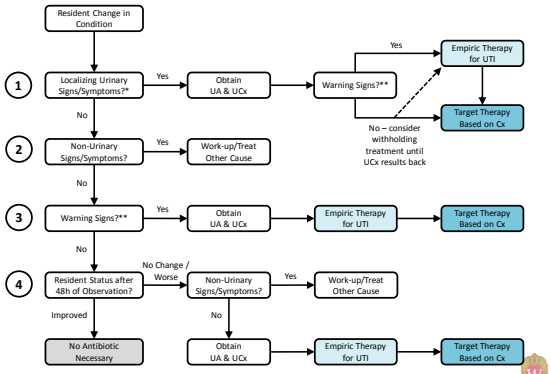
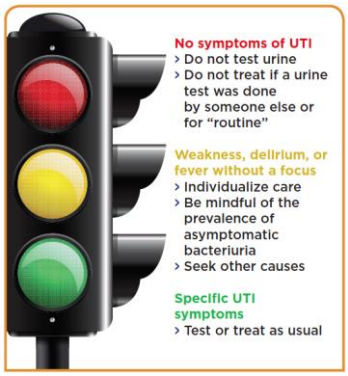
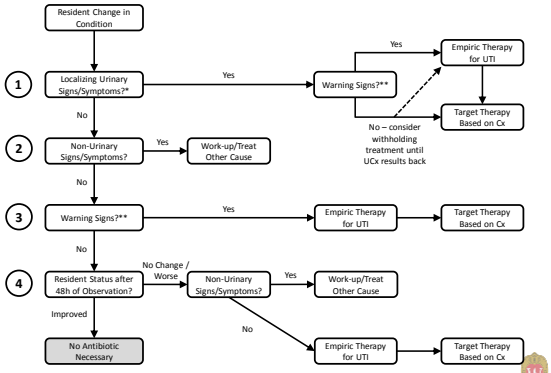


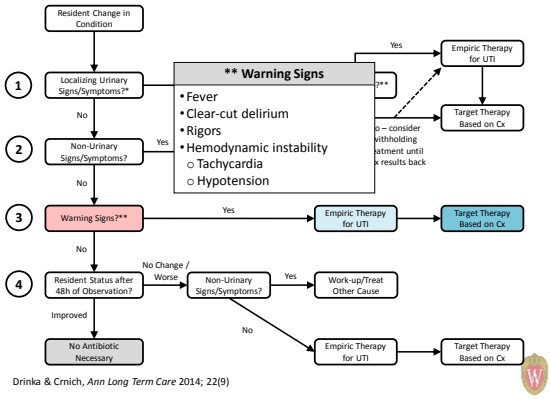
Drinka & Crnich, *Ann Long Term Care* 2014; 22(9)



http://www.macoalition.org/Initiatives/infections/uti_2013/tools/LTC_Clinician%20Education%20Sheet_final.pdf



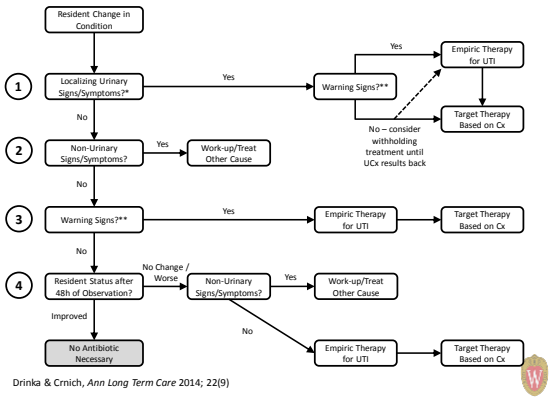
Drinka & Crnich, *Ann Long Term Care* 2014; 22(9)



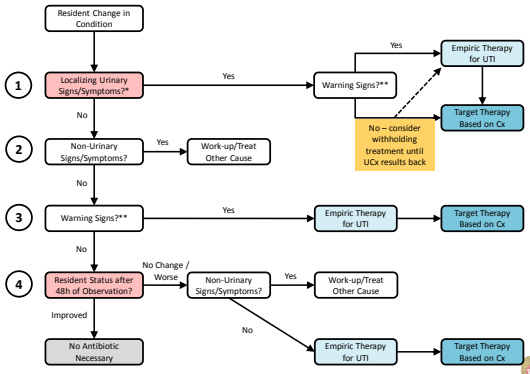
Drinka & Crnich, *Ann Long Term Care* 2014; 22(9)

Antibiotic Pause?

- Resident change-in-condition may be caused by a variety of non-infectious causes (e.g., dehydration, medication side effect)
- Withholding antibiotics for 48 hours to assess response may be reasonable in residents with cognitive changes who meet the following criteria:
  - No localizing urinary signs/symptoms
  - No warning signs*



Drinka & Crnich, *Ann Long Term Care* 2014; 22(9)



Drinka & Crnich, *Ann Long Term Care* 2014; 22(9)

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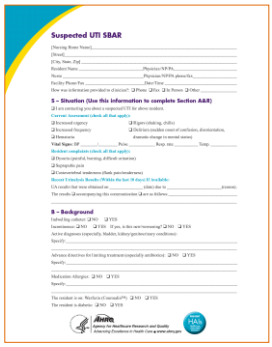
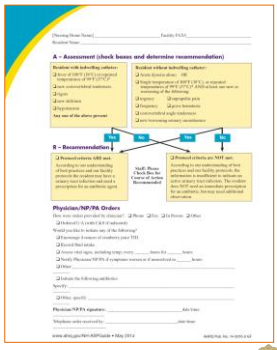
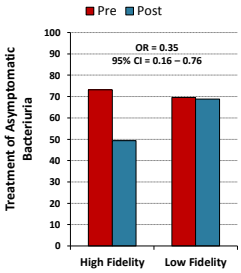




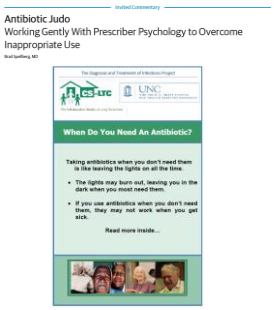
Communication/Decision Aid Tool

- 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)



American Institute for Research. *Final Report to AHRQ* 2012. ACTION Contract No. 290-2006-000-191-08.

Raising Prescribing Threshold by Moving Pressure from One End to Another


Invited Commentary

Antibiotic Judo

Working Gently With Prescriber Psychology to Overcome Inappropriate Use

Brad Spellberg, MD

The Diagnosis and Treatment of Infections Project

CS-LTC

UNC

When Do You Need An Antibiotic?

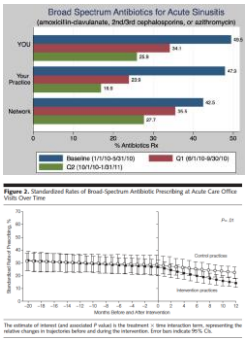
Taking antibiotics when you don't need them is like leaving the lights on all the time.

- The lights may burn out, leaving you in the dark when you most need them.
- If you use antibiotics when you don't need them, they may not work when you get sick.

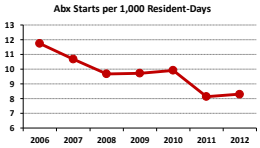
Read more inside...

Abt. *Final Report to AHRQ* 2012. ACTION Contract No. 290-2006-000-191-11.

Audit & Feedback



- 147-bed NH in WI with 12 staff who developed MRSA infection
- 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



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

Boero, unpublished data

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Approach to Treatment

- **Always** get culture before starting therapy
- Empiric therapy
  - Base on regional/institutional susceptibility patterns
  - Review individual's recent antibiotic use and culture results
  - TMP/SMX > fluoroquinolones
- Follow-up on culture results and de-escalate to narrowest spectrum possible
- Avoid prolonged courses of antibiotics
  - Females: 3-5d if no catheter, 7d if catheter or if NFT/BL used
  - Males: 7d regardless of catheter
  - Consider alternative diagnosis if symptoms not improving in 24-48 hours

NFT = nitrofurantoin; BL = beta-lactam antibiotic

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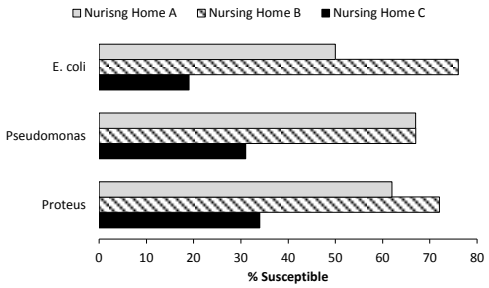
Importance of the Antibiogram



Drinka et al. *JAMDA* 2013; 14(6): 443

Discordance Between Resident History and Treatment Decisions

- 162 antibiotic events in 3 Wisconsin NHs were examined in detail.
- 36 (22%) subjects were prescribed an antibiotic for a UTI indication and had a prior urine culture result available in the previous 3 months.
- 10/36 subjects (28%) were prescribed a FQ despite a prior culture result positive for a FQ-resistant organism.

Crnich et al., unpublished data

Approach to Treatment

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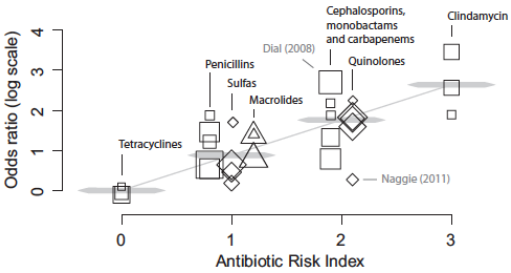
Antibiotic Choice: A Simple Way to Reduce *C. difficile* Risk



Wenisch et al. *Antimicrob Ag Chemother* 2014; 58(9): 5079-83

Importance of Post-Prescribing Review

- 162 antibiotic events in 3 Wisconsin NHs were examined in detail.
- 33% of antibiotics initiated for a UTI indication were continued despite negative culture results.
- 32% of antibiotics were not modified despite a culture result demonstrating resistance to the empirically-initiated antibiotic regimen.

Crnich et al., unpublished data

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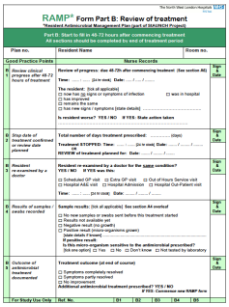
Introducing Post-Prescribing Review into Nursing Homes


RAMP® Form Part B: Review of treatment

- Cluster RCT in 30 NHs in the United Kingdom
- Antibiotic starts unchanged
  - Intervention: 6.46% → 6.52%
  - Control: 5.27% → 5.83%
- Antibiotic utilization significantly reduced
  - Intervention: 69.8 → 66.5 DDD per 1,000 resident-days
  - Control: 49.7 → 51.9
  - % difference: 10%

Fleet et al. *J Antimicrob Chemother* 20014; 69(8): 2265-73

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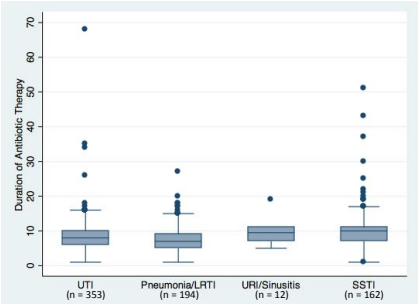
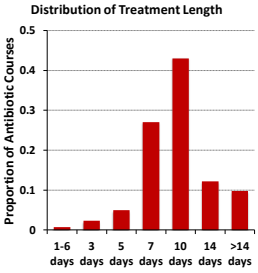
NFT = nitrofurantoin; BL = beta-lactam antibiotic

Frequency of Prolonged Rx



Unpublished data

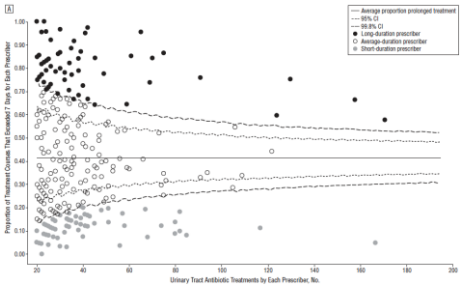
Prolonged Treatment of UTI



- Antibiotic selection
  - Quinolones (66.6%)
  - TMP/SMX (26.8)
  - NFT (6.8%)
  - Amox-Clav (5.6%)
- Longer duration of therapy (>7d) associated with:
  - Higher risk of late recurrence
  - Higher risk of *C. difficile* infection

Drekonja et al. *JAMA Intern Med* 2013; 173(1): 62-8

Developing NH-Specific Guidelines for Common Infections



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

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Catheter Replacement in UTI

	Day 3		Day 7		Day 28	
	Rep	No Rep	Rep	No Rep	Rep	No Rep
Micro cure	89%	30%*	67%	33%*	48%	19%*
Clinical cure	93%	41%*	93%	78%	89%	54%
Clinical relapse	---	---	7%	29%	11%	41%*

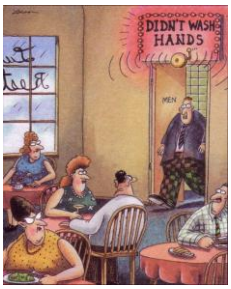
Raz, *J Urol* 2000

Prevention of UTIs

- Avoid the use of indwelling urinary catheters
  - 5-15% of LTCF residents have indwelling catheter
  - 50% of newly admitted LTCF residents do not meet established criteria for an indwelling urinary catheter
  - Regularly evaluation and justification of the continued need for indwelling catheter will significantly reduce device utilization
  - Judicious use of incontinence pads, condom catheters, and intermittent straight catheterization can further reduce inappropriate use
  - Role of routine catheter exchange unclear
  - Role of suprapubic catheter in reducing UTI unclear
- Anti-infective catheters (only for short-term)
- Cranberry tablets, methenamine salts, acetic acid bladder instillations have situational use
- Extremely limited role for prophylactic systemic antibiotics

Hooton et al. *Clin Infect Dis* 2010; 50(5): 625-63

Thank You



WI LTC HAI Coalition UTI Toolkit Sub-Committee

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