



UTI Toolkit – Module 1

The Clinical Rationale for Improving the Management of UTIs in Nursing Homes



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Narration by:

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Healthcare-Associated Infections in Long-Term Care Coalition



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Outline

- Frequency of Inappropriate Antibiotic Use in Nursing Homes
- Resident-Level Risks of Antibiotic Therapy
 - Adverse Drug Events
 - Clostridium difficile infection
 - Future antibiotic-resistant infections
- Facility-Level Risks of Antibiotic Therapy
 - Resident-to-Resident Spread of Antibiotic Resistance
 - Regulatory issues (see “The Regulatory Rationale for Improving the Management of UTIs in Nursing Homes” presentation)
- Why Focus on Urinary Tract Infection?



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25-80% of Antibiotic Use in Nursing Homes (NHs) is Inappropriate

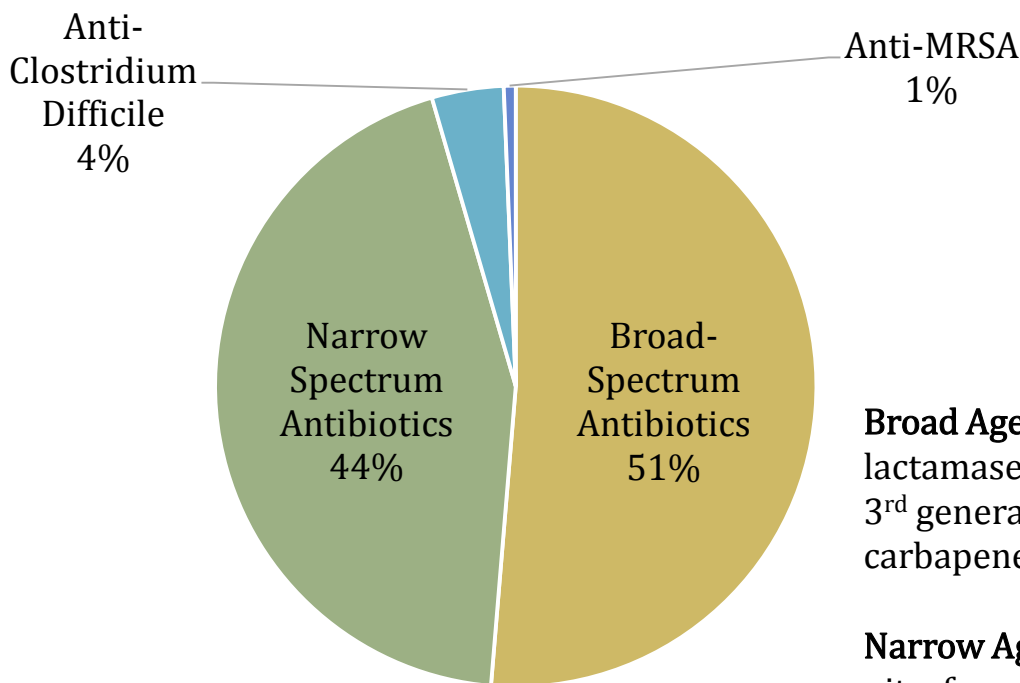


1. Zimmer et al. *J Am Geriatr Soc* 1986; 34(10): 703-10
2. Katz et al. *Arch Intern Med* 1990; 150(7): 1465-8
3. Warren et al. *J Am Geriatr Soc* 1991; 39(10): 963-72
4. Pickering et al. *J Am Geriatr Soc* 1994; 42(1): 28-32
5. Loeb et al. *J Gen Intern Med* 2001; 16(6): 376-83
6. Vergidis et al. 2011; *J Am Geriatr Soc* 59(6): 1093-8



Broad-Spectrum Antibiotic Use in Wisconsin Nursing Homes is Common

Distribution of Antibiotic Use in 5 Wisconsin Nursing Homes: Percentage by Days of Antibiotic Therapy



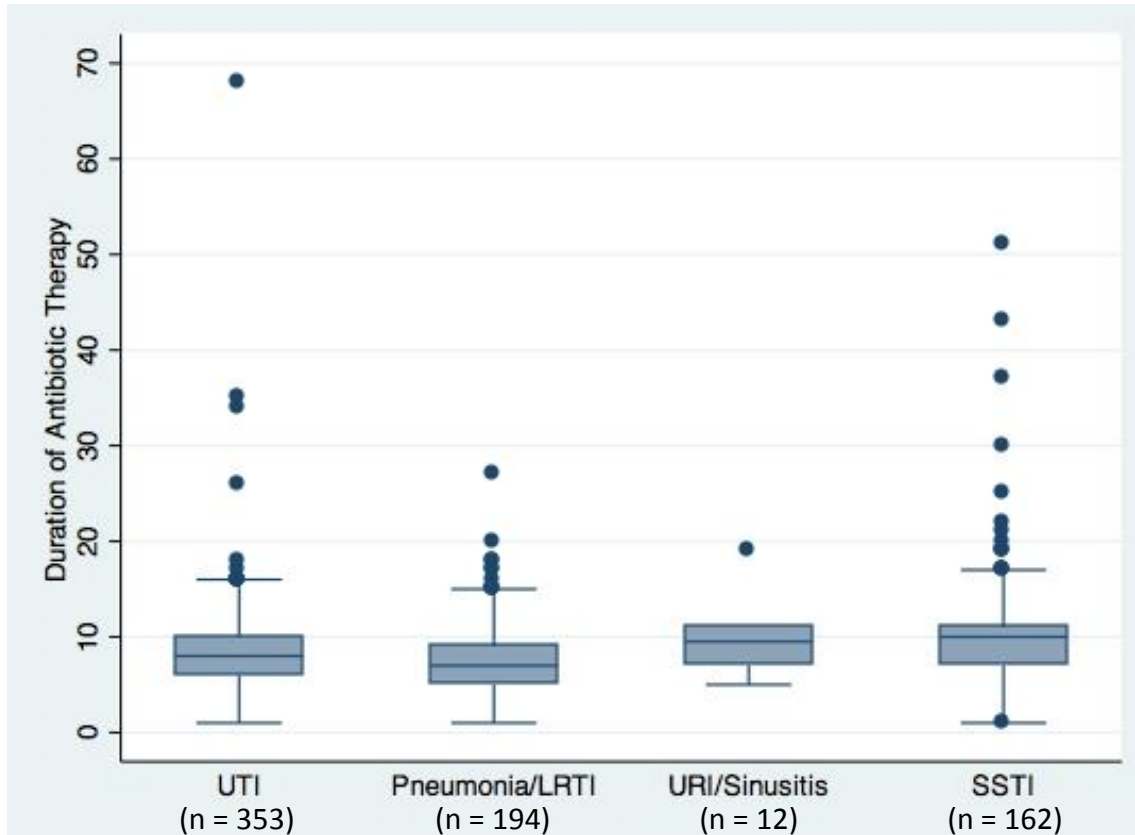
- Broad-spectrum agents account for over half (51%) of antibiotic use in Wisconsin NHs (Figure).
- Fluoroquinolones are the most frequently prescribed class (27% of all antibiotic days)

Broad Agents: fluoroquinolones, beta-lactam/beta-lactamase inhibitors (e.g., amoxicillin-clavulanate), 2nd & 3rd generation cephalosporins, macrolides, & carbapenems

Narrow Agents: Trimethoprim-sulfamethoxazole, nitrofurantoin, tetracyclines, 1st generation cephalosporins, penicillins



Prolonged Antibiotic Courses are Common in Wisconsin NHs



- Half of antibiotic treatment courses initiated in Wisconsin NHs are prescribed for more than seven days (Figure).⁸
- 20% of overall antibiotic use in NHs could be eliminated by shortening treatment courses to 7 days or less even if there was no change in the total number of antibiotic starts!⁹

8. Crnich; Unpublished data
 9. Daneman et al. *JAMA Intern Med* 2013



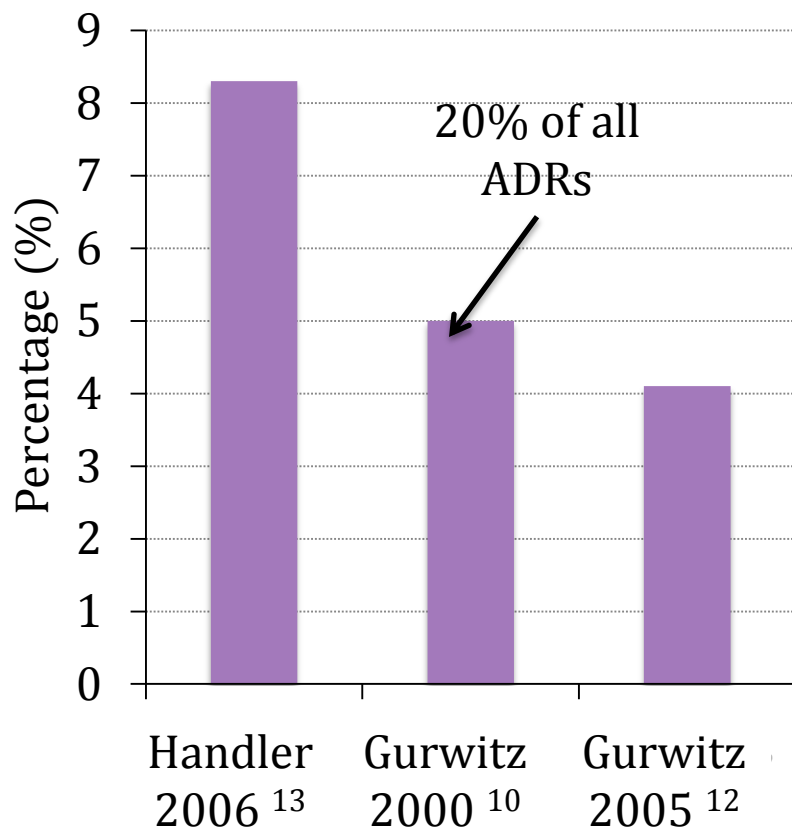
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Antibiotics are a Leading Cause of Adverse Drug Events (ADEs) in Nursing Homes (NHs)

Preventable ADEs



Independent Risk Factors of ADEs¹¹

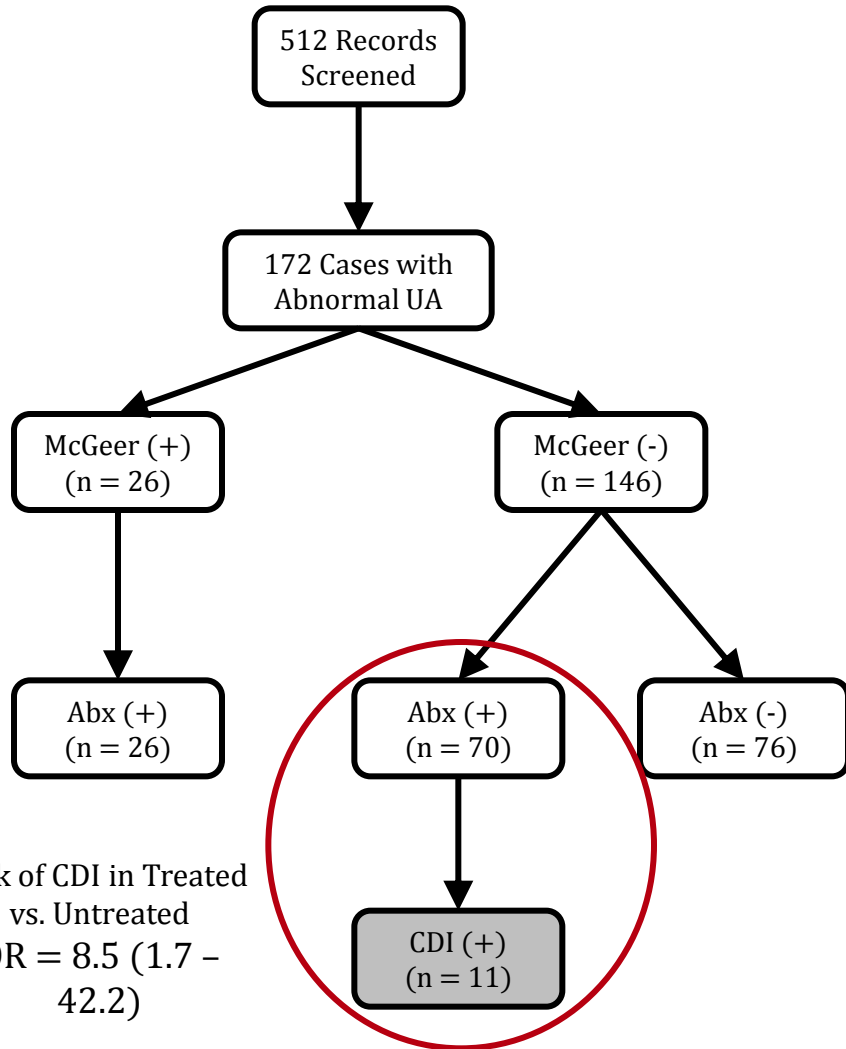
Risk Factor	OR	95% CI
New admission	2.8	(1.5 – 5.2)
No. of Scheduled Medications		
<5	1.0	(referent)
5-6	2.0	(1.2 – 3.2)
7-8	2.8	(1.7 – 4.7)
≥9	3.3	(1.9 – 5.6)
Current Medications		
Antibiotic	4.0	(2.5 – 6.2)
Antipsychotic	3.2	(2.1 – 4.9)
Antidepressant	1.5	(1.1 – 2.3)
Supplements	0.4	(0.3 – 0.6)

10. Gurwitz et al. *Am J Med* 2000 11. Field et al. *Arch Intern Med* 2001

12. Gurwitz et al. *Am J Med* 2005 13. Handler et al. *Am J Geriatr Pharmacother* 2006



Antibiotic Use is Driving CDI in NHs



Risk of CDI in Treated vs. Untreated
OR = 8.5 (1.7 - 42.2)

- **Original McGeer Criteria-1991** (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

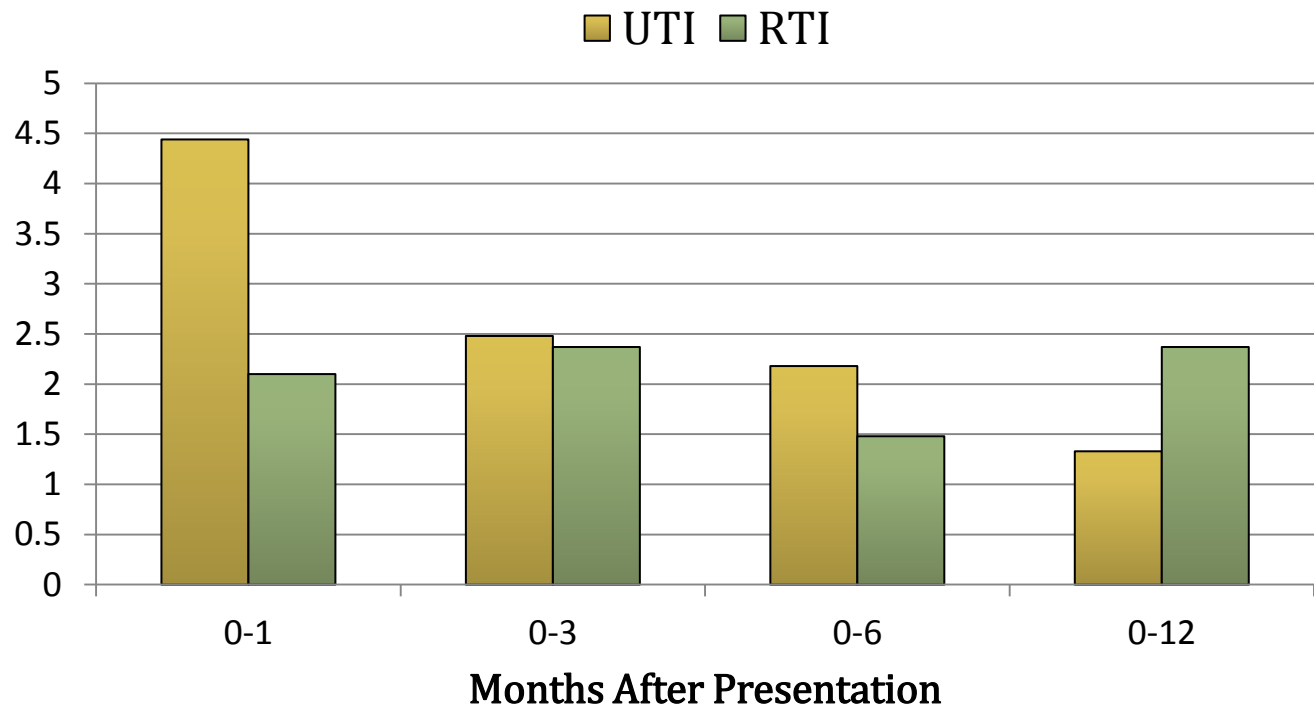
- **Inappropriate therapy (independent of decision to start)**
 - Treatment initiated empirically (before culture) in only 27/96 (28%) of residents
 - Empiric antibiotic inappropriate in 56% of cases (FQ when TMP/SMX or NFT reasonable)
 - Dosage (High [21%] / Low [13%] / CI [12%])
 - Duration (Short [3%] / Long [67%])



Antibiotic Treatment (even when appropriate) Carries Future Risk of Antibiotic Resistance for the Individual

Effects of Antibiotic Treatment in Patients with Possible Infection

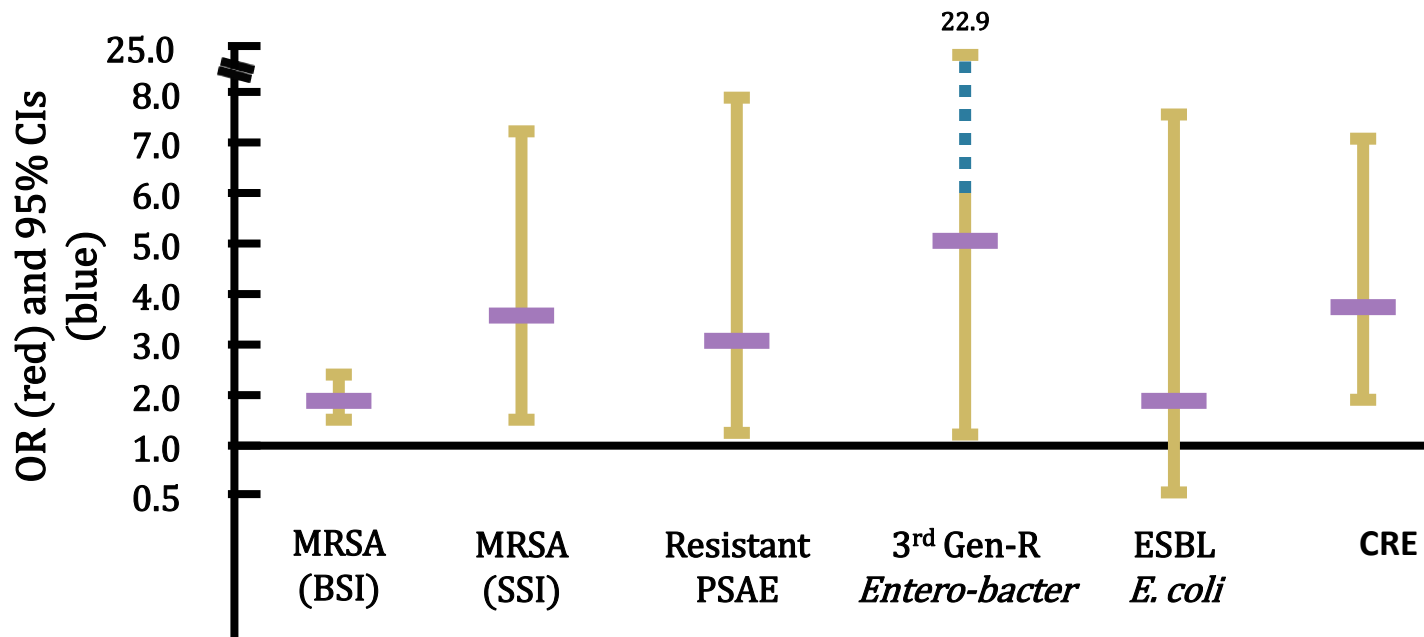
Odds of Colonization with
Antibiotic-Resistant Bacteria
(Treated for vs. Untreated)





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

Attributable Mortality of Antibiotic-Resistant Infections





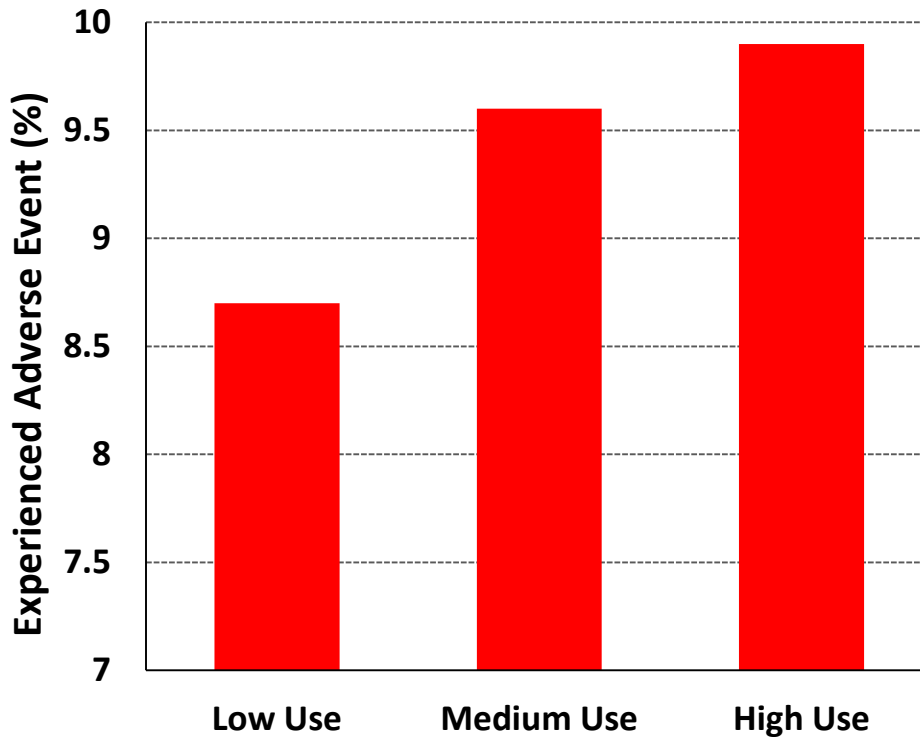
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 - Fallout to other residents
 - Resident-to-Resident Spread of Antibiotic Resistance
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Antibiotic Fallout

Frequency of adverse events among residents not exposed to an antibiotic



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)

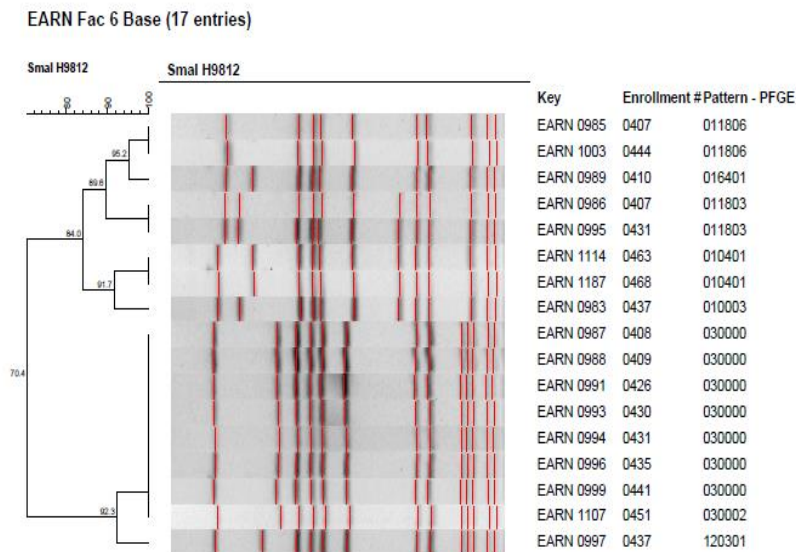
Results:

- ~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)**



Antibiotic-Resistant Bacteria Spread Easily in the Nursing Home Environment

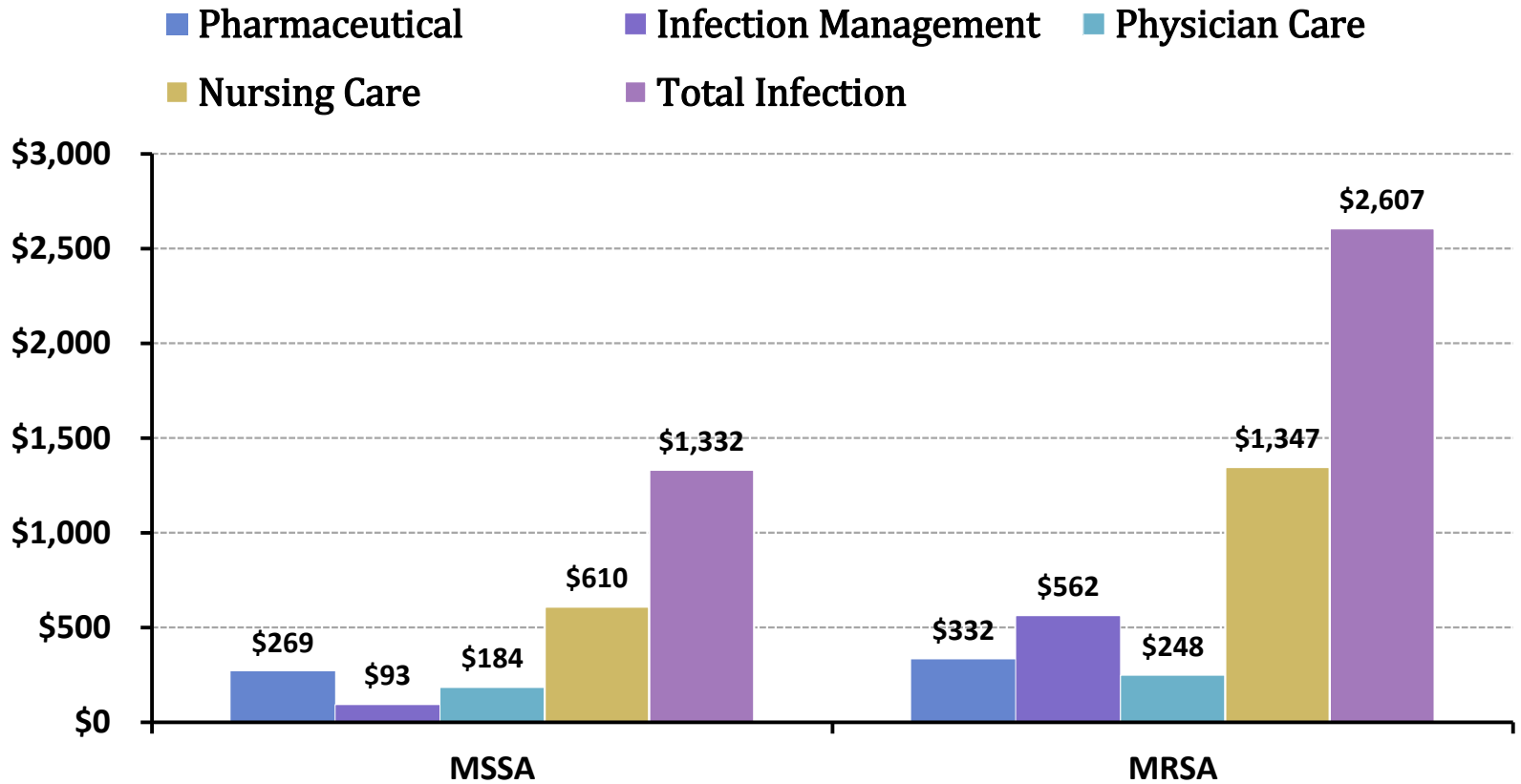
- Strong evidence of resident-to-resident spread in NHs.
 - 50% of MRSA isolates recovered from Wisconsin NHs are genetically identical
 - >85% of the MRSA isolates from NH residents who entered the NH negative but subsequently became colonized during their stay in the NH are genetically identical to strains recovered from other residents



14 of the 17 MRSA isolates recovered from residents in this nursing home were found to be genetically identical by pulsed-field gel electrophoresis (PFGE – a commonly employed genetic finger-printing technique)



Treating Antibiotic Resistant Infections is More Costly to Nursing Homes





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Suspected UTI

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



Up to 75% of the Cases of Suspected UTI are Actually Asymptomatic Bacteriuria (ASB)

- Definition: (+) urine culture in the absence of (“specific”) symptoms
- Prevalence
 - Community: 6 – 17%
 - Institutionalized: 19 – 57%
- Treatment of ASB
 - Does not reduce episodes of symptomatic UTI ^{28, 29, 30, 32}
 - Promotes resistance ^{28, 30}
 - Increases risk of *C. difficile* ³⁰
 - Does not reduce mortality ^{29, 30, 31}



Providers Don't Think They Are Treating Asymptomatic Bacteriuria

- UTI, as well as many 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
- There is no evidence that behavior change, falls, anorexia, or functional status associated with UTI

D	Drugs	BEERS Criteria (e.g., anticholinergic, benzodiazepines, hypnotics) OR dose change
	Dementia	Dementia Lewy bodies: Fluctuations in alertness and attention
	Discomfort	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



Why?

- Risk Aversion
 - Frail residents can get sick quickly
 - Family member pressure
 - Nursing staff pressure
- Uncertainty
 - 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)
- Myths Perpetuated During Training Become Habits
 - Falls and behavior change = UTI
 - Abnormal UA = UTI
 - Positive Culture = UTI



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)



Conclusions

- Inappropriate antibiotic use is common in NHs.
- Inappropriate antibiotic use causes significant resident harm and increases NH operating costs.
- UTIs account for a majority of the inappropriate antibiotic use in NHs.
- Reducing unnecessary urine testing can reduce inappropriate antibiotic use.
- Reducing spectrum and duration of antibiotic therapy are other promising strategies for reducing antibiotic pressure in NHs.