




Antibiotic Stewardship in Long-Term Care Facilities



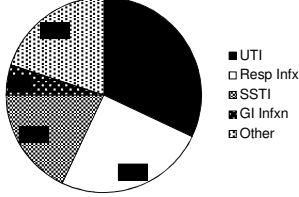
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1

What Are Antibiotics Used for in LTCFs?


- Single day survey of antibiotic use in 9 NHs¹
- 11.1% of all residents on an antibiotic (95% CI 9.4-12.9%)
- Antibiotic use more common in short stay residents with devices (23.5%)
- 23% of use was for prophylaxis



1. Thompson et al. J Am Med Dir Assoc. 2016 Dec 1;17(12):1151-1153.

2

Overuse of Antibiotics in Nursing Homes



50% of antibiotics will be unnecessary or inappropriate



70-80% will receive an antibiotic each year

- 2 million will receive unnecessary or inappropriate antibiotics

3

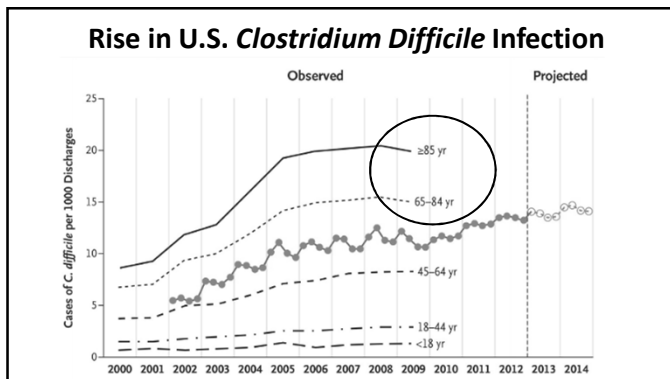
Colonization with MDROs in Long-Term Care Facilities

- MRSA colonization 8-21%
- ESBL producing E. coli or Klebsiella: 15-39%
- VRE stool colonization: 3.5 - 19%
- Stool colonization with C. difficile: 20-50%
- Chicago LTACHs: 30% colonized with CRE

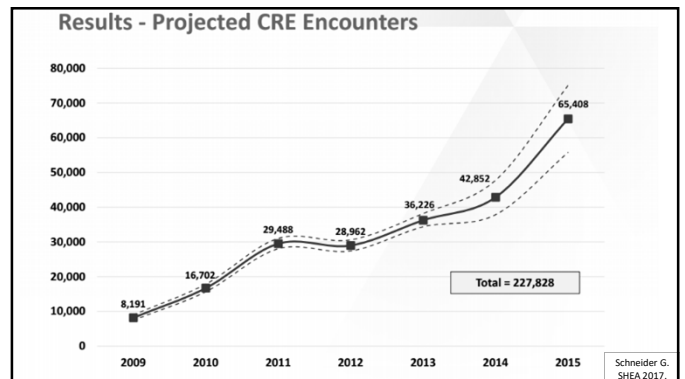



Cassone. Current Geriatr Rep. 2015
Murphy. J Am Geriatr Soc. 2012
Trick. J Am Geriatr Soc. 2001

4



5



6

Increased Risk of ADEs in NH Residents

- > Polypharmacy is associated with an increased risk of ADEs in older adults^{1,2}
 - ADEs increase with # of regularly scheduled meds
- > Antibiotics contribute to significant drug interactions^{3,4}
 - With sulfonylureas, higher rates of hypoglycemia⁵
 - With warfarin, higher risk of bleeding⁶
- > Cohort study at two NHs, 13% of ADEs were secondary to antibiotic use¹
- > Abx for asx bacteriuria was ass'd w 12% incidence of CDAD within 3 weeks, and 8x increased risk of CDAD within 3 mos⁷

1. Guwella et al. Am J Med. 2003;115(3):253-6.
 2. Tenover et al. Clin Diabetes Med. 2003;21(2):92-100.
 3. Ford et al. Arch Intern Med. 2003;163(13):1429-34.
 4. Conover et al. Clin Med (London). 2010;10(1):24-30.
 5. Parvath et al. JAMA Intern Med. 2011;131(10):1407-12.
 6. Jiang et al. Hospital Care Pharm. 2005;80(1):38-44.
 7. Flanagan et al. Arch Intern Med. 2011;171:458-62.

7

Risks with Use of the Quinolones

Condition	Relative Risk
Achilles tendon rupture	
Current exposure overall	4.3 (95% CI, 2.4-7.8)
Age 60-79	6.4 (95% CI, 3.0-13.7)
Age > 80	20.4 (95% CI, 4.6-90.1)
Serious arrhythmia	2.43, 95% (CI, 1.6-3.8)
Death 1-5 d after Levofloxacin	2.49 (95% CI, 1.7-3.6)
Aortic dissection	2.43 (95%CI, 1.8 - 3.2)
C. Diff infection	12.7 (95% CI, 2.6-61.6)
Risk of acquiring MRSA	3.0 (95% CI 2.5 to 3.5) (c/w 1.8 RR for other abx)

FDA BLACK BOX WARNING

Van Der Linden. JAMA Int Med 2003
 Clowthair. Am J Fam Med. Apr 2014
 Chen-Chang. JAMA Int Med 2015
 McCusker. Emerg Infect Dis 2003
 Taconelli. JAC 2008

8

FLUOROQUINOLONE LEGAL ASSISTANCE PROVIDED BY TRULAW

FLOXED?

IT'S NOT YOUR FAULT | YOU'RE NOT ALONE



LEARN INSTANTLY IF YOU HAVE A CASE

SEE IF YOU QUALIFY

- **2nd line** abx for pneumonia and UTIs with a black box warning
- **Over 23 million** prescriptions of quinolones / yr in U.S. (most commonly prescribed class)
- **Over 2,000 lawsuits** filed for injuries in 2011

9

Regulatory and Cost Imperatives for Antimicrobial Stewardship






NATIONAL ACTION PLAN FOR COMBATING ANTIBIOTIC-RESISTANT BACTERIA


MARCH 2011

10

Regulatory and Cost Imperatives for Antimicrobial Stewardship

11



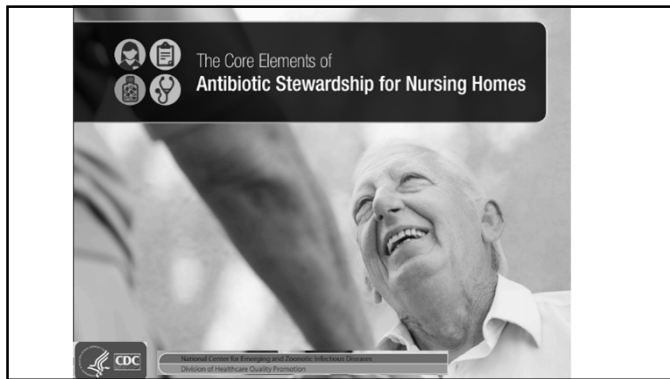
Finalized Rule: Reform of Requirements for LTCFs:

- September 2016
- Improvements in care, safety, and consumer protections for LTCF residents
- Updates the infection prevention and control program, including requiring an IPC officer and an antibiotic stewardship program that includes antibiotic use protocols and a system to monitor antibiotic use

Phased Implementation dates:

Phase I	November 28, 2016
Phase II	November 28, 2017
Phase III	November 28, 2019

12



13

CDC Guidelines 7 Core Elements for LTCFs

- **Leadership commitment** - dedicating necessary human, financial, and IT resources to the program
- **Accountability** - leader who is responsible for program outcomes
- **Drug expertise** - engaging with someone with content expertise
- **Action** - implementing at least one policy or practice
- **Tracking** - monitoring patterns of prescribing and resistance
- **Reporting** - relaying information on abx use and resistance within institution on a regular basis
- **Education** - teaching clinicians, pharmacists, and nurses about abx resistance and optimal prescribing habits, educating residents and families

14

ASP..... It Works!

(at least in acute care settings)

15

ASP Efficacy: Meta-Analysis of 11-19 Studies

Pathogen	Incidence Ratio (95% CI)	Percent Reduction
MRSA	0.63 (0.45 - 0.88)	37%
MDR - Gram Negatives	0.49 (0.35 - 0.68)	51%
C. difficile	0.68 (0.53 - 0.88)	32%

Bauer. Lancet Inf Dis 2017

16

ASP Clinical Scenarios: What We Can Target

17

Common Infectious Diseases and Areas for Potential Improvement

- UTI
- Cellulitis / SSTI
- Acute diarrheal illness
- Pneumonia

18

Urinary Tract Infection – What is It?

19

UTI Definitions (IDSA)

- **Asymptomatic Bacteriuria:**
 $\geq 10^5$ cfu/mL voided specimen (? X2) or chronic foley, or $\geq 10^2$ cfu/mL from a new catheterized specimen
- **Acute uncomplicated cystitis/pyelonephritis:**
 typical symptoms in an otherwise healthy non-pregnant adult. Dx confirmed with + UA and/or $\geq 10^2$ cfu/mL on UC
- **Complicated cystitis or pyelonephritis:**
 lower or upper tract UTI in patient with underlying risk of treatment failure (diabetes, pregnancy, renal failure, obstruction or anatomic abnormality, indwelling device, recent instrumentation, transplant, immunosuppression, hospital-acquired)
- **Catheter-associated UTI:**
 presence of symptoms or signs of UTI with no other identifiable source with $\geq 10^3$ cfu/mL

20

Prevalence of Asymptomatic Bacteriuria and Pyuria

Population	Bacteriuria	Pyuria w Bacteriuria
Healthy Adult Women	2-5%	32%
Pregnant Women	2-11%	50%
Diabetic Women	8-14%	70%
Elderly: Nursing Home		
Female	25-53%	90%
Male	15-35%	90%
Spinal Cord Injury	50%	33-86%
Indwelling urinary catheter	100%	70%

Nicolle LE, *Int J of Antimicrob Agents*. Aug 2006.
 Juthani-Mehta M. *Clin Geriatr Med* 2007; 23

21

Asymptomatic Bacteriuria ≠ UTI

- Common, esp. elderly women and compromised pts
- 20-50% of treated "UTI" is actually Asx Bacteriuria
- Ratio of asx bacteriuria to symptomatic UTI in LTC is > 100:1
- Good evidence that Rx gives no benefit and causes harm (ADEs, resistance, more UTI)

Nicolle et al. *NEJM* 1983
 Nicolle et al. *Am J Med* 1987
 Ouslander et al. *Annals Int Med* 1995

22

23

UTI is #1 reason for Abx in LTCFs



Problem: What constitutes symptoms in an elderly, incontinent, and demented patient with limited ability to communicate?


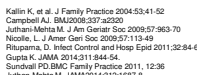
ASB is common in the elderly but so are atypical presentations for sepsis.

24

Do "UTIs" Cause That? - Myths, Legends, and Reality:

- Unexplained falls
- Weakness
- Evidence for this is overall poor quality
- Change in urine character

25

Diagnosing UTI in the Cognitively Impaired NH Patient

Table 1
Comparison of the expert consensus criteria for the diagnosis of acute symptomatic UTI for noncatheterized residents in the nursing home

McGeer	Loeb
3 of the following signs or symptoms: Fever or chills New or increased dysuria, frequency, or urgency New flank or suprapubic pain Change in character of the urine Worsening of mental or functional status	Acute dysuria OR fever with 1 of the following: New or worsening urgency Frequency Suprapubic pain Gross hematuria Costovertebral angle tenderness Urinary incontinence

Must have a positive urine culture with $\geq 10^6$ bacteria and ≤ 2 organisms

26

Clinical Symptoms in Elderly vs Young Adults with Bacteremic UTI

Symptoms and Signs	Young (18-74) n = 24	Elderly (> 75) n = 37	
Dysuria	8 (33.3%)	1 (2.7%)	McGeer Criteria - 56.8% false negative
Hematuria	1 (4.2%)	1 (2.7%)	
Frequency	4 (16.7%)	3 (8.1%)	Loeb Criteria - 43.2% false negative
Retention	1 (4.1%)	4 (10.8%)	
Suprapubic tenderness	4 (16.7%)	14 (37.8%)	*Note: 1/3 of these patients had an indwelling catheter
Any urinary tract symptoms	19 (79.2%)	19 (51.4%)	
Functional decline	1 (4.1%)	16 (43.2%)	
Fever > 37° C	24 (100%)	34 (91.9%)	
Fever > 37.9° C	23 (95.8%)	27 (73%)	
WBC > 11.0	18 (75%)	27 (73%)	

27

MHA "Seeing Sepsis Campaign" for LTCFs


Every hour a resident in septic shock doesn't receive antibiotics, the risk of death increases 7.6%

Call the doctor!

28


MHA "Seeing Sepsis Campaign" for LTCFs

100




Is their Pulse ≥ 100 ?

100




Is their BP < 100?

100





Is their Temp ≥ 100 ?


Is their RR > 22?



29







Risks of not recognizing and treating early sepsis

Risks of over-diagnosis and treatment

30

What Type of Pneumonia?

- CAP
 - Ceftriaxone + Azithromycin first line
 - Quinolones 2nd line
- HCAP
 - Levofloxacin ok
 - Possible Vanco/Pip-Tazo
- HAP/VAP
 - Vanco/Pip-Tazo

43

Sputum Culture and Pneumonia

- Often hard to get, consider having RT induce
- If "normal flora" or "negative", at least consider de-escalation away from MRSA and Pseudomonal coverage

44

"Aspiration" Pneumonia

- Routinely covered, often unnecessary
- IDSA guidelines
 - Overestimated
 - Only for clear aspiration pleuropulmonary syndrome (LOC, seizures with gingival dz or esophageal motility disorder
 - Is the patient edentulous?

45

COPD Exacerbation - Outpatient Mngmt

- Avoid antibiotics if does not meet GOLD criteria (2 or more of the following symptoms):
 - Increased dyspnea
 - Increased sputum volume
 - Increased purulence of sputum

46

SSTI?

- No documentation other than skin changes - no fever, no WBC, no pain
- Called to see a patient for a red foot. You examine the patient and not he has a chronic dry ulcer on plantar surface. No palpable pulses. Foot is red and cool. When you raise the foot, redness disappears. What is this?

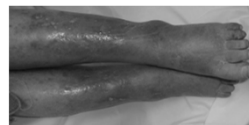


Dependent Rubor

47

SSTI?

- No documentation other than skin changes - no fever, no WBC, no pain
- You are asked to see patient with bilateral red legs. Patient is obese. There is 3+ pitting edema at the mid-tibia. No ulcers. Palpable pulses. Legs are symmetrically erythematous and slightly warm to touch with very minimal tenderness to pressure. What is this?



Acute Edema / Expansion Syndrome



48

SSTI?

> No documentation other than skin changes - no fever, no WBC, no pain

Stasis dermatitis and Stasis ulceration
Lipodermatosclerosis

49

Empiric Rx of Cellulitis

50

> **Purulent or Wound**

- Usually staphylococcal
- MRSA will account for ~ 50% depending on your community

> **Non-purulent**

- usually due to beta-hemolytic strep

50

PRESSURE ULCER CLASSIFICATION

		Category / Stage I: Intact skin with non-blanchable redness of a localized area usually over a bony prominence. The area may be painful, firm, soft, warmer or cooler as compared to adjacent tissue. Category I may be difficult to detect in individuals with dark skin tones!
		Category/ Stage II: Partial thickness loss of dermis presenting as a shallow open ulcer with a red pink wound bed, without slough. May also present as an intact or open/ruptured serum-filled or sero-sanguinous filled blister.
		Category/ Stage III: Full thickness tissue loss. Subcutaneous fat may be visible but bone, tendon or muscle are not exposed. Slough may be present but does not obscure the depth of tissue loss!
		Category/ Stage IV: Full thickness tissue loss with exposed bone, tendon or muscle. Slough or eschar may be present. Often includes undermining and tunnelling. Category/Stage IV ulcers can extend into muscle and/or supporting structures (e.g., fascia, tendon or joint capsule!)

51

When to Culture - When to Give Antibiotics

> Look for signs of infection - Probe and poke around!

- Sinus tracts, ability to probe to bone, pus pockets, dead tissue, surrounding cellulitis, osteo on MRI

> Don't swab ulcer base, exception may be if overt pus

> Deep tissue culture or bone culture if going for debridement

> Evaluate for osteomyelitis if grade IV, slow to heal (> 4 weeks)

- ESR and CRP, MRI

> Antibiotics if evidence of infection or osteomyelitis - pus, tumor/calor/rubor/dolor

- Preferably after appropriate cultures taken. Ok to delay if not septic.

52

Probably Uninfected	Probably Infected
	<p>a. Before Treatment</p> <p>b. Debridement of necrotic tissue</p>

53

Infectious Diarrhea - ACG Guidelines

> Acute Diarrheal Infection is defined as > 3 unformed stools / 24 h period plus an enteric symptom (N/V, cramps/pain, tenesmus, fecal urgency, mod-severe gas)

> Consider placement in contact precautions

> Oral fluid therapy for all cases (fluids, soups, broths, saltines, broiled/baked food)

> Categorize as watery vs dysenteric (gross blood)

> No empiric antibiotics unless travel history (not too likely in NH pop'n!)

> Low threshold for C diff testing. Severe disease, dysentery, or symptoms lasting > 7 days should have microbiological evaluation.

54

Resources

- AHRQ: Nursing Home Antimicrobial Stewardship Guide <https://www.ahrq.gov/nhgguide/index.html>
- CDC: The Core Elements of Antibiotic Stewardship for Nursing Homes <https://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html>
- CDC: Get Smart for Healthcare in Hospitals and Long-Term Care <https://www.cdc.gov/getsmart/healthcare/index.html>
- <http://www.ndhealth.gov/disease/hai/Resources/> (Patient Education)

55



56

Twelve Common NH Situation Where Abx are Often Prescribed but Rarely Indicated

1. Positive urine culture in an asymptomatic patient.	7. Influenza w/o secondary infection
2. Urine culture ordered solely because of a change in urine appearance.	8. Resp symptoms in pt with advanced dementia, palliative care, end of life
3. Nonspecific symptoms or signs not referable to the urinary tract (with or without a positive urine culture).	9. Skin wound w/o cellulitis/sepsis/osteo (regardless of culture result)
4. Upper respiratory infection (cold)	10. Small abscess (< 5 cm) w/o signif surrounding cellulitis
5. Bronchitis or asthma w/o advanced COPD	11. Uninfected decubitus ulcer or decub in patient at end of life
6. Infiltrate on CXR w/o symptoms	12. Acute vomiting and/or diarrhea in absence of positive cx or C diff test

57

When to Order Urine Testing and Treatment

Any of the Following:

1. Fever
2. Leukocytosis (WBC $\geq 14,000$)
3. P ≥ 100 , Syst BP < 100, or RR $\geq 22^*$

AND ONE or more of the following, or 2 of the following alone:

- CV angle pain/tender
- New or incr SP tenderness
- Gross hematuria
- New or marked increased incontinence
- New or marked increased urgency
- New or marked increased frequency
- Change in urine character and change in mental status

Or

1. Acute dysuria AND ONE or more of the following:

- Change in character of the urine
- Change in mental status
- Gross hematuria

OR

2. Acute pain, swelling, or tenderness of the testes, epididymis, or prostate

↓

Urinary dipstick or UA

↓

Inf Dis Clin NA, March 2014 *Carson addition

58

When to Order Testing and Treatment

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    graph TD
      A[Urinary dipstick or UA] -- "-" --> B[Negative for both leukocyte esterase and nitrite (dipstick) or UA ≤ 10 WBC/hpf]
      A -- "+" --> C[Obtain UCx]
      B --> D[Consider other dx, Increased monitoring]
      C --> E[Definite Dx if: 1. ≥ 10^5 CFU/mL of no more than 2 organisms from voided specimen 2. ≥ 10^2 CFU/mL of any organism from straight cath or typical UTI symptoms]
      C --> F[Empiric Rx while waiting Cx results: • TMP/SMX 160/800 mg (DS tab) bid x 3d or • Nitrofurantoin macrocrystals 100 mg bid x 5d]
    
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Inf Dis Clin NA, March 2014

59

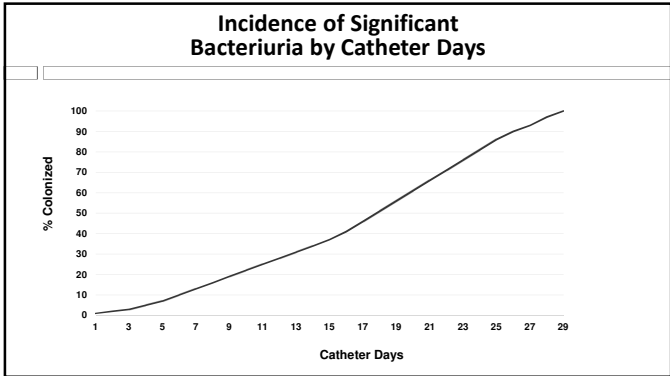
Chronic Indwelling Catheter-Associated Urinary Tract Infection

60

Long-Term Urinary Catheters and Infection

- 5-10% of LTCF residents are catheterized
 - Essentially all are bacteriuric (CA-ASB) – defined as $\geq 10^5$ cfu/mL
 - CA-UTI defined as $\geq 10^3$ cfu/mL with ass'd symptoms
- Associated with increased upper urinary inflammation at autopsy
- Accounts for 45-55% of bacteremias in LTCFs
- Incidence of febrile episodes is 1.1 per 100 catheter-days, most are low grade and resolve without abx
- Symptom correlation with bacteriuria is v poor and nonspecific. Order cultures with: new CVA tenderness, high temps, rigors, or delirium

61



62

Long-term Urinary Catheters – Don'ts

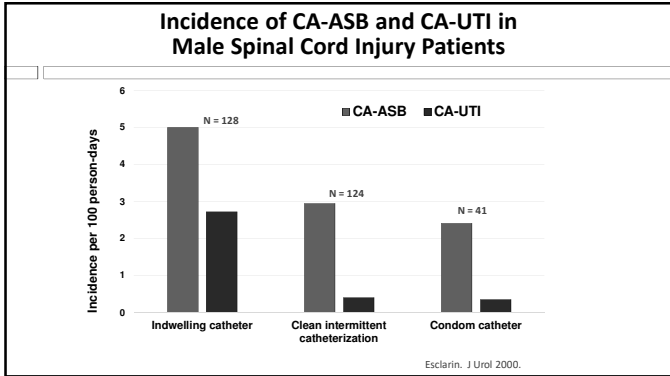
- Don't place unless definitive indication
- Don't obtain a U/A or U/C with nonspecific symptoms
 - (esp don't obtain for "cloudy", "malodorous" urine or encrusted catheter)
- Don't use pyuria to distinguish CA-ASB from CA-UTI (although absence of pyuria suggests not CA-UTI)
- Don't use methenamine salts or cranberry juice as preventative
- Don't use prophylactic antibiotics

63

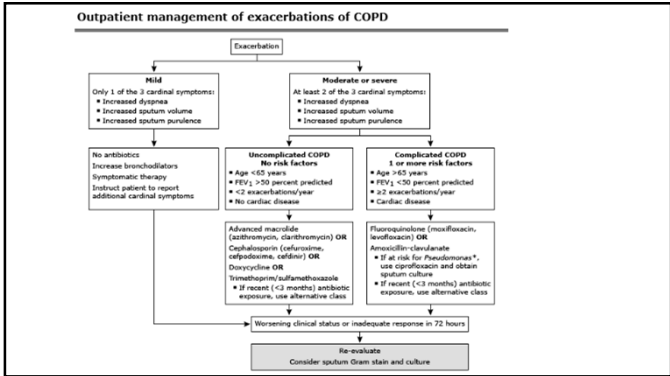
Long-term Urinary Catheters – Dos

- Frequently review for necessity and remove when possible
- Acceptable indications: Urinary retention
 - Not indicated for incontinence unless terminally ill or failing all other management methods
- Diapering > Condom Cath > Intermittent straight cath > Suprapubic catheter? > Indwelling foley catheter
- If suspect UTI, replace catheter, then send UA/UC

64



65



66

Is It Safe to Not Cover MRSA with Non-purulent Cellulitis?

- 2004-2007 UCLA prospective study of 179 pts with non-purulent cellulitis (96 evaluable at end of study)
- 73% proved to have BHS by cx or serology
 - 97% responded to beta-lactam therapy
- 23 pts did not have proven BHS, 21 (91%) responded to beta-lactam therapy

Jeng et al. Medicine 2010

67

Empiric Antibiotic Choices for SSI

- **If Strep likely**
 - IV start with cefazolin (2gm IV q 8 hrs) or ceftriaxone (1gm IV)
 - Continue with p.o. cephalexin or dicloxacillin
 - Don't shortchange the dose.... Minimum 500 mg qid, can give up to 1gm qid in the obese
- **If S. aureus likely**
 - IV start with vancomycin
 - Continue with p.o. Linezolid or cephalexin + TMP-SMX or Minocycline

68