

# ***Strategies for Stewardship and Tool for Implementation***

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# Main actions to prevent and control antimicrobial resistance

**Prudent use of antimicrobials**  
(only when needed, correct dose, dose intervals, duration)



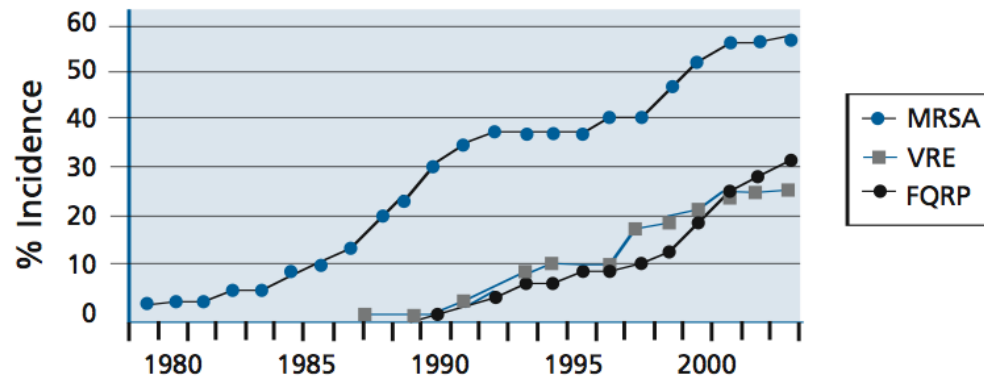
**Infection control**  
(hand hygiene, screening, isolation)



**New antibiotics**  
(with a novel mechanism of action, research, development)



# Get Smart 2010



## *Each year*

- *2 million patients develop bacterial HAI*
- *90,000 people die*
- *More than 70% of these infections are resistant to at least one class of antibiotics*

## *Antibiotic resistance is associated with:*

- *Increased risk of hospitalization*
  - *Increased length of stay*
  - *Increased hospital costs*
  - *Increased risk of ICU transfer*
  - *Increased mortality*
- **Decreasing inappropriate antibiotic use is the best way to control the development of resistance**

# Antimicrobial Resistance: A local, national, and international problem....

Massachusetts:

- Between 2000 and 2007, 3-fold increase in *C. diff* as a primary diagnosis for hospitalization and >4-fold increase in deaths
- Over 1/3 of *Streptococcus pneumoniae* isolates in MA are resistant to penicillin and 20% could not be treated with other common antibiotics
- State DPH reported 67 cases of fluoroquinolone-resistant *N. gonorrhoeae* in 2006, up from 2 cases in 2001

Geographical Distribution of *Klebsiella pneumoniae* carbapenemase (KPC) Infections



[HOME](#) / [NEWS](#) / [LOCAL](#) / [MASS.](#)

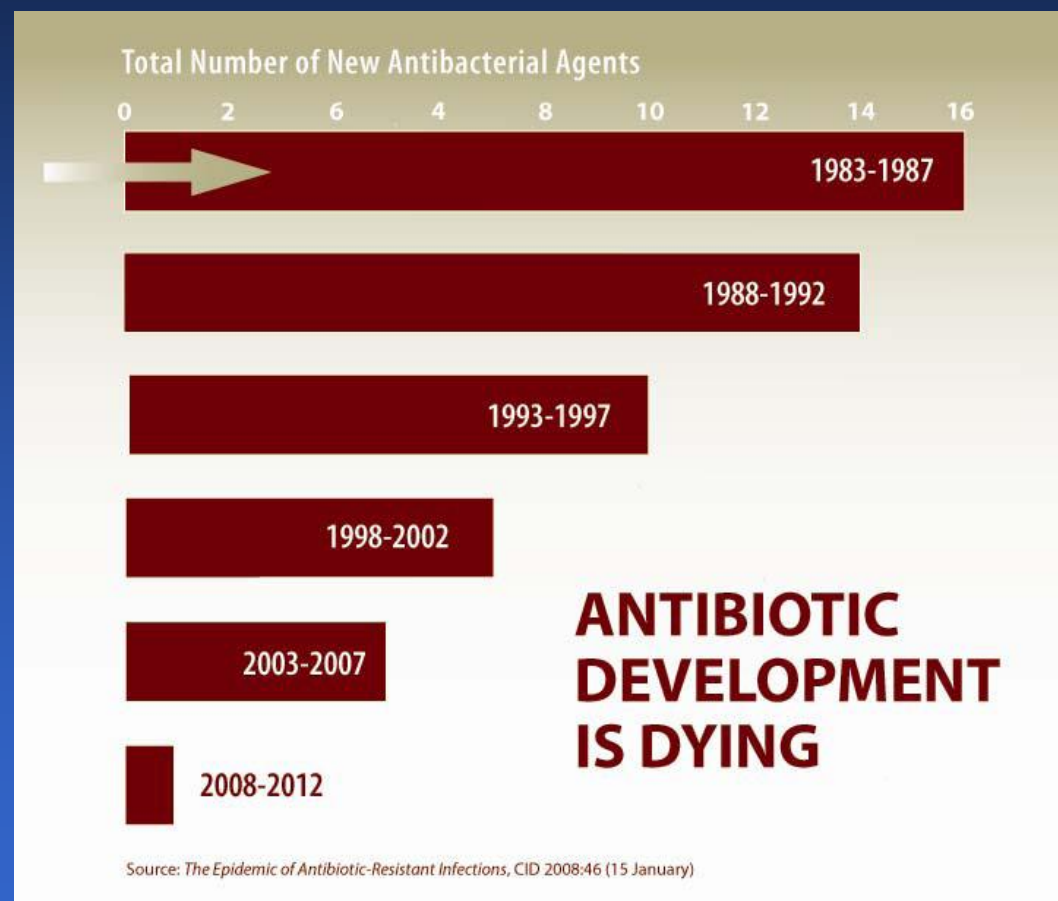
The Boston Globe

## 'Superbug' patient treated at MGH

Arrival of the germ in US casts a spotlight on global spread of drug-resistant bacteria

# Bad Bugs: No Drugs, No ESKAPE

- *Enterococcus*
- *S. aureus*
- *Klebsiella spp.*
- *Acinetobacter*
- *P. aeruginosa*
- *Enterobacter spp.*



# What is Antimicrobial Stewardship?

- Antimicrobial stewardship involves the optimal selection, dose and duration of an antibiotic resulting in the cure or prevention of infection with minimal unintended consequences to the patient including emergence of resistance, adverse drug events, and cost.

Ultimate goal is improved patient  
care and healthcare outcomes

Dellit TH, et al. CID 2007;44:159-77,  
Hand K, et al. Hospital Pharmacist 2004;11:459-64  
Paskovaty A, et al IJAA 2005;25:1-10  
Simonsen GS, et al Bull WHO 2004;82:928-34

# *Get Smart: Know When Antibiotics Work*

## Goals:

- promoting adherence to appropriate prescribing guidelines
- decreasing demand for inappropriate antibiotics

National campaign to target five conditions that accounted for >75% of all office based antibiotic prescribing:

- Otitis media
- Sinusitis
- Pharyngitis
- Bronchitis
- The common cold





# **Get Smart 2010**

## **Targeting Healthcare settings**

**Mission: To optimize the use of antimicrobial agents in inpatient healthcare settings**

**Goals:**

- Improve patient safety through better treatment of infections
- Reduce the emergence of antimicrobial resistant pathogens
- Encourage better use of antimicrobials in healthcare settings



# Get SMART about Stewardship

- Starting off – choosing the appropriate empiric regimen
  - “front end”
- Maintenance of therapy: Targeting, de-escalating, and discontinuing therapy
  - “back end”
- Are you treating infection or colonization?
  - Using current quality measures to promote ASP
- Route: IV or PO
  - Empowering your pharmacist
- Time: Stop antibiotics as early as possible
  - Harnessing your resources

# Antimicrobial Stewardship Strategies at Tufts Medical Center

- Prospective audit with intervention and feedback
- Formulary restriction and preauthorization (pg 6858)

## Supplemental Strategies

- Education: “AMT Question of the Week”
- Antimicrobial guidelines and disease management
- Dose optimization via PK-PD: extended dosing of Zosyn
- De-escalation/Streamlining: MR/pages to change treatment
- Antimicrobial order forms/order sets if CPOE
- IV-PO switch: automated by pharmacy
- Computerized decision support (Sentri7 and Safety Surveillor)

# Starting off - “Front End”

- Also referred to as “preauthorization” or “pre-prescription approval”
- Restriction at the time the antimicrobial is prescribed:
  - Formulary vs. non-formulary
  - Target specific antimicrobials associated with high rates of resistance or \$\$\$
  - May target a specific disease or indication
- In order to receive restricted antibiotics, a prescriber must have clearance from a member of the stewardship team
- Performed by either an infectious diseases physician, a clinical pharmacist with infectious diseases training, or a member of the antimicrobial support team
- Requires resources early in the intervention process

**ADULT ANTIMICROBIAL ORDER SHEET**

ALL SECTIONS MUST BE COMPLETED BEFORE DRUG CAN BE DISPENSED

2-Hole 1/4 2/4 - 3-Hole 1/4 4/4

DATE: \_\_\_\_\_ TIME: \_\_\_\_\_ (24-Hour Clock)

|   |   |                   |   |
|---|---|-------------------|---|
| Patient Allergies:  | Wt (Kg):  | Serum Creatinine: | Must be calculated<br>$CrCl = \frac{(140 - age) \times IBW (Kg)}{72 \times SCr} = \text{_____ mL/min}$<br>Female = 0.85 x CrCl<br>IBW Calculations:<br>IBW (male) = 50 kg + {2.3 x (every inch above 5 feet)}<br>IBW (female) = 45 kg + {2.3 x (every inch above 5 feet)}<br>*For patients > 60 years with an actual SCr < 0.7 mg / dL, use SCr = 1 mg / dL for estimating CrCl |
| <input type="checkbox"/> Suspected Infection<br><input type="checkbox"/> Documented Infection<br>List pathogen(s) isolated: | Suspected/Known Site of Infection:<br><input type="checkbox"/> Abdominal <input type="checkbox"/> Neutropenic<br><input type="checkbox"/> Bone/Joint <input type="checkbox"/> Respiratory<br><input type="checkbox"/> CNS <input type="checkbox"/> Skin/Soft Tissue<br><input type="checkbox"/> Bacteremia <input type="checkbox"/> Urine<br><input type="checkbox"/> Febrile Neutropenia<br><input type="checkbox"/> Other _____ |                   |   |

Drugs that may be prescribed without restriction.

| DRUG  | Dose  | Route | Frequency | Duration               |
|---|-------|-------|-----------|------------------------|
| <input type="checkbox"/> Ampicillin/Sulbactam (Unasyn)                    | 1.5g  | IV    |           | _____ Doses _____ Days |
| <input type="checkbox"/> Azithromycin                                     |       |       |           | _____ Doses _____ Days |
| <input type="checkbox"/> Cefazolin  |       | IV    |           | _____ Doses _____ Days |
| <input type="checkbox"/> Ceftriaxone                                      | 1g    | IV    | Q24h      | _____ Doses _____ Days |
| <input type="checkbox"/> Ciprofloxacin                                    |       |       |           | _____ Doses _____ Days |
| <input type="checkbox"/> Clindamycin                                      |       |       |           | _____ Doses _____ Days |
| <input type="checkbox"/> Ertapenem  | 1g    | IV    | Q24h      | _____ Doses _____ Days |
| <input type="checkbox"/> Fluconazole                                      |       | PO    | Q24h      | _____ Doses _____ Days |
| <input type="checkbox"/> Gentamicin                                       |       | IV    |           | _____ Doses _____ Days |
| <input type="checkbox"/> Metronidazole                                    |       |       |           | _____ Doses _____ Days |
| <input type="checkbox"/> Moxifloxacin                                     | 400mg |       | Q24h      | _____ Doses _____ Days |
| <input type="checkbox"/> Oxacillin  |       | IV    |           | _____ Doses _____ Days |
| <input type="checkbox"/> Trimethoprim/sulfamethoxazole (Bactrim)          |       | IV    |           | _____ Doses _____ Days |
| <input type="checkbox"/> Vancomycin (see back for dosing recommendations) |       |       |           | _____ Doses _____ Days |

Drugs for which RESTRICTIONS MAY APPLY. SEE OTHER SIDE FOR ANTIMICROBIAL RESTRICTION POLICIES.

| DRUG   | Dose   | Route           | Frequency | Duration               |
|--|--------|-----------------|-----------|------------------------|
| <input type="checkbox"/> Ampicillin/Sulbactam (Unasyn)   | 3g     | IV              |           | _____ Doses _____ Days |
| <input type="checkbox"/> Cefepime  |        | IV              |           | _____ Doses _____ Days |
| <input type="checkbox"/> Ceftriaxone   |        | IV              |           | _____ Doses _____ Days |
| <input type="checkbox"/> Fluconazole   |        | IV              | Q24h      | _____ Doses _____ Days |
| <input type="checkbox"/> Meropenem   |        | IV              |           | _____ Doses _____ Days |
| <input type="checkbox"/> Piperacillin/tazobactam (Zosyn) (Not indicated for patients who are neutropenic, on HD, CAPD, have a CrCl < 20 ml/min, have CF, or have had an organ transplant or BMT) | 3.375g | IV, over 4h     | Q8h       | _____ Doses _____ Days |
| <input type="checkbox"/> Piperacillin/tazobactam (Zosyn)   |        | IV, over 30 min |           | _____ Doses _____ Days |
| <input type="checkbox"/> Voriconazole  |        |                 |           | _____ Doses _____ Days |
|  |        |                 |           | _____ Doses _____ Days |
|  |        |                 |           | _____ Doses _____ Days |
|  |        |                 |           | _____ Doses _____ Days |
|  |        |                 |           | _____ Doses _____ Days |
|  |        |                 |           | _____ Doses _____ Days |
|  |        |                 |           | _____ Doses _____ Days |

Sign: \_\_\_\_\_

Page # \_\_\_\_\_

# **Maintenance of therapy: Targeting, de-escalating, and discontinuing therapy**

- Empiric regimen is often NOT the regimen that needs to be continued for the full treatment course
- GET CULTURES and use the data to target therapy using the most narrow spectrum agent possible.
- Take an “Antibiotic Time Out” – reassess after 48-72 hours

# “Back end”

- Also called “post prescription review”
- Prescribers are allowed to order antibiotics upon admission
- Antibiotic orders are reviewed at specified intervals after initiation
- May be restricted to particular patient populations
  - Ex: Cefepime and Zosyn in ICU for up to 72 hours
  - Ex: Echinocandins in candidemia
- May be restricted to formulary drugs or by using a clinic pathway or protocol
  - Ex: Pneumonia or ABSSTI protocol



# Getting started is as a easy as 123 and ABC

## Getting Started...

1. Review Blood and urine cultures that grow organisms
2. Review of Key “Never” Combinations
  1. Metronidazole and Zosyn
  2. Cefazolin and cefepime
  3. Levofloxacin and azithromycin
3. Align the formulary with Local susceptibility data

## Focus on the basics...

- A. Appropriate indication, dose, and duration
  - Guidelines
  - Order sets
- B. Take an antibiotic **B**reak
  - Review of all orders after 48 hours to asses for appropriate therapy
- C. Get **C**ultures

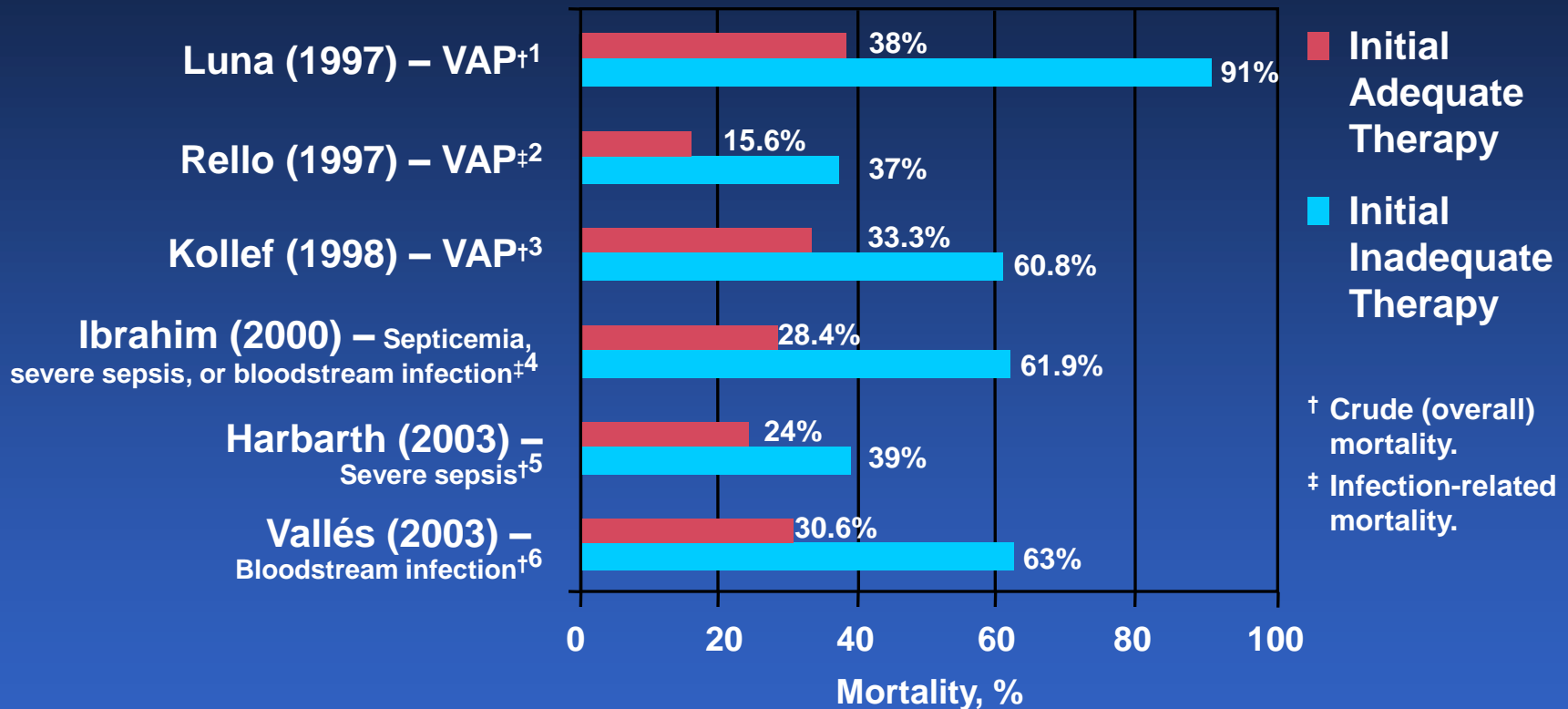


# Antimicrobial Stewardship Care Bundle

- Prospective audit system
  - Stewardship program
  - Outcomes
    - Reason for treatment, cultures, empirical, and de-escalation
    - LOS, mortality, and % interventions accepted

| Indicator                                    | Fraction (%) Courses Compliant With Indicator |                    | <i>p</i> |
|--|---|--------------------|----------|
|  | Control Phase                                 | Intervention Phase |          |
| Documented indication for antibiotic therapy | 76/80 (95)                                    | 80/80 (100)        | 0.12     |
| Appropriate cultures collected               | 70/80 (87)                                    | 76/80 (95)         | 0.09     |
| Appropriate empirical therapy                | 55/80 (69)                                    | 65/80 (81)         | 0.06     |
| Appropriate deescalation <sup>a</sup>        | 41/57 (72)                                    | 52/58 (90)         | 0.01     |
| All indicators concurrently                  | 13/80 (16)                                    | 43/80 (54)         | <0.001   |

# Mortality Associated With Initial Inadequate\* Therapy in Critically Ill Patients With VAP or Septicemia, Severe Sepsis, or Community-Acquired Bloodstream Infection



\* Based on the 2005 ATS/IDSA guidelines for VAP, HAP, and HCAP (*Am J Respir Crit Care Med.* 2005; 171:388–416), “inappropriate” refers to the inadequate therapy noted on this slide.

1. Luna CM et al. *Chest.* 1997;111:676–685.
2. Rello J et al. *Am J Respir Crit Care Med.* 1997;156:196–200.
3. Kollef MH et al. *Chest.* 1998;113:412–420.
4. Ibrahim EH et al. *Chest.* 2000;118:146–155.
5. Harbarth S et al. *Am J Med.* 2003;115:529–535.
6. Vallés J et al. *Chest.* 2003;123:1615–1624.

**Ventilator-associated/Healthcare-associated/  
Hospital-acquired pneumonia  
ORDER SHEET for ADULT PATIENTS**

DATE: \_\_\_\_\_ TIME: \_\_\_\_\_ (24-hour clock)

|                    |              |                   |                                |
|--------------------|--------------|-------------------|--------------------------------|
| Patient Allergies: | Weight (Kg): | Serum Creatinine: | Creatinine Clearance (mL/min): |
|--------------------|--------------|-------------------|--------------------------------|

| MEDICATION ORDERS ONLY<br>(INCLUDES IV MEDICATIONS)  | PHYSICIANS ORDERS<br>(EXCLUDES MEDICATION ORDERS)  |
|--|--|
| <p><b>Order Set A. No Risk factors for Multi-drug Resistant Organisms (see Risk Assessment for Multi-drug Resistant Organisms)</b></p> <p><input type="checkbox"/> Ceftriaxone 1g IV Q24 hours x 72 hours<br/>OR<br/><input type="checkbox"/> Moxifloxacin 400 mg <input type="checkbox"/> IV or <input type="checkbox"/> PO Q24 hours x 72 hours</p> <p>Consider adding Vancomycin if history of infection or colonization with MRSA<br/><input type="checkbox"/> Vancomycin _____ mg IV Q _____ hours x 72 hours<sup>a</sup><br/>Consider adding Azithromycin for coverage of atypical organisms<br/><input type="checkbox"/> Azithromycin 500 mg <input type="checkbox"/> IV or <input type="checkbox"/> PO Q 24 hours x 72 hours</p>   | <p><b>Hespiratory Specimen Order (select one)</b></p> <p><input type="checkbox"/> Sputum gram stain and culture (if a sputum has been processed by the laboratory in the last 72 hours, use standard micro requisition but write in "new pneumonia")</p> <p>If patient is intubated and no antibiotic changes have been made in the last 72 hours (changes made in the last 6 hours are acceptable) and bronchoscopy cannot be performed:</p> <p><input type="checkbox"/> Mini Bronchoalveolar Lavage (Mini-BAL) for quantitative culture (Page respiratory to perform, do not hold antibiotics until obtained, use standard micro requisition but write in "quantitative mini-BAL culture" and attach designated sticker)</p>   |
| <p><b>Order Set B. Risk factors for Multi-drug Resistant Organisms (see Risk Assessment for Multi-drug Resistant Organisms) AND not intubated</b></p> <p>Drug 1:<br/><input type="checkbox"/> Cefepime 2g IV Q8 hours x 72 hours<sup>a,b</sup><br/><input type="checkbox"/> Cefepime _____ g IV Q _____ x 72 hours<sup>b</sup></p> <p>OR If patient has recent history of hives, anaphylaxis or Stevens-Johnson syndrome to penicillin or cephalosporin:<br/><input type="checkbox"/> Adrosonam 2 g IV Q8 hours x 72 hours<sup>a,b</sup><br/><input type="checkbox"/> Adrosonam _____ mg IV Q _____ hours x 72 hours</p> <p>AND<br/>Drug 2:<br/><input type="checkbox"/> Vancomycin _____ mg IV Q _____ hours x 72 hours<sup>a</sup></p>   | <p><b>Laboratory Orders:</b></p> <p><input type="checkbox"/> Blood cultures x 2<br/><input type="checkbox"/> Legionella urinary antigen</p> <p><b>Other Orders:</b></p> <p><input type="checkbox"/> Continuous pulse oximetry OR <input type="checkbox"/> Pulse oximetry Q _____ hours<br/><input type="checkbox"/> Chest X-ray in A.M. PA/LAT OR <input type="checkbox"/> Chest X-ray in A.M. portable</p> <p><input type="checkbox"/> Check a tobramycin serum concentration 2 hours and 8 hours AFTER the infusion of tobramycin is completed and contact pharmacy for further dosing assistance</p>  |
| <p><b>Order Set C. Risk factors for Multi-drug Resistant Organisms (see Risk Assessment for Multi-drug Resistant Organisms) AND Intubated:</b></p> <p>Drug 1:<br/><input type="checkbox"/> Cefepime 2g IV Q8 hours x 72 hours<sup>a,b</sup><br/><input type="checkbox"/> Cefepime _____ g IV Q _____ x 72 hours<sup>b</sup></p> <p>OR If patient has recent history of hives, anaphylaxis or Stevens-Johnson syndrome to penicillin or cephalosporin:<br/><input type="checkbox"/> Adrosonam 2 g IV Q8 hours x 72 hours<sup>a,b</sup><br/><input type="checkbox"/> Adrosonam _____ mg IV Q _____ hours x 72 hours<sup>b</sup></p> <p>AND Drug 2: Tobramycin<sup>a,c</sup><br/><input type="checkbox"/> Tobramycin _____ mg IV QNCE</p> <ul style="list-style-type: none"> <li>If CrCl &gt; 40 mL/min use extended interval dose (8 mg/kg, use ideal or dosing weight)</li> <li>If CrCl ≤ 40 mL/min use traditional dosing (5 mg/kg, use ideal or dosing weight)</li> </ul> <p>AND Drug 3:<br/><input type="checkbox"/> Vancomycin _____ mg IV Q _____ hours x 72 hours<sup>a</sup></p> <p>OR<br/><input type="checkbox"/> Linezolid 600mg <input type="checkbox"/> IV or <input type="checkbox"/> PO Q12hours x 72 hours</p> | <p><b>Risk Assessment for Multi-drug Resistant Organisms</b></p> <p><b>Step 1: My patient has a NEW pneumonia that developed in the hospital AND:</b></p> <ul style="list-style-type: none"> <li>Is currently hospitalized for 5 days or more OR</li> <li>Has received antibiotics for 5 days or more in the last 30 days OR</li> <li>Has immunosuppressive disease or therapy</li> </ul> <p>If answer is YES (to 1 or more), then...</p> <ul style="list-style-type: none"> <li>If not intubated – Order Set B</li> <li>If intubated – Order Set C</li> </ul> <p>If NO – go to step 2 below</p> <p><b>Step 2: My patient has pneumonia and one or more of the following risk factors for drug resistant organisms:</b></p> <p><b>Criteria 1</b></p> <ul style="list-style-type: none"> <li>Recent hospitalization 5 or more days in last 30 days OR</li> <li>Residence in a nursing home or long-term care facility OR</li> <li>Home infusion therapy (i.e. tpn, chemotherapy) OR</li> <li>Chronic Dialysis (&gt;30 days) OR</li> <li>Recipient of home wound care OR</li> <li>Has immunosuppressive disease or therapy</li> </ul> <p>AND</p> <p><b>Criteria 2: TWO of the following THREE risk factors:</b></p> <ol style="list-style-type: none"> <li>Requires ICU admission</li> <li>Three or more days of antibiotics in the past 6 months</li> <li>Inability to perform self care</li> </ol> <p><b>Does NOT meet criteria 1 – Order Set A</b><br/><b>Criteria 1 but NOT Criteria 2: Order Set A + Vancomycin</b><br/><b>Criteria 1 and Criteria 2, not intubated – Order Set B</b><br/><b>Criteria 1 and Criteria 2, intubated – Order Set C</b></p> |
| <p><b>FOOTNOTES</b></p> <p><sup>a</sup> Adjust dose for renal dysfunction. See Tufts-MC Antibiotic Guidebook or Tufts-MC Pharmacy website.</p> <p><sup>b</sup> If patient recently received a β lactam or quinolone or has history of ESBL, please call AMT for consideration of therapy targeting ESBLs.</p> <p><sup>c</sup> For patients with acute renal failure and/or CKD, ciprofloxacin may be considered as a second agent; however gram negative organisms are frequently quinolone resistant. Please call AMT with questions.</p>   |  |

1/2011 (Rev. 07/2010)

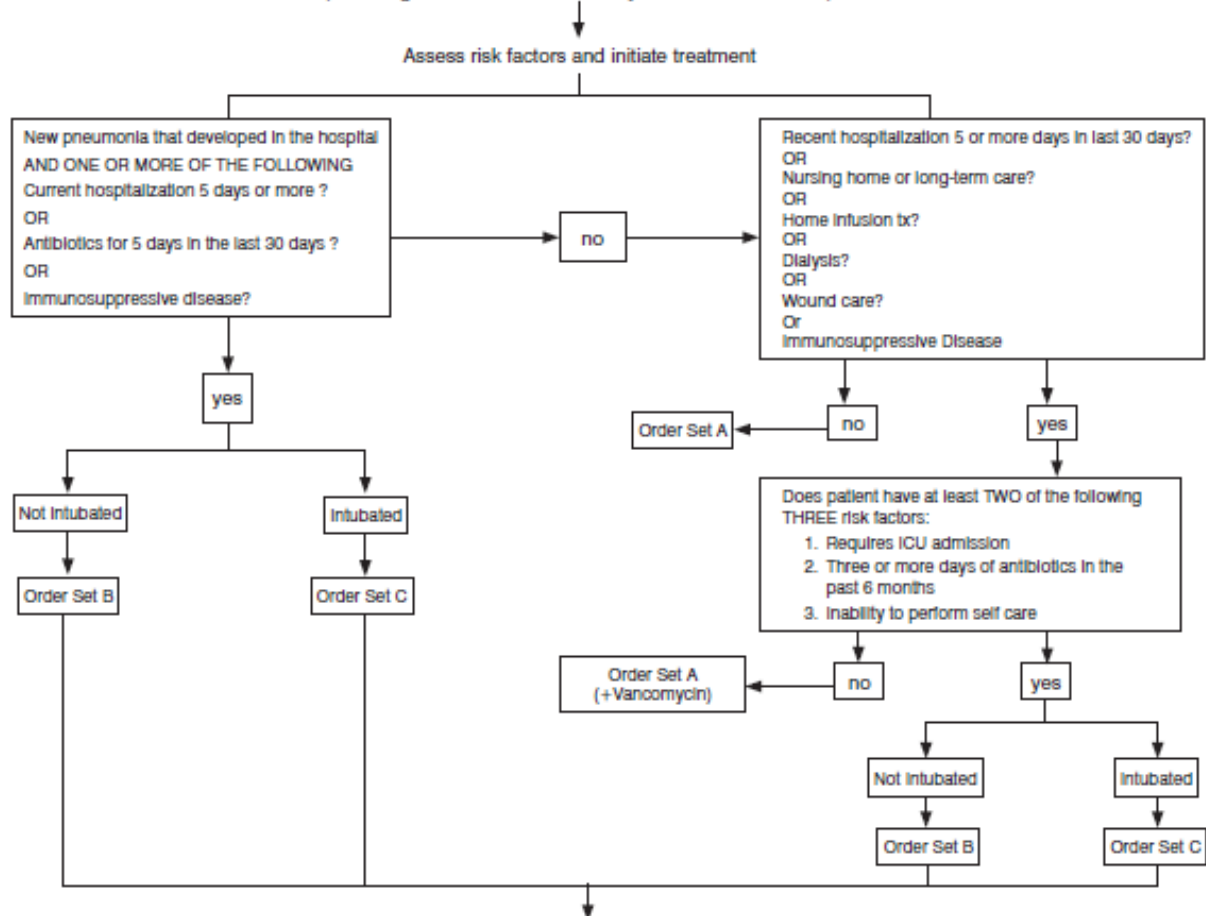
Physician's Name (Print): \_\_\_\_\_ Physician's Signature: \_\_\_\_\_ Pager # \_\_\_\_\_

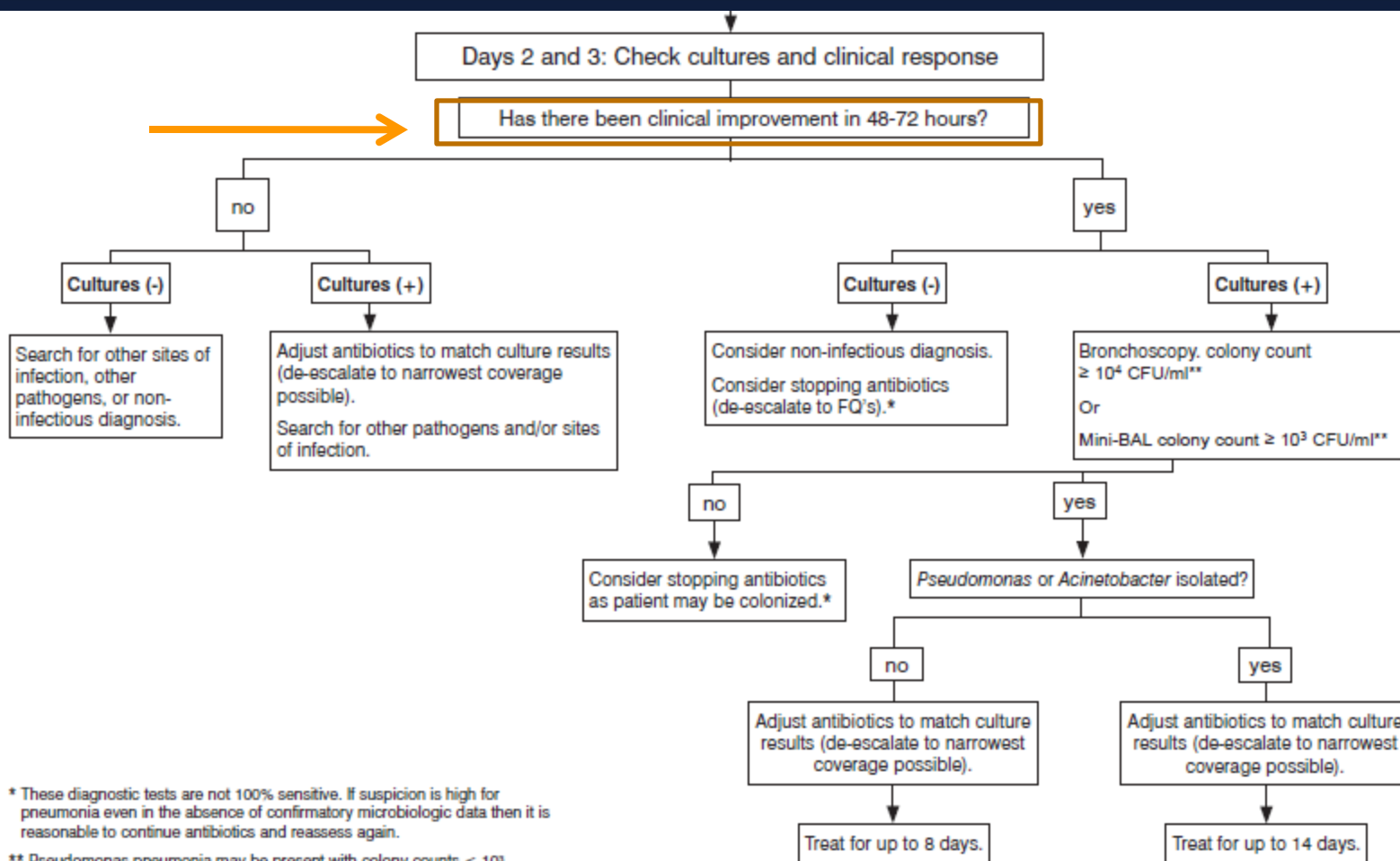
White - Medical Records      Yellow - Pharmacy

## Treatment algorithm for HAP/VAP/HCAP

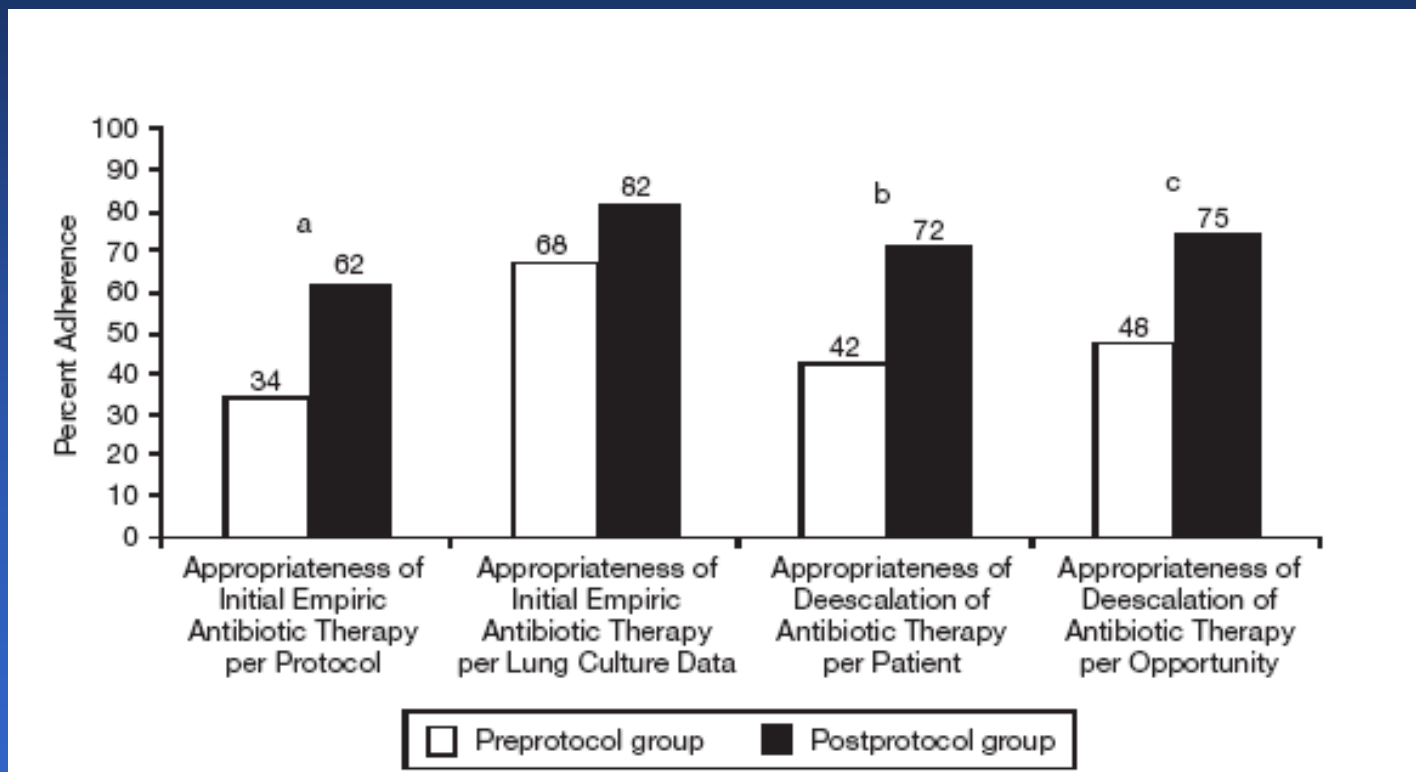
### Suspected Ventilator-associated / Healthcare-associated / Hospital-acquired Pneumonia

Obtain lower respiratory tract sample for quantitative culture and microscopy prior to start of therapy.  
(obtaining cultures should not delay initiation of treatment)

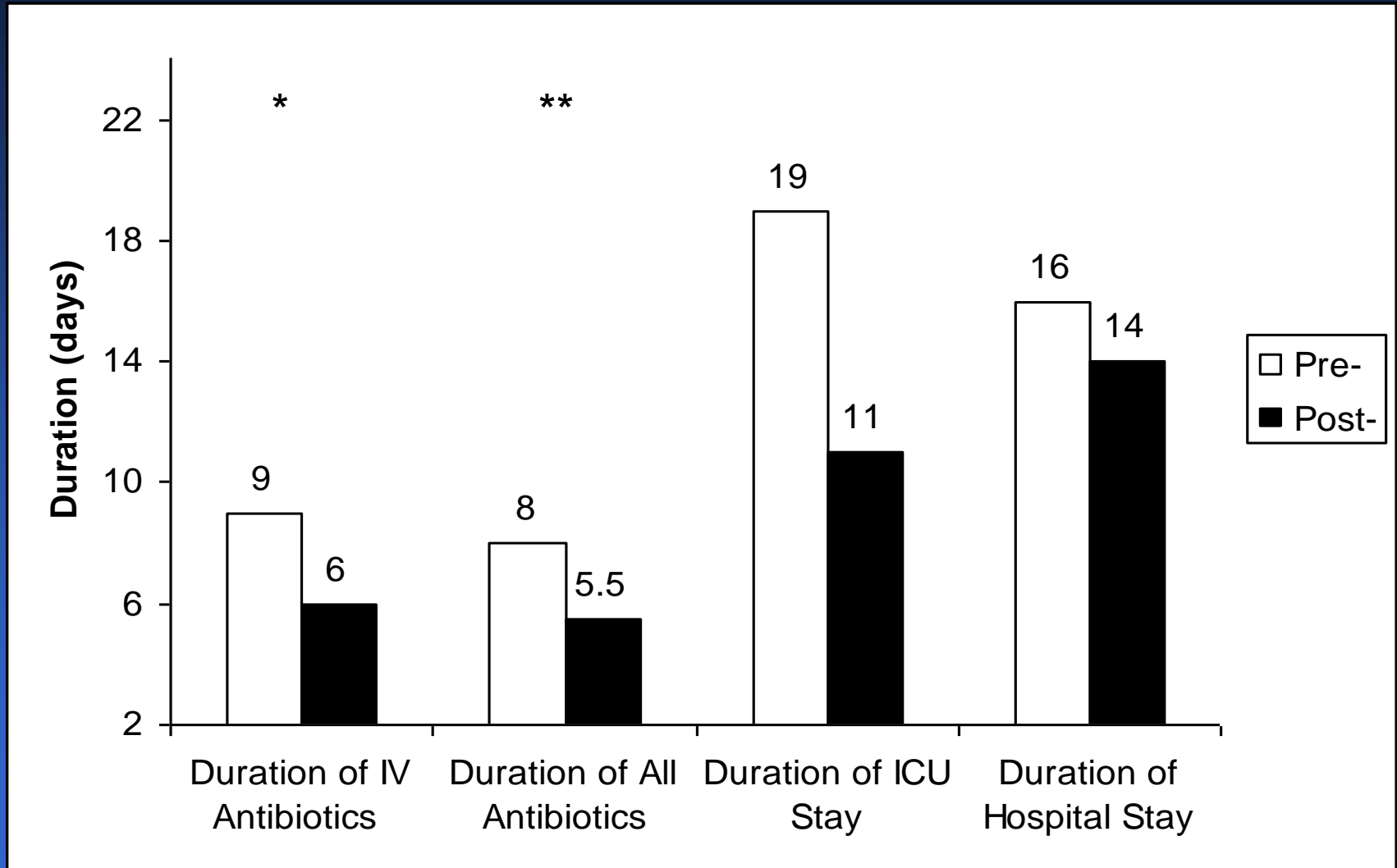




# Benefits of a VAP/HAP Protocol at Tufts Medical Center



# Duration of antibiotic use and hospital stay



(\*)  $p=0.024$ , (\*\*)  $p=0.01$ . Duration of ICU ( $p=0.97$ ) and hospital ( $p=0.41$ ) stay were not statistically different



# Are you treating infection or colonization?

- Colonization = bacteria are present at the site sampled, but are not causing disease
- Contamination = bacteria are present in the laboratory sample, but not at the site
- NEITHER requires antibiotics!
- Cultures drawn through a central line should be avoided
- WBCs in the urine  $\neq$  UTI; NO WBCs in the urine = NO UTI
- Candida is a frequent colonizer

# The government vs. the microbes

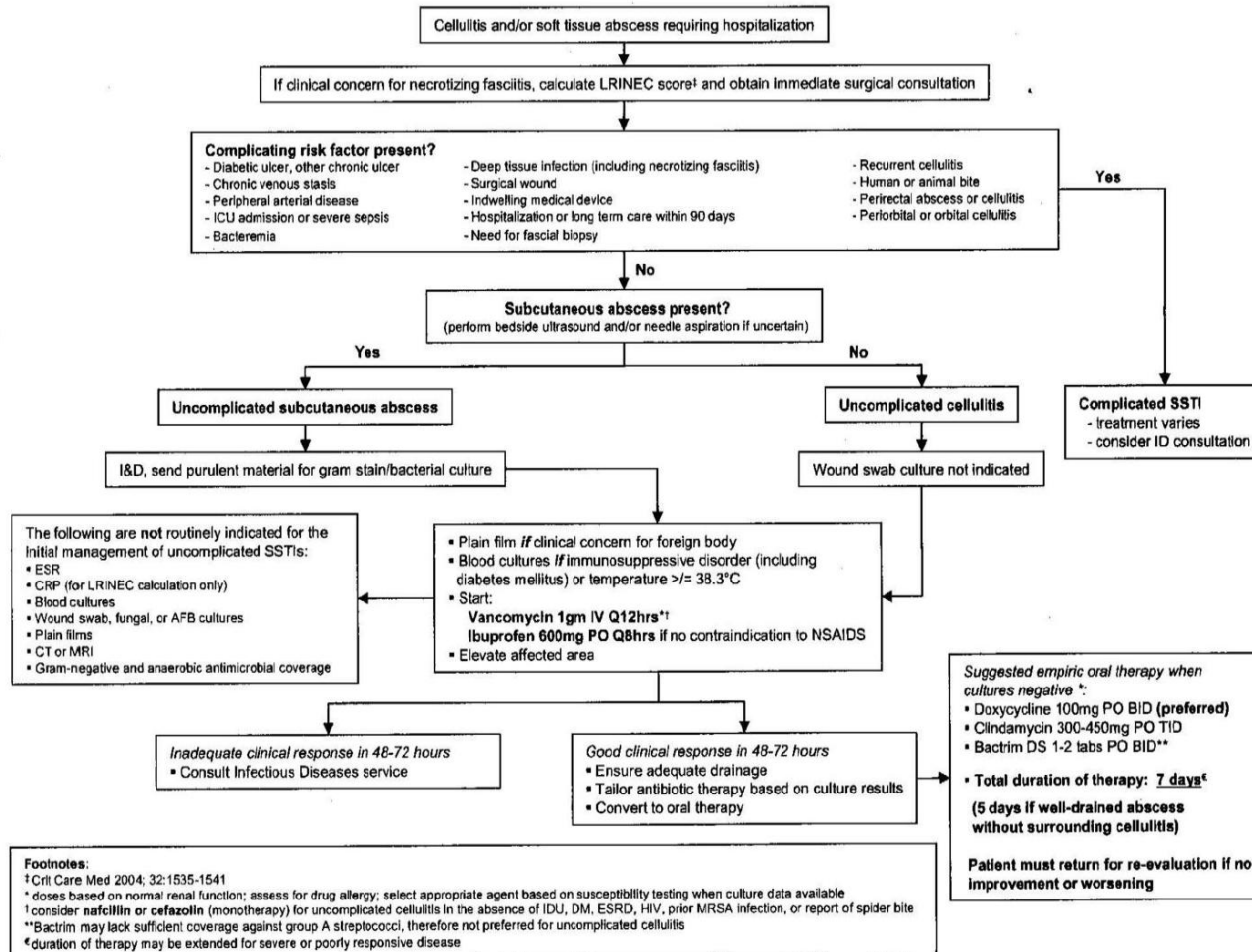
## Center for Medicare and Medicaid Services (CMS) Non Payment Conditions

- Object inadvertently left in after surgery
- Air embolism
- Blood incompatibility
- Catheter associated urinary tract infection
- Pressure ulcer (decubitus ulcer)
- Central line associated blood stream infection
- Surgical site infection- Mediastinitis after CABG, post orthopedic surgery, post bariatric surgery
- Certain types of falls and trauma

## Working with ...

- Surgical Care Improvement Project (SCIP) to develop pre/post antibiotic guidelines
- Collaborate closely with Infection Control on the development of bundles for the prevention of HAIs
- Work with hospitalists and nursing specialists ( i.e. wound care nurses, ostomy nurses, etc) to develop understanding of colonization vs infection

## Guideline for the Management of Adults Hospitalized with Cellulitis or Cutaneous Abscess



## Route: IV or PO

- Many drugs are highly available in the PO form
- The oral route is less expensive, allows for earlier removal of lines and decreased length of stay
- Patients on oral antimicrobials with clearly documented reasons for continued hospital stay are not at risk for claims rejection by payors

# Tufts Pharmacy IV to PO switch program

- Pharmacists may dispense, and nurses may administer to inpatients equivalent oral doses of certain highly bioavailable IV medications
- Criteria:
  - Functioning GI tract (taking oral fluids and medications or enteral feeds)
  - No evidence of severe nausea, diarrhea, GI bleeding, high NG output, etc
  - Normal stable vital signs
  - WBC between 4,000 and 11,000 cells /microliter
  - No life threatening infection



# Pharmacists driven initiatives

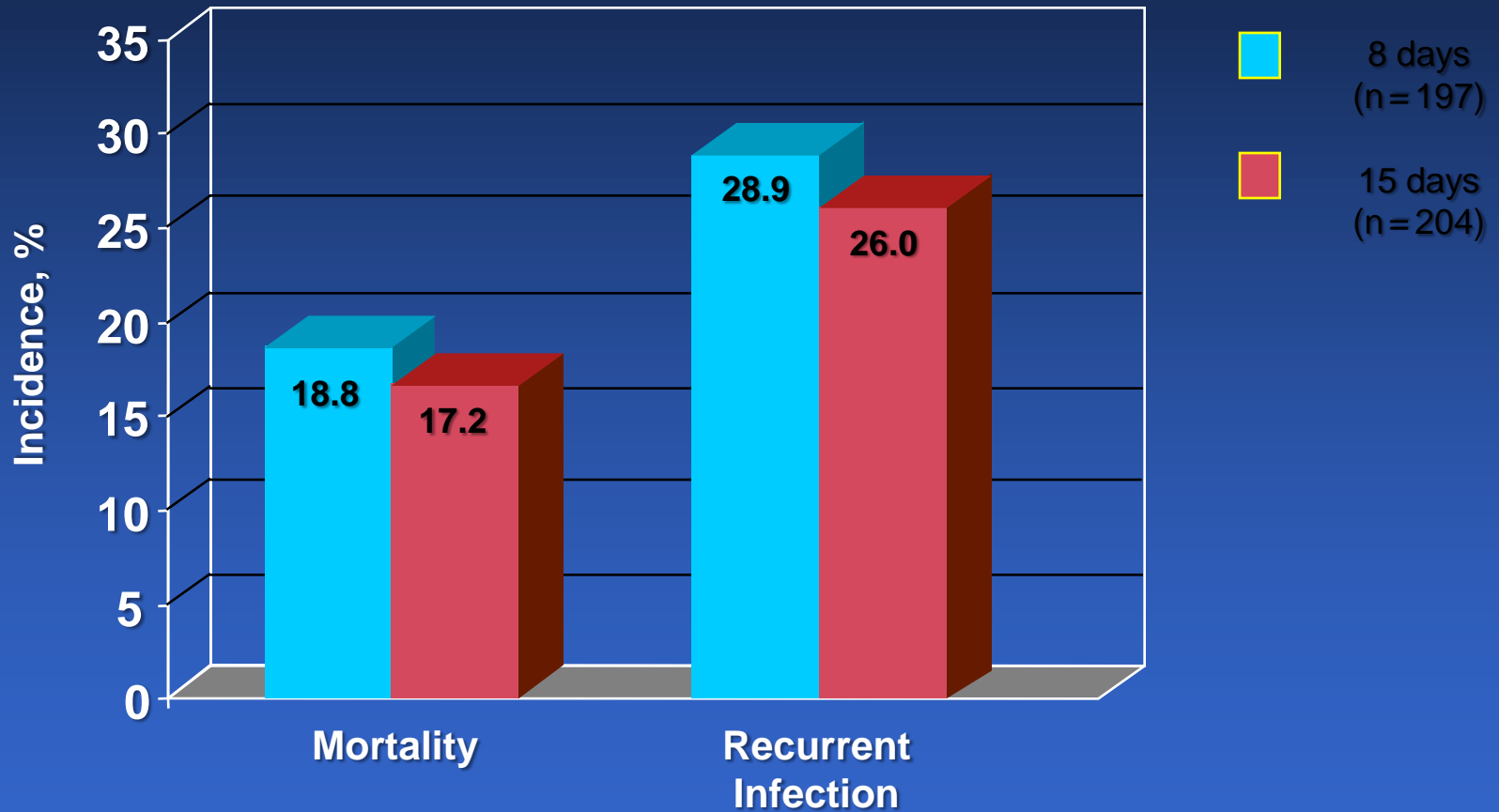
- Pharmacokinetic dosing or monitoring of aminoglycosides or vancomycin
  - automatic dosing of AG's and vanco by pharmacy rather than clinicians
- Automatic Drug conversion
  - Ex: transfers from outside hospital automatically transitioned to formulary drugs
- Alternative dosing regimens
  - Continuous or prolonged infusions of  $\beta$ -lactam
  - Increased frequency of dosing (e.g., meropenem)



# Time: Stop antibiotics as early as possible

- “*We know everything about antibiotics except how much to give.*”— Maxwell Finland (one of the forefathers of antibiotic therapy)
- Longer is not better
- CAP guidelines and clinical trials suggest good results with 5 days of antibiotics if patient meets clinical criteria
- Intra-abdominal infection guidelines: 4-7 days unless difficult to control the source of infection

# Comparison Between 8-Day and 15-Day Treatments for VAP



# Diagnostic and Pathogen Identification Techniques

- Biomarkers
  - Procalcitonin
  - CRP
- PNA FISH
- PCR
- E-test of patient samples

# Decision Support for Antimicrobial Stewardship

The screenshot shows a Windows Internet Explorer browser window displaying the Senti7 Lists application. The address bar shows the URL: <https://s1.aspnet.pharmacyresource.com/sentri7/Lists/Default.aspx>. The browser's address bar includes search engines like Verizon Broadband, Web Search, and Top Picks. The application header features the Tufts Medical Center logo and the Senti7® logo. Navigation tabs include Dashboard, Lists (selected), and Patients. A search bar is located below the navigation tabs. The main content area is titled "Lists" and displays a list of various monitoring and therapy programs, each with a magnifying glass icon to its right. The list is organized into several categories:

- Pharmacy Monitoring \***
  - Med Rec Pilot Program \*
  - Keppra IV \*
- Anticoagulation \***
  - Argatroban or Lepirudin \*
  - Warfarin Daily Monitoring - TEST \*
  - Vitamin K Use \*
  - Heparin Dosing Study \*
- Antimic Stewardship \***
  - Daptomycin without CK Check \*
  - Vanco Trough > 20 or < 10 \*
  - Metronidazole AND Other Drugs with Anaerobic Activ \*
  - C diff patients \*
  - Prolonged Antibiotic Therapy \*
- Antimicrobial Therapy \***
  - Daptomycin and Linezolid Patients \*
  - Fluoroquinolone Patients \*
  - Cefepime and Ceftriaxone Patients \*
  - Antifungal Patients \*
  - Carbepenem Patients \*
  - Zosyn Patients \*
- Med/Surg \***
  - Enoxaparin and Fondaparinux Dosing \*
  - IV to PO - Anti-infectives \*
  - IV to PO - Other \*

The Windows taskbar at the bottom shows the Start button, several open applications (Sonic Update Manager, Verizon Internet Security, Microsoft Outlook Web Access, and Senti7 Lists - Windows Internet Explorer), a search bar, and the system tray with the time 8:40 PM.

# CPOE

Order picklists -- Webpage Dialog

57y M MR#2288544

Selected Visit  Discharge

Other Visit

No Visit

**Common** Patient Based Order Sets Search

All Meds Labs

**Favorites**

- \_ Common Orders
- \_ Common IV Fluid Orders
- \_ Common Medication Orders**
- 1 - MEDICINE ORDER SETS
- Adolescent
- Adoption
- Allergy
- Cardiac Transplant
- Cardiology Adult
- CT Surg
- CTU
- CVVH Orders
- Dermatology
- Diabetes
- ED
- Endocrine
- Endocrinology Pedi

**Specialty**

Common Medications

\*\*\*\*\*

- Adult Antimicrobials - No Restrictions
- Adult Antimicrobials - Restricted Medications
- Analgesics
- Anticoagulants
- Cardiovascular Meds
- Antihyperlipidemics
- Antidepressants
- Anti-Emetics
- Diuretics
- Immunosuppressants
- Potassium Chloride Oral Preps
- Diabetic Medications
- Taper Dosing Medications
- Vitamin & Mineral Medications
- Stess Ulcer Prophylaxis Medications
- Bowel Management Medications
- Lidocaine Medications

**Session Details**

StartDateTime

Ordering Dr.

Lisa Davidson (159085)

Order Source

Written

Ordering Device

LAPTOPDAVIDSON1

TargetCosigner1

TargetCosigner2

TargetCosigner3

Add to Order Session Close Help

The completed details will be applied to all applicable orders.

# Computer Surveillance and Decision Support in Antimicrobial Stewardship

- Senti7
- SafetySurveillor
- TheraDoc
- Computerized physician order entry
- Benchmarking and local antimicrobials point prevalence surveys (state may consider doing this)

# Behind the scenes: Infection Control and AMT



- Web-based infection control surveillance system/antimicrobial management program
- ADT, Microbiology, and Pharmacy data interfaces
  - OR data and Radiology data are in progress
- Ability to alert AMT to inappropriate antimicrobial use in real time and evaluation of antibiotic use trends.



# Conclusions

- Antimicrobial resistance is a major patient safety and patient care issue, LIVES are at stake.
- Healthcare providers have a moral obligation to ensure that the currently available antimicrobials, as well as those yet to be developed remain the powerful tools that penicillin was in the 1940
- Antimicrobial stewardship strategies are the best way to achieve this goal.

# The Future of Stewardship = YOU

- Appropriate antibiotic use is a patient safety priority
- Antibiotics are a shared resource – and becoming a scarce resource.
- Inappropriate antibiotic use and resistant infections = Billions of \$\$ in excess healthcare costs
- To combat resistance: Think globally, act locally