

## **Disclaimer:**

The following guidelines have been developed and adapted from various clinical practice guidelines from reputable professional organizations. These guidelines have been developed using evidence based medicine and are not intended to replace clinical judgment. The treatment medications are not listed in order of preference, and therapeutic decisions should be based on a number of factors including patient history, comorbidities, suspected etiology, antimicrobial susceptibility patterns, and cost. In certain populations (e.g., intravenous drug abusers, immunosuppressed, travelers), the suspected organisms may include a broader range of organisms.

## **Community Acquired Pneumonia**

### **Inpatient Treatment:**

#### **General admission- (β-lactam + Macrolide/Doxycycline) OR Respiratory FQ Alone**

*(Choose one from each section)*

##### Section 1

- Ceftriaxone 2g (1g if under 80kg) IV Daily
- Ampicillin/Sulbactam 3g IV q6h

##### Section 2

- Azithromycin 500mg IV/PO Daily
- Doxycycline/Minocycline 100mg IV/PO q12h

**OR**

- Levofloxacin 750mg IV/PO Daily

#### **Pseudomonal\*/MDR Risk Factors\*\*-**

*(Choose one from each section)*

##### Section 1

- Carbapenem
- Cefepime 1gm IV q6h (2gm IV q8h if neutropenia)
- Penicillin Allergic** - Aztreonam 2g IV q8hr + Clindamycin 900mg IV q8h

##### Section 2

- Ciprofloxacin 400mg IV q8h
- Levofloxacin 750mg IV Daily
- Azithromycin 500mg PO/IV + Tobramycin/Gentamicin 7mg/kg IV Daily EIAD\*\*\*

#### **MRSA Risk Factors**

*(Add to Pseudomonal abx tx)*

- Vancomycin \_\_\_\_ mg per pharmacy consult

**OR**

- Linezolid 600mg IV q12h

**OR**

- Anti-MRSA IV antimicrobial

\*Pseudomonas Risk Factors – structural lung disease, >10mg prednisone/day, malnutrition

\*\*MDR Risk Factors – hospitalization for 5 or more days in preceding 90, residence in a nursing home or extended care facility, family member with MDR pathogen, immunosuppressive disease and/or therapy, Home wound care, home infusion therapy, chronic dialysis within 30 days, broad spectrum antimicrobial therapy within 90 days

\*\*\*Extended interval aminoglycoside dosing – consult the pharmacist



Clostridial myonecrosis (gas gangrene)	<i>C. perfringens</i> , rarely <i>C. septicum</i>	- Immediate surgical debridement - Aqueous PCN G 2-4 MU IV q4-6h PLUS clindamycin 600 mg IV q8h
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CA-MRSA – community-associated methicillin-resistant *S. aureus*; I & D – incision and drainage; TMP/SMX – trimethoprim/sulfamethoxazole; PCN – penicillin

\*Consider using TMP/SMX DS 2 tabs PO bid for more severe infections. Monitor for increased adverse effects, such as hyperkalemia and GI upset.

\*\*Should not be used in pregnant women or children under the age of 8 years.

\*\*\*If considering clindamycin, susceptibility to clindamycin should be confirmed with the “D test” for isolates resistant to erythromycin.

§Alternatives to vancomycin include linezolid 600 mg PO/IV q12h OR daptomycin 4 mg/kg IV q24h.

## Sepsis

<u>Suspected Source of Infection</u>	<u>Suggested Antibiotics</u>
<b>Unknown</b>	Vancomycin per clinical pharmacy consult <b>PLUS EITHER</b> Extended spectrum $\beta$ -lactam + $\beta$ -lactamase inhibitor IV <b>OR</b> Carbapenem
<b>Intra-abdominal Source</b>	Extended spectrum $\beta$ -lactam + $\beta$ -lactamase inhibitor IV <b>OR</b> Carbapenem <b>OR</b> Metronidazole 500 mg IV q8h <b>PLUS</b> Cefepime 2g q8h hours <b>Note:</b> If risk factors for nosocomial or pseudomonas infection exist consider adding: Ciprofloxacin 400mg IV q8h or Gentamicin/tobramycin 5mg/kg IV q24h
<b>Urinary Tract</b>	Ciprofloxacin 400 mg IV q12h <b>PLUS EITHER</b> Gentamicin 5-7 mg/kg IV single dose OR ceftriaxone 1g IV single dose <b>OR</b> Extended spectrum $\beta$ -lactam + $\beta$ -lactamase inhibitor IV <b>OR</b> Carbapenem <b>OR</b> Ampicillin 2 grams IV q6h <b>PLUS Tobramycin/Gentamicin</b> 5-7 mg/kg IV qday***
<b>Skin/Soft Tissue: Staphylococcus spp.</b>	Vancomycin per clinical pharmacy consult <b>OR</b> Anti-MRSA IV Antibiotic <b>OR</b> Cefazolin <b>if MRSA not suspected or ruled out</b>
<b>Skin/Soft Tissue: Clostridium perfringens (“Gas gangrene”), Group A Streptococcus</b>	<b>Aggressive surgical debridement recommended</b> Penicillin G 4 million units IV q4h <b>PLUS</b> Clindamycin 900 mg IV q8h
<b>Skin/Soft Tissue: Polymicrobial Necrotizing fasciitis</b>	<b>Aggressive surgical debridement recommended</b> Extended spectrum $\beta$ -lactam + $\beta$ -lactamase inhibitor IV <b>OR</b> Carbapenem

<p><b>Community Acquired Pneumonia – No Pseudomonas Risk Factors</b> Excludes nursing home patients.</p>	<p>Ceftriaxone 1 gram (2 grams if &gt; 80 kg) IV q24h <b>PLUS EITHER</b> Levofloxacin 750 mg IV q24h OR Azithromycin 500 mg IV q24h</p>
<p><b>Community Acquired Pneumonia – Pseudomonas Risk Factors</b> (structural lung disease, &gt;10mg prednisone/day, malnutrition) Excludes nursing home patients.</p>	<p>Cefepime 2g IV q8h OR Extended spectrum <math>\beta</math>-lactam + <math>\beta</math> -lactamase inhibitor IV <b>OR</b> Carbapenem (Imipenem/cilistatin or Meropenem) <b>PLUS EITHER**</b> Ciprofloxacin 400 mg IV q8h <b>OR</b> Aminoglycoside PLUS Azithromycin</p>
<p><b>Nosocomial Pneumonia, includes healthcare-associated pneumonia (HCAP), hospital-acquired pneumonia (HAP), ventilator-associated pneumonia (VAP)</b> <b>Risk Factors for Multidrug Resistant (MDR) Bacteria</b> Early onset HAP/VAP (&lt;5 days) with NO known MDR risk factors</p>	<p><b>Risk Factors for Multidrug Resistant Bacteria</b></p> <ul style="list-style-type: none"> <li>• Antimicrobial therapy in preceding 90 days</li> <li>• Current hospitalization of 5 days or more</li> <li>• Hospitalization for 2 days or more in the preceding 90 day</li> <li>• Residence in a nursing home or extended care facility</li> <li>• Home wound care</li> <li>• Home infusion therapy (including antibiotics)</li> <li>• Chronic dialysis within 30 days</li> <li>• Family member with multidrug-resistant pathogen</li> <li>• Immunosuppressive disease and/or therapy</li> <li>• High frequency of antibiotic resistance in the community or in the specific hospital unit.</li> </ul> <p>Vancomycin 15 mg/kg q12h per pharmacy consult * or Anti-MRSA IV Antibiotic <b>PLUS</b> Cefepime 2g IV q8h or Extended spectrum <math>\beta</math>-lactam + <math>\beta</math> -lactamase inhibitor IV <b>OR</b> Carbapenem (Imipenem/cilistatin or Meropenem) <b>PLUS**</b> Tobramycin 5-7 mg/kg IV qday*** <b>OR</b> Ciprofloxacin 400 mg IV q8h</p> <p>Ceftriaxone 1 gram (2 grams if &gt; 80 kg) IV q24h OR Ampicillin/sulbactam 1.5 grams (3 grams if &gt; 80 kg) IV q6h <b>PLUS</b> Levofloxacin 750 mg PO/IV q24h OR Azithromycin 500mg PO/IV q24h</p>

#Modified from the Second Edition of the Antimicrobial and Clinical Microbiology Guidebook at The Nebraska Medical Center, 2010, Omaha, Nebraska

\*Trough levels for vancomycin should be approximately 15 mg/L – Consult the pharmacist for pharmacokinetic evaluation

\*\*If Legionella is suspected, use an aminoglycoside plus azithromycin 500 mg IV qday

\*\*\*Use Hartford nomogram for dosing and obtain random level at 10 hrs – Consult pharmacist for pharmacokinetic evaluation

## **Acute Pyelonephritis – Hospitalized**

Etiology – *E. coli*, Enterococci (2<sup>nd</sup>)

Fluoroquinolone IV

Ampicillin + gentamicin IV

or

Ampicillin-sulbactam IV

or

Extended spectrum cephalosporin IV

or

Extended spectrum beta-lactam + beta-lactamase inhibitor IV

or

Carbapenem

Treat IV until afebrile x24-48 hours, and then switch to PO for at total of 14 days

\*Cephalosporins and ertapenem are not active against enterococcus

\*\*Carbapenems are DOC for ESBL producing Enterobacteriaceae

## **Complicated UTI/Catheters**

Etiology – Enterobacteriaceae, *P. aeruginosa*, enterococci, rarely *S. aureus*

### First Choice

Ampicillin + gentamicin IV

or

Extended spectrum beta-lactam + beta-lactamase inhibitor IV

or

Carbapenem

### Second Choice

Fluoroquinolone IV

or

Extended spectrum cephalosporin IV

Treat for 7 days in patients with prompt resolution of symptoms

Treat for 10-14 days for patients with delayed response

Treat for 5 days if susceptible to levofloxacin in patients that are not severely ill

Treat for 3 days for young relatively healthy catheterized women without upper urinary tract symptoms and removal of the catheter

Switch to PO when possible

\*Cephalosporins and ertapenem are not active against enterococcus

\*\*Carbapenems are DOC for ESBL producing Enterobacteriaceae

# **National Pharmacy Council Antibiotic Stewardship Program (ASP) Recommendations**

## **Guideline Recommendations**

1. Inpatient recommended guidelines: separate document
2. AmbuCare recommended guidelines: separate document

## **Recommendations for ASP implementation at Service Units**

1. Identify a local Provider and Pharmacist to champion ASP
2. Education of facility staff ( Providers, Pharmacy, Nursing, Lab and Infection Control) on ASP including rationale and referencing CMS transmittal
3. Antimicrobial guidelines for inpatient and ambulatory care infections
  - a. Recommend that each SU develop evidence-based guidelines for their specific most common infections, to include local resistance patterns, local patient specific needs, and local formulary restrictions
  - b. Recommend contacting ASP working group for help in developing Evidence Based Medicine (EBM) guidelines utilizing current recommendations as a starting point
4. ASP monitors, surveillance activities
  - a. Recommend inpatient prospective audit and feedback activities as a primary focus for hospitalized patients.
  - b. Recommend trending antimicrobial utilization with regular feedback to prescribers.
  - c. Recommend tracking adverse drug effects – specifically w/ antimicrobials
  - d. Develop Service Unit (SU) specific intervention tracking – Access database would be very useful (ex. Anticoagulation Access database)
  - e. As programs develop, recommend national monitor for SU to report
  - f. Recommend contacting ASP working group for help in developing SU specific surveillance activities

## **Antibiogram recommendations**

1. Recommended that each SU prepare an Antibiogram
2. Recommend presenting an educational section of the antibiogram
  - a. May include important strains that are not included in the antibiogram (*C. difficile*, MTB, KPC, etc)
  - b. May include trend data (MRSA, VISA, hVISA, CRE, etc)
3. Recommend use of an Antibiogram toolkit
  - a. See AZ Antibiogram Toolkit attached
4. Recommend contacting ASP working group for help in developing antibiograms

## **Governance:**

Determine where local antibiotic stewardship resides: P&T, ICC or both, Med Staff, other? How is the information moved to the Medical Staff and eventually to the Governing Body?

## **EHR recommendations**

1. Develop EHR pediatric weight based antibiotic quick orders or at minimum attach a drug text to the orderable item with recommended weight based dosing
2. Develop EHR disease state menus with recommended first line, second line medications

## **Ongoing ASP workgroup support**

1. Create and continually update an ASP SharePoint site providing links to newest guidelines from nationally recognized organizations for consideration, antibiogram data, educational documents and/or links, and other useful information
2. Provide direct interaction and recommendations with Service Units during the initial implementation phase
3. Provide antibiogram analysis
4. Provide direct interaction and recommendations with Service Units as requested
5. ASP workgroup report quarterly to National Pharmacy and Therapeutics Committee providing updates on national guidelines and formulary recommendations

## **Sharing information with local and regional health care systems:**

1. Recommend all IHS Service Unit (SU) reporting antibiogram data to ASP workgroup
2. Recommend sharing resistance data with health systems that the SU commonly shares patients
3. Recommend sharing antimicrobial formulary with the local health systems
4. Recommend opening a dialog with these local health systems and with the state health departments that the SU covers (this may be multiple states for some SUs)
5. Recommend contacting ASP workgroup when initially developing regional ASP relationships

## **Local, regional and State health care considerations:**

1. Establish POC/champions
2. Set an agenda
  - a. Initially modest
  - b. Discuss long range goal
3. Sharing of data
  - a. Facility approval
4. Communication in event of resistant microbe. Resistance trends reported

5. Monthly meetings to initially establish the group with quarterly meetings thereafter and an option for as needed meetings

**Educational materials:**

Providers: CDC, links to updated recommendations, and ASP SharePoint

Patients: CDC materials

Real value is ASP workgroup's willingness to work assist with individual Service Units implementation of ASP.

**Survey Monkey for IHS ASP:**

1. Recommend sending survey monkey for IHS ASP to all SU and participating tribal clinics to evaluate expectations of ASP
2. Recommend that ASP working group review data produced by survey and make additional recommendations