Community Acquired Pneumonia

Abdullah Alharbi, MD, FCCP

- A 68 y/ male presented to the ED with SOB and productive coughing for 2 days. Reports poor oral intake since onset due to nausea and intermittent vomitting. His wife had similar symptoms 1 week ago which improved with an unknown antibiotic. Patient is requesting to go home with antibiotic. He previously had tongue swelling and skin rash with use of augmentin. Reports good health otherwise. Denies chest pain, swelling of extremities, or diarrhea.
- His vital signs are T 38.5 C, P 76, BP 128/82, spO2 94%, RR 16. Patient is alert and oriented. Crackles were heard over left lower lung field. Labs showed WBC 14, BUN 20 mg/dL. Chest X-ray had a consolidation in left lower lobe.
- **What is the best way to further manage this patient?**
- A. Send home with oral azithromycin
- B. Send home with oral levofloxacin
- C. Admit to medicine floor with iv levofloxacin
- D. Admit to medicine floor with iv ceftriaxone and azithromycin
- E. Admit to ICU with iv ceftriaxone and iv azithromycin

MD:	ROOM	TEMP. °C	PULSE	RESP.	BLOOD PRESSURE	% O_2 SAT'N.	WT. (kg)
TIME: 2301 hhmm	A8	39.5	130	35	70 / 140	87/RA	—

☐ REFERRED BY MD
NAME: WALK IN

ALLERGIES: ☒ NONE
NKDA

MEDICATIONS: ☒ LIST ATTACHED
Ø

20 y/o ♀ Queen's Student (Truck team)
24 HRS C/O SOB
⊕ MALAISE, ⊕ Fever, ⊕ Cough
⊕ Sputum, NO chest pain
⊖ Smokes
Living alone in residence.

O/E Vitals as above!
looks unwell

☐ REASSESSMENTS / ADDITIONAL NOTES ON REVERSE

CODING
A135
K996.

DISCHARGE DIAGNOSIS:
[redacted]

PROCEDURES / INVESTIGATIONS:
C+R PA/LAT, ABG, CBC
Sputum Culture.

DISCHARGE TREATMENT/ADVICE: ☐ PRINTED INSTRUCTIONS PROVIDED
Consult Medicine/Resp.

☐ CONSENT OBTAINED

CONSULTS (NAME/SERVICE): DATE yyyy/mm/dd TIME hhmm
MEDICINE/RESP

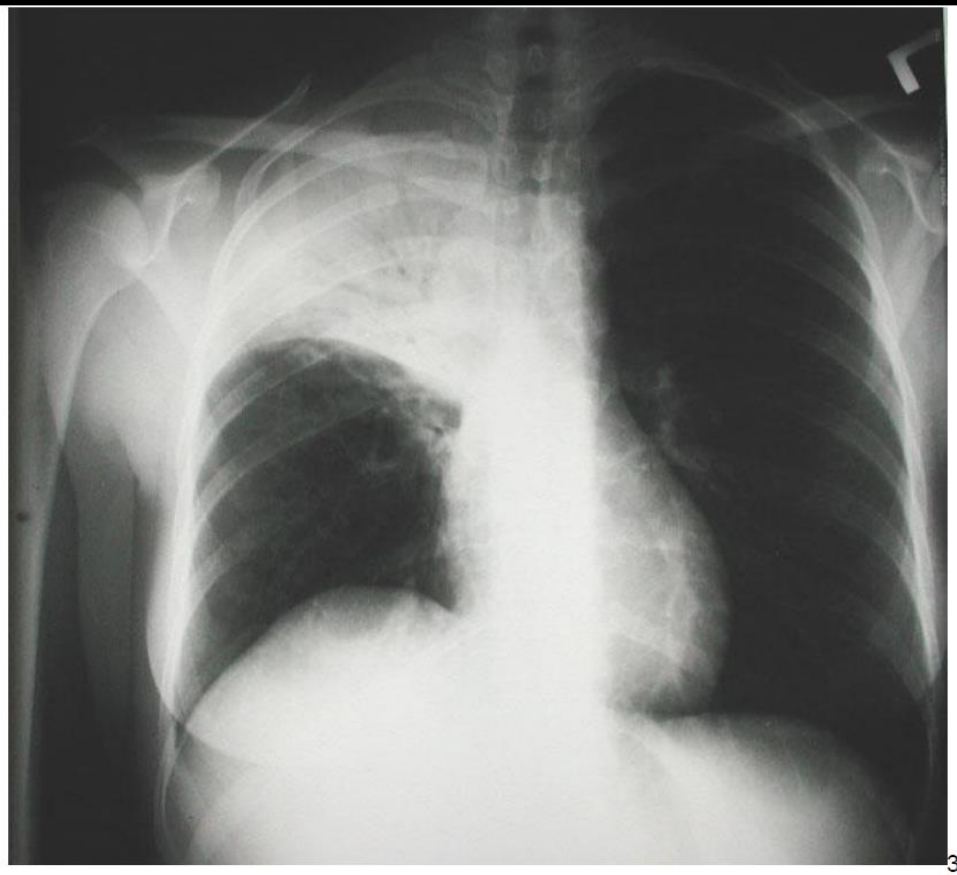
FOLLOW-UP:
☐ F.P. ☐ E.R. ☐ CLINIC:
☐ OUTPT. INVESTIGATIONS:
☐ OTHER:

DISPOSITION: DATE yyyy/mm/dd TIME hhmm
☐ HOME
☒ ADMIT/TRANSFER TO: 2008/01/02 0135
☐ D.O.A. ☐ D.I.E.

☐ CARE TRANSFERRED TO NEW E.R. PHYSICIAN
MD NAME: DATE: yyyy/mm/dd TIME:: hhmm

ATTENDING PHYSICIAN #2
NAME/SIGNATURE: [redacted]
DATE & TIME: yyyy/mm/dd hhmm 2008/01/01 23:20

HOUSESTAFF NAME/STATUS:



- **What are the features of Jane's history that suggest which organisms are most likely to be responsible for her presentation?**

- **What additional information from her history would you like to know and why?**

- **. What are the features of Jane's physical examination that indicate pneumonia?**
-
- **.What are signs of pleural involvement? Does she have any?**
- **.What are signs of serious sepsis? Does she have any?**
-
    - **Bonus: What are examples of extra-pulmonary infection that may complicate pneumonia?**

Where should Jane be managed?

Definition

- Lower respiratory tract infection in a non-hospitalized person associated with symptoms of acute infection **with or without** new infiltrate on chest radiograph

- Acute infection of the pulmonary parenchyma acquired outside of a health care setting.

Types of CAP

- Typical CAP (60-70%)
  - Streptococcus pneumoniae
- Atypical CAP (30-40%)
  - Influenza virus
  - Mycoplasma
  - Chlamydia
  - Legionella

Signs & Symptoms

- Clinical symptoms
  - Cough (productive or non-productive)
  - Fever Chills/Rigors
  - Dyspnea
  - Fatigue/Myalgia
  - Gastrointestinal (Legionella)

Signs & Symptoms

- Physical exam
  - Dullness to percussion of chest
  - Crackles on auscultation
  - Bronchial breath sounds
  - Egophony (“E” to “A” changes)

Risk factors

- ●**Older age** – The risk of CAP rises with age]. The annual incidence of hospitalization for CAP among adults ≥65 years old

- ●**Chronic comorbidities** – (COPD), chronic lung disease (eg, bronchiectasis, asthma), chronic heart disease (particularly congestive heart failure), stroke, diabetes mellitus, malnutrition and immunocompromising conditions

- ●**Viral respiratory tract infection** – Viral respiratory tract infections can lead to primary viral pneumonias and also predispose to secondary bacterial pneumonia.

- ●**Impaired airway protection** – Conditions that increase risk of macroaspiration of stomach contents and/or microaspiration of upper airway secretions predispose to CAP, such as alteration in consciousness (eg, due to stroke, seizure, anesthesia, drug or alcohol use) or dysphagia due to esophageal lesions or dysmotility

- ●**Smoking and alcohol overuse** – Smoking, alcohol overuse (eg, >80 g/day), and opioid use are key modifiable behavioral risk factors for CAP .

- ●**Other lifestyle factors** – Other factors that have been associated with an increased risk of CAP include crowded living conditions (eg, prisons, homeless shelters), residence in low-income settings, and exposure to environmental toxins (eg, solvents, paints, or gasoline)

MICROBIOLOGY

- *Streptococcus pneumonia* (pneumococcus) and respiratory viruses are the most frequently detected pathogens in patients with CAP.

Typical bacteria

- •*S. pneumoniae* (most common bacterial cause)
- •*Haemophilus influenzae*
- •*Moraxella catarrhalis*
- •*Staphylococcus aureus*
- •Group A streptococci
- •Aerobic gram-negative bacteria
- anaerobes (associated with aspiration)

Atypical bacteria

- •*Legionella* spp
- •*Mycoplasma pneumoniae*
- •*Chlamydia pneumoniae*
- •*Chlamydia psittaci*
- •*Coxiella burnetii*

•Respiratory viruses

- •Influenza A and B viruses
- •Rhinoviruses
- •Parainfluenza viruses
- •Adenoviruses
- •Respiratory syncytial virus
- •Human metapneumovirus
- •Coronaviruses (eg, Middle East respiratory syndrome coronavirus)
- •Human bocaviruses

Diagnosis- Labs

- **All patients with suspected CAP should have chest radiograph**
- Leukocyte count
- Sputum Gram stain
- Blood cultures x 2
- Serum/urine antigens

- Inflammatory markers, (ESR), (CRP) procalcitonin . CBC

- organ dysfunction such as renal dysfunction, liver dysfunction, and/or thrombocytopenia .

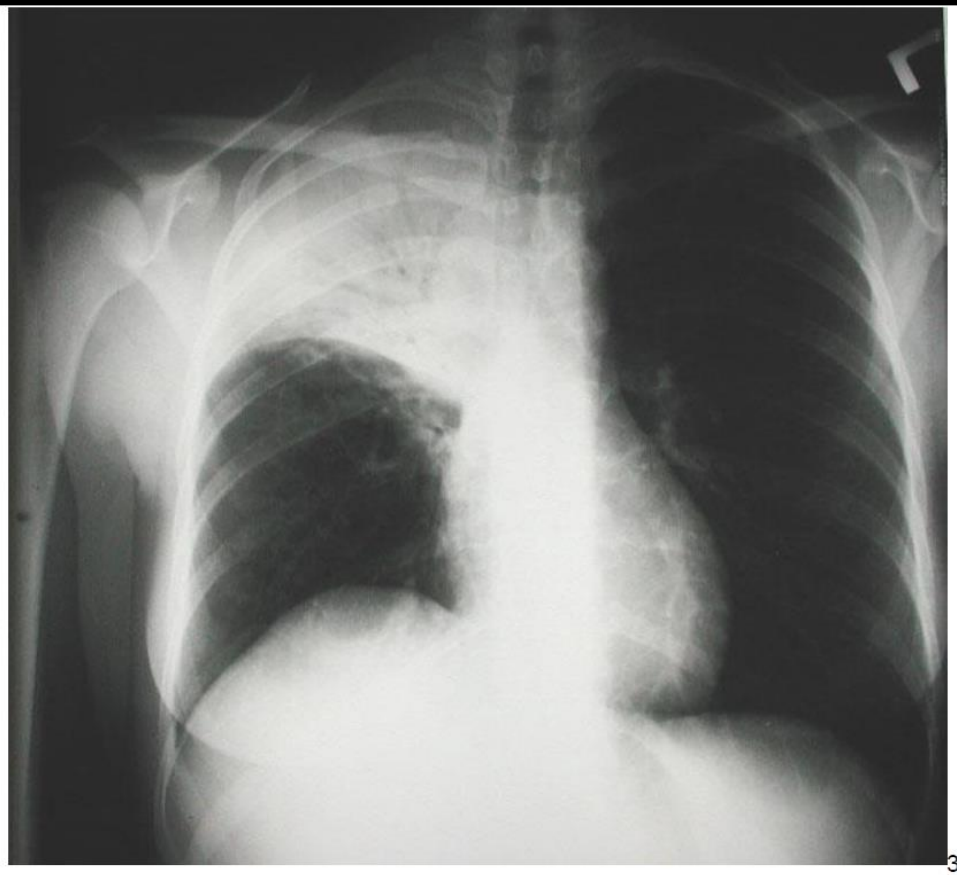
- **Blood cultures**

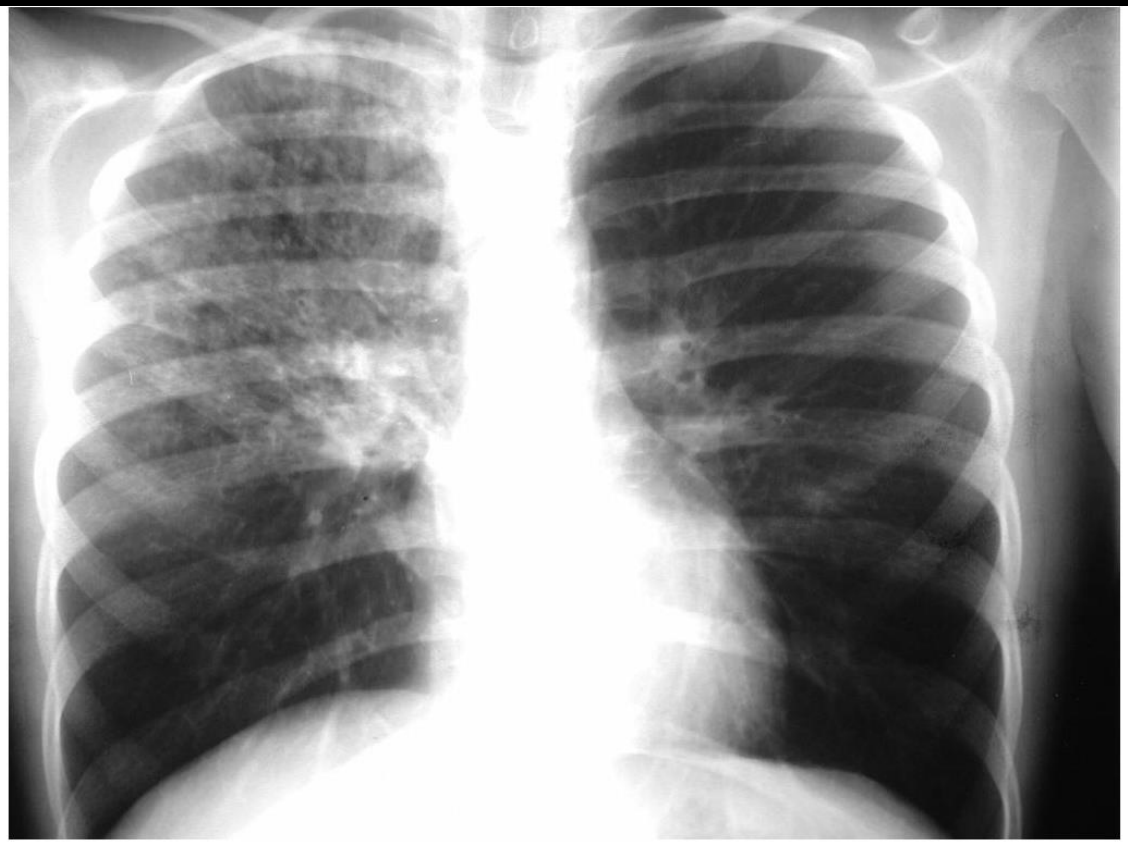
- **Sputum ●**
- Intensive care unit admission
- ●Failure of antibiotic therapy (either outpatients or hospitalized patients
- ●Cavitary lesions
- ●Active alcohol abuse
- ●Severe obstructive or structural lung disease
- ●Immunocompromised host
- ●Pleural effusion
- MERS-CoV.

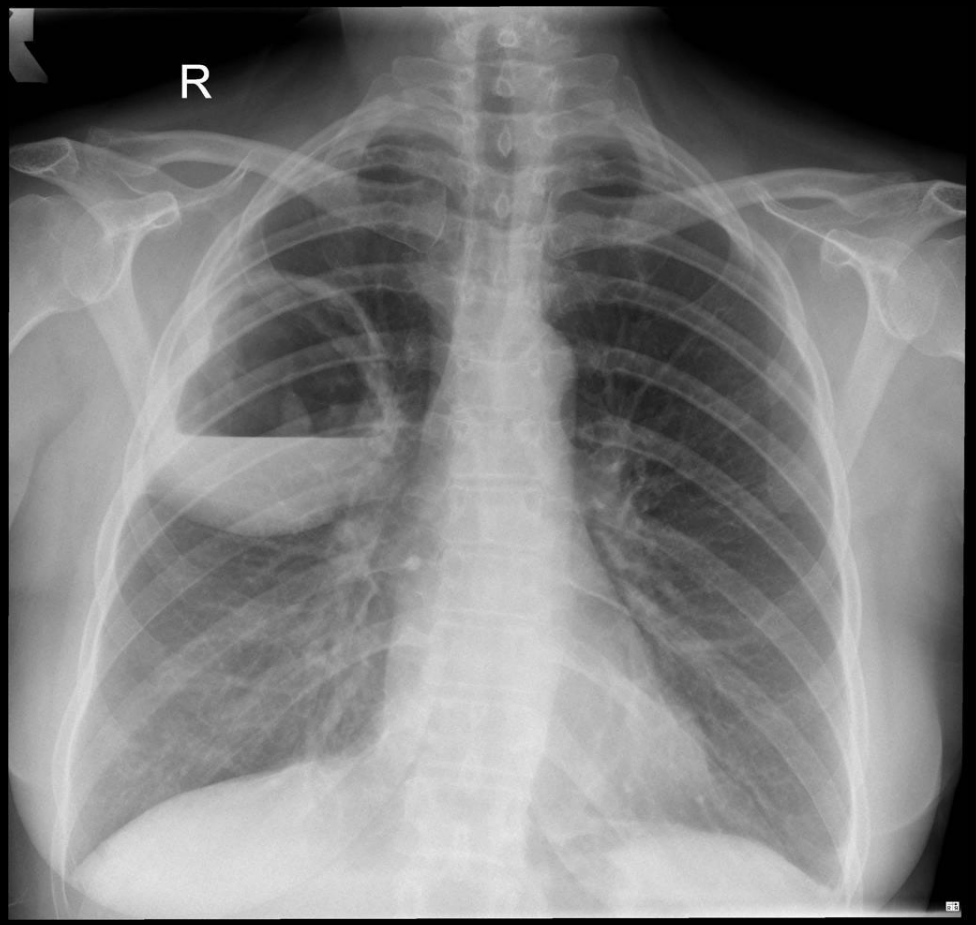
- **Urinary antigen**

RADIOLOGIC EVALUATION

- Consolidation
- interstitial infiltrates
- Cavitation



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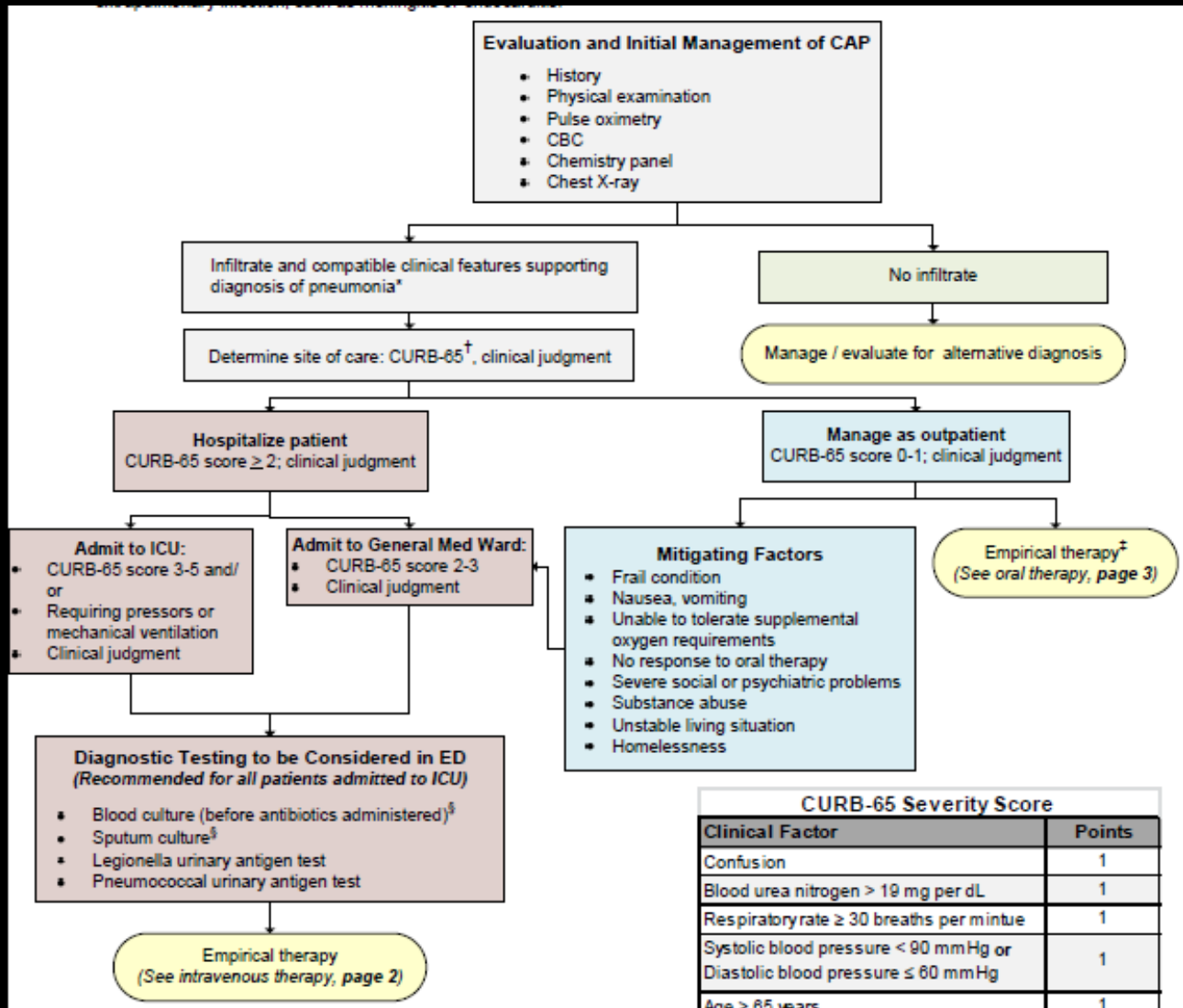
Evaluation and Initial Management of Community-Acquired Pneumonia (CAP)



CURB-65 Severity Score

Clinical Factor	Points
Confusion	1
Blood urea nitrogen > 19 mg per dL	1
Respiratory rate ≥ 30 breaths per mintue	1
Systolic blood pressure < 90 mmHg or Diastolic blood pressure ≤ 60 mmHg	1
Age ≥ 65 years	1

Recommendations	CURB-65 Score
Low risk, consider home treatment	0
	1
Short inpatient hospitalization or closely supervised outpatient treatment	2
Severe pneumonia; hospital and consider admitting to intensive care unit	3
	≥ 4

* Compatible clinical features include but are not limited to: fever, hypothermia, rigors, sweats, new cough with / without sputum production, change in color of secretions, chest discomfort, or onset of dyspnea.
† See CURB-65 Severity Scores in boxes on the right.
‡ Obtain cultures as clinically indicated.
§ If culture cannot be obtained, DO NOT delay antibiotic administration.

Table 2: Oral Therapy

Patient Population	Antibiotic	Recommended Dosing	Notes
Previously Healthy and No Recent Antibiotic Therapy	azithromycin **or** doxycycline	500 mg PO Q24 hrs. 100 mg PO Q12 hrs.	If comorbidities, consider moxifloxacin as an alternative.
Antibiotic Therapy in Past 3 Months ***If previous therapy known, use an alternative agent***	amoxicillin / clavulanate **or** amoxicillin (high dose) **or** cefdinir	2000/125 mg PO Q12 hrs.* 1 g PO Q8 hrs.* 300 mg PO Q12 hours*	High dose amox/clav targets drug-resistant S. pneumoniae (DRSP). Patients with co-morbidities or recent antimicrobial therapy are at risk of DRSP.
	Plus (+) either azithromycin **or** doxycycline	 500 mg PO Q24 hrs. 100 mg PO Q12 hrs.	
	OR monotherapy levofloxacin	 750 mg PO Q24 hrs.*	
Suspected Aspiration	amoxicillin / clavulanate **or** clindamycin	2000/125 mg PO Q12 hrs.* 300–450 mg PO Q6 hrs.	High dose amox/clav targets drug-resistant S. pneumoniae (DRSP). Patients with co-morbidities or recent antimicrobial therapy are at risk of DRSP.

Patient Population	Antibiotic	Recommended Dosing	Notes
Non-ICU Patient *without Pseudomonal* Risk	ceftriaxone **Plus (+)** azithromycin	2 g IV Q24 hrs.* 500 mg IV Q24 hrs.	If < 65 years of age and no risk factors for drug-resistant pneumococcus, azithromycin is appropriate at discharge.
	OR monotherapy levofloxacin	 750 mg IV Q24 hrs.**	
ICU Patient *without Pseudomonal* Risk	cefriaxone*	2 g IV Q24 hrs.	If documented severe β-lactam allergy, use levofloxacin plus aztreonam (2 g IV Q8 hrs.**) as an alternative.
	Plus (+) either azithromycin **or** levofloxacin	 500 mg IV Q24 hrs. 750 mg IV Q24 hrs.**	
ICU and Non-ICU Patients *with Pseudomonal* Risk*	piperacillin / tazobactam **or** cefepime	4.5 g IV Q8 hrs.** 2 g IV Q8 hrs.**	If documented severe β-lactam allergy, use aztreonam plus levofloxacin with tobramycin (7 mg/kg IV Q24 hrs.**) as an alternative.
	Plus(+) tobramycin **and** azithromycin	 7 mg/kg IV Q24 hrs.** 500 mg IV Q24 hrs.	
Suspected Aspiration**	ampicillin / subactam **or** ertapenem	3 g IV Q6 hrs.** 1 g IV Q24 hrs.**	Ertapenem should be used in patients with penicillin allergies.
Suspected MRSA Pneumonia	**Add** vancomycin	 15-20 mg/kg Q12 hrs.**	Consider loading dose of 25 mg/kg.

*Ceftriaxone 1 g IV Q24 hrs. is adequate for patients weighing < 80 kg.

**Dose should be adjusted for renal function.

The End