

PNEUMONIA

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PNEUMONIA

- Objectives:
- Review ATS/IDSA Guidelines for Community Acquired Pneumonia 2019
 - Diagnosis
 - Treatment
 - Inpatient
 - Outpatient

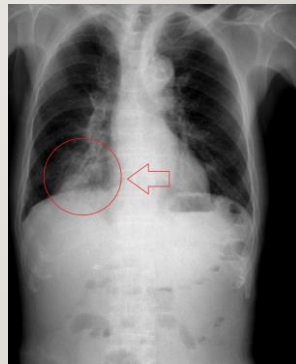


LIFE AND MEDICINE 2007 AND 2019 COMPARISON

- 2007
 - Rivers EGDT for Septic Shock 2001
 - PROWESS study Xigris 2001 for severe sepsis (taken off the market in 2012)
 - HCAP
 - Bob Barker's last year on the PRICE IS RIGHT
 - Martin Scorsese won Academy Award for best director / THE DEPARTED
 - June 2007 – first I phone
 - George W Bush President
- 2019
 - ATS/ IDSA CAP Guidelines
 - Factor Xa Inhibitors 1st line for PE/DVT Tx
 - Tom Brady is still playing football
 - Facebook / Twitter
 - Netflix / Amazon Prime
 - I phone 11
 - Parasite won Academy Award in 2020 for best picture
 - Donald Trump President

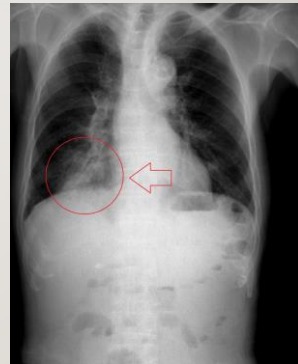
CASE STUDY

- 68 yo male presents to clinic with 3 day hx of subjective fevers, SOB and productive cough
- PMHx: HTN, CHF
- SocHx: non-smoker; occasionally drinks Corona beer; enjoys golfing and is still very upset about not being able to attend the Masters in April
- Has NOT been hospitalized in the past 3 months



CASE STUDY

- CXR shows RML infiltrate
- Questions to ask:
 - What type of Pneumonia?
 - CAP vs HAP vs VAP
 - PSI vs. CURB 65 to determine severity
 - Is his pneumonia severe?
 - Inpatient vs. Outpatient Treatment
 - Risk factors for MRSA / Pseudomonas
 - Need for cultures / antigen testing / procal.
 - Repeat Imaging needed



CAP COMMUNITY ACQUIRED PNEUMONIA

- ATS / IDSA Guidelines 2019 Summary (compared to 2007)
 - CAP: acute infection of the pulmonary parenchyma acquired outside of the hospital
 - Nosocomial
 - HAP and VAP
 - RIP HCAP
 - Diagnosis:
 - Infiltrate on chest imaging with clinical s/sx



CAP SEVERITY

- Outpatient / Ambulatory vs. Hospital Admission
 - PSI* (preferred) / CURB-65
 - ATS / IDSA states ≥ 3 of the following warrant ICU admission for CAP:
 - AMS
 - Hypotension requiring IVF
 - Temp < 36 C
 - RR ≥ 30
 - PaO₂ / FiO₂ ratio ≤ 250
 - BUN ≥ 20
 - WBCs $< 4K$ / Platelets $< 100K$
 - Multilobar infiltrates



CURB 65 - PSI

Clinical factor	Points
Confusion	1
Blood urea nitrogen > 19 mg per dL	1
Respiratory rate ≥ 30 breaths per minute	1
Systolic blood pressure < 90 mm Hg or Diastolic blood pressure ≤ 60 mm Hg	1
Age ≥ 65 years	1
Total points:	

CURB-65 score	Deaths/total (%) ^a	Recommendation ^b
0	7/1,223 (0.6)	Low risk; consider home treatment
1	31/1,142 (2.7)	
2	69/1,019 (6.8)	Short inpatient hospitalization or closely supervised outpatient treatment
3	79/563 (14.0)	Severe pneumonia; hospitalize and consider admitting to intensive care
4 or 5	44/158 (27.8)	

CRB-65 score [‡]	Deaths/total (%) ^a	Recommendation ^b
0	2/212 (0.9)	Very low risk of death; usually does not require hospitalization
1	18/344 (5.2)	Increased risk of death; consider hospitalization
2	30/251 (12.0)	
3 or 4	39/125 (31.2)	High risk of death; urgent hospitalization

CURB-65 = Confusion, Urea nitrogen, Respiratory rate, Blood pressure, 65 years of age and older.

CRB-65 = Confusion, Respiratory rate, Blood pressure, 65 years of age and older.

^a—Data are weighted averages from validation studies.^{1,2}

^b—Recommendations are consistent with British Thoracic Society guidelines.¹ Clinical judgment may overrule the guideline recommendation.

[‡]—A CRB-65 score can be calculated by omitting the blood urea nitrogen value, which gives it a point range from 0 to 4. This score is useful when blood tests are not readily available.

Risk factor	Points
Demographics	
Men	Age (years): ____
Women	Age (years) - 10: ____
Nursing home resident	+10
Comorbidities	
Neoplasm	+30
Liver disease	+20
Heart failure	+10
Stroke	+10
Renal failure	+10
Physical examination findings	
Altered mental status	+20
Respiratory rate ≥ 30 breaths per minute	+20
Systolic blood pressure < 90 mm Hg	+20
Temperature < 95°F (35°C) or ≥ 104°F (40°C)	+15
Pulse rate ≥ 125 beats per minute	+10
Laboratory and radiographic findings	
Arterial pH < 7.35	+30
Blood urea nitrogen > 30 mg per dL	+20
Sodium < 130 mmol per L	+20
Glucose ≥ 250 mg per dL	+10
Hematocrit < 30 percent	+10
Partial pressure of arterial oxygen < 60 mm Hg	+10
Pleural effusion	+10
Total points:	

Point total	Risk class	Deaths/total (%)		Recommendation ^b
		Adults with CAP ^a	Nursing home patients with CAP ^a	
< 51	I	3/1,472 (0.2)	None	Outpatient therapy should be considered, especially for patients in classes I and II
51 to 70	II	7/1,374 (0.5)	None	
71 to 90	III	41/1,603 (2.6)	1/21 (4.8)	
91 to 130	IV	149/1,605 (9.3)	6/50 (12.0)	Patient should be hospitalized
> 130	V	109/438 (24.9)	28/85 (32.9)	

^a—Data for community-acquired pneumonia (CAP) are weighted averages from validation studies.^{1,4}

^b—Recommendations are consistent with clinical guidelines.^{1,4} Clinical judgment may overrule the guideline recommendation.

ATS / IDSA GUIDELINES 2019

- Summary:
 - RIP HCAP
 - Role of Procalcitonin
 - Microbiology / sputum / urine antigen
 - Antibiotic recommendations
 - Role of Follow up imaging
- Strong recommendations vs. conditional recommendations
- These are guidelines ... Not absolute



PROCALCITONIN

- Not recommended to determine initial antibiotic coverage
- Strong recommendation based on “moderate” evidence
- Procalcitonin cannot distinguish between viral and bacterial CAP
- Treatment should be based on clinical evidence alone

BLOOD AND SPUTUM CULTURES

- Strong recommendation
 - Obtain cultures when:
 - Severe Pneumonia
 - High risk for MRSA / pseudomonas
 - Risk factors: previous dx of MRSA or pseudomonas in sputum within the past year AND hospitalization requiring IV anbx within the past 90 days
- Conditional recommendations
 - To obtain cultures for urine legionella and strep antigens in Severe Pneumonia cases

ANTIBIOTIC RECOMMENDATIONS

- **Outpatient Setting:**
 - **Healthy Individuals without comorbidities:**
 - Amoxicillin 1g TID / Doxycycline 100 mg BID / Macrolide (azithromycin 500 mg x 1, then 250 mg daily or clarithromycin 500 mg BID)
 - **With Comorbidities: (examples chronic heart, lung, liver, renal disease, DM, Etoh use, Malignancy or asplenia)**
 - **Combination therapy:**
 - amoxicillin/clavulanate 875 mg/125 mg twice daily, or a cephalosporin (cefepodoxime 200 mg twice daily or cefuroxime 500 mg twice daily); AND
 - macrolide or doxycycline 100 mg twice daily (conditional recommendation, low quality of evidence for combination therapy);
OR
 - **Monotherapy:**
 - respiratory fluoroquinolone (levofloxacin 750 mg daily, moxifloxacin 400 mg daily, or gemifloxacin 320 mg daily) (strong recommendation, moderate quality of evidence).
 - **Duration: No less than 5 days (strong recommendation)**

ANTIBIOTIC RECOMMENDATIONS

- **Inpatient Setting:**
 - **NON SEVERE CAP without risk factors for MRSA / P. aeruginosa**
 - combination therapy with a β -lactam (ampicillin + sulbactam 1.5–3 g every 6 h, cefotaxime 1–2 g every 8 h, ceftriaxone 1–2 g daily, or ceftazidime 600 mg every 12 h) and a macrolide (azithromycin 500 mg daily or clarithromycin 500 mg twice daily) (strong recommendation, high quality of evidence), or
 - monotherapy with a respiratory fluoroquinolone (levofloxacin 750 mg daily, moxifloxacin 400 mg daily) (strong recommendation, high quality of evidence).
 - **SEVERE CAP without risk factors for MRSA / P. aeruginosa**
 - β -lactam plus a macrolide (strong recommendation, moderate quality of evidence); or
 - β -lactam plus a respiratory fluoroquinolone (strong recommendation, low quality of evidence).
- **If suspect aspiration PNA in patients with CAP should anaerobic coverage be added?**
 - No: *"suggest not routinely adding anaerobic coverage for suspected aspiration pneumonia unless lung abscess or empyema is suspected (conditional recommendation, very low quality of evidence)."*

Table 4. Initial Treatment Strategies for Inpatients with Community-acquired Pneumonia by Level of Severity and Risk for Drug Resistance

	Standard Regimen	Prior Respiratory Isolation of MRSA	Prior Respiratory Isolation of <i>Pseudomonas aeruginosa</i>	Recent Hospitalization and Parenteral Antibiotics and Locally Validated Risk Factors for MRSA	Recent Hospitalization and Parenteral Antibiotics and Locally Validated Risk Factors for <i>P. aeruginosa</i>
Nonsevere inpatient pneumonia*	β-Lactam + macrolide [†] or respiratory fluoroquinolone [‡]	Add MRSA coverage [§] and obtain cultures/nasal PCR to allow deescalation or confirmation of need for continued therapy	Add coverage for <i>P. aeruginosa</i> and obtain cultures to allow deescalation or confirmation of need for continued therapy	Obtain cultures but withhold MRSA coverage unless culture results are positive. If rapid nasal PCR is available, withhold additional empiric therapy against MRSA if rapid testing is negative or add coverage if PCR is positive and obtain cultures	Obtain cultures but initiate coverage for <i>P. aeruginosa</i> only if culture results are positive
Severe inpatient pneumonia*	β-Lactam + macrolide [†] or β-lactam + fluoroquinolone [‡]	Add MRSA coverage [§] and obtain cultures/nasal PCR to allow deescalation or confirmation of need for continued therapy	Add coverage for <i>P. aeruginosa</i> and obtain cultures to allow deescalation or confirmation of need for continued therapy	Add MRSA coverage [§] and obtain nasal PCR and cultures to allow deescalation or confirmation of need for continued therapy	Add coverage for <i>P. aeruginosa</i> and obtain cultures to allow deescalation or confirmation of need for continued therapy

FOLLOW UP IMAGING FOR CAP

- In patients who are improving the guidelines state:

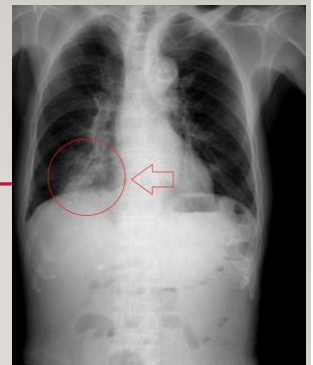
“In adults with CAP whose symptoms have resolved within 5 to 7 days, we suggest not routinely obtaining follow-up chest imaging (conditional recommendation, low quality of evidence).”

Recommendation	2007 ATS/IDSA Guideline	2019 ATS/IDSA Guideline
Sputum culture	Primarily recommended in patients with severe disease	Now recommended in patients with severe disease as well as in all inpatients empirically treated for MRSA or <i>Pseudomonas aeruginosa</i>
Blood culture	Primarily recommended in patients with severe disease	Now recommended in patients with severe disease as well as in all inpatients empirically treated for MRSA or <i>P. aeruginosa</i>
Macrolide monotherapy	Strong recommendation for outpatients	Conditional recommendation for outpatients based on resistance levels
Use of procalcitonin	Not covered	Not recommended to determine need for initial antibacterial therapy
Use of corticosteroids	Not covered	Recommended not to use. May be considered in patients with refractory septic shock
Use of healthcare-associated pneumonia category	Accepted as introduced in the 2005 ATS/IDSA hospital-acquired and ventilator-associated pneumonia guidelines	Recommend abandoning this categorization. Emphasis on local epidemiology and validated risk factors to determine need for MRSA or <i>P. aeruginosa</i> coverage. Increased emphasis on deescalation of treatment if cultures are negative
Standard empiric therapy for severe CAP	β -Lactam/macrolide and β -lactam/fluoroquinolone combinations given equal weighting	Both accepted but stronger evidence in favor of β -lactam/macrolide combination
Routine use of follow-up chest imaging	Not addressed	Recommended not to obtain. Patients may be eligible for lung cancer screening, which should be performed as clinically indicated

Definition of abbreviations: ATS = American Thoracic Society; CAP = community-acquired pneumonia; IDSA = Infectious Diseases Society of America; MRSA = methicillin-resistant *Staphylococcus aureus*.

CASE STUDY

- 68 yo male presents to clinic with 3 day hx of subjective fevers, SOB and productive cough
- PMHx: HTN, CHF
- SocHx: non-smoker, occasionally drinks Corona beer, enjoys golfing and is still very upset about not being able to attend the Masters in April
- Has NOT been hospitalized in the past 3 months
- VS: 94% on RA, BP 135/82, RR 18, P 78
- Alert and oriented on exam, slight RLL crackles



CASE STUDY DISCUSSION

- What type of Pneumonia?
 - PSI vs. CURB 65 to determine severity
 - Is his pneumonia severe?
 - Inpatient vs. Outpatient Treatment
 - Risk factors for MRSA / Pseudomonas
 - Need for cultures / antigen testing
 - Repeat Imaging needed
- Based on the above how would you treat?

CASE STUDY DISCUSSION

- What type of Pneumonia? **Community Acquired Pneumonia**
- PSI vs. CURB 65 to determine severity **PSI = 78 (Risk III) CURB 65 = I**
- Is his pneumonia severe? **NO**
- Inpatient vs. Outpatient Treatment **OUTPATIENT**
- Risk factors for MRSA / Pseudomonas **NO**
- Need for cultures / antigen testing **NO**
- Repeat Imaging needed **NO**
- Based on the above how would you treat?
 - **amoxicillin/clavulanate 875 mg/125 mg twice daily x 5 days**

CITATIONS

- <https://www.thoracic.org/about/newsroom/press-releases/journal/2019/ats-idsa-publishes-clinical-guideline-on-community-acquired-pneumonia.php>
- **Diagnosis and Treatment of Adults with Community-acquired Pneumonia. An Official Clinical Practice Guideline of the American Thoracic Society and Infectious Diseases Society of America** Published , 10/1/2019 *American Journal of Respiratory and Critical Care Medicine*, Volume 200, Issue 7, 1 October 2019, Pages e45-e67, <https://www.atsjournals.org/doi/full/10.1164/rccm.201908-1581ST>
Published: 01 October 2019
- **Ramirez, et al. Overview of community-acquired pneumonia in adults** Retrived March 22, 2020 from https://www.uptodate.com/contents/overview-of-community-acquired-pneumonia-in-adults?search=community%20acquired%20pneumonia%20treatment&source=search_result&selectedTitle=2~150&usage_type=default&display_rank=2
- **Changes in Therapy Recommendations in the 2019 ATS/IDSA Guidelines for Community-Acquired Pneumonia**; NOV 07, 2019 | KHALID ELJAALY, PHARMD, MS, BCPS, BCIDP

