Education and Training:
MSU-COM
Genesys Regional Medical Center

Entering Practice in Melbourne, FL

No financial disclosures
Just the Facts

Incidence of overall CAP 4-15/1000

Incidence much higher in older adults 18-44/1000

20-50% of patients with CAP can be treated as outpatient

The mortality for patients with CAP who require hospitalization is 5-15%

Outpatient mortality <1%

ICU mortality 30-40%
Case TS

50 yo male, non-smoker presents to your office with 4 day history of fevers, cough with yellow sputum, and shortness of breath. He denies rhinorrhea, sore throat, or earache.

No history of asthma or lung disease.

No recent antibiotic use.

He is a business executive who travels extensively. He just returned from a flight to Minneapolis.
Case TS Continued

Vital Signs: BP 115/70, HR 95, Temp 101.7, RR 24, O2 Sat 91% on RA

Physical Exam:

Mildly tachypneic, no accessory muscle use

Coarse rales and rhonchi in the posterior right lung base. No wheezes

Mildly tachycardic, S1/S2 no murmurs

Rest of exam unremarkable
What is the first step?

A. Empiric therapy with respiratory fluoroquinolone
B. Chest x-ray
C. Sputum culture
D. Hospitalization
E. CBC, Chem panel
What is the first step?

A. Empiric therapy with fluoroquinolone
B. Chest x-ray
C. Sputum culture
D. Hospitalization
E. CBC, Chem panel

Temp $>38.5\ (101.3)$ with cough should never be attributed to bronchitis without a chest x-ray
Clinical Presentation

Typical CAP- initial presentation is acute with an intense chill or rigors, fevers, sputum production, purulent sputum, and lobar consolidation on x-ray, leukocytosis and bandemia
Clinical Presentation

Atypical CAP - gradual onset of fever, non-productive cough, patchy/interstitial changes on x-ray, normal WBC count
Clinical Presentation

Don’t forget

CXR lags behind symptoms

May be normal in early CAP

Especially if patient is dehydrated

Follow-up CXR to resolution

May take 4-6 weeks
Typical vs Atypical

Current guidelines do not emphasize the use of typical vs atypical classification to determine the initial antibiotic regimen.

Several studies have shown that neither clinical symptoms or radiographic changes are sufficient to guide pathogen directed therapy.
Case TS Continued

Patient has CXR confirmed pneumonia

What is the next best step?

A. Empiric antibiotic therapy
B. Send to emergency room
C. Send patient for sputum sample and await results before choosing antibiotic
Case TS Continued

Patient has CXR confirmed pneumonia

What is the next best step?

A. **Empiric antibiotic therapy**
B. Send to emergency room
C. Send patient for sputum sample and await results before choosing antibiotic
To ER or not To ER

What sort of things go into the clinical decision making process for pneumonia especially regarding the need for antibiotics or hospitalization

Guidelines recommend using an objective validated scoring system in addition to subjective factors
### CURB-65

1 point given for each of:
- Confusion
- Urea (>7 mmol/L)
- Respiratory rate (≥30/min)
- BP (SBP <90 mmHg or DBP ≤60 mmHg)
- Age (≥65 years)

<table>
<thead>
<tr>
<th>Risk class</th>
<th>Mortality (%)</th>
<th>Recommended site of care</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.7</td>
<td>Outpatient</td>
</tr>
<tr>
<td>1</td>
<td>2.1</td>
<td>Outpatient</td>
</tr>
<tr>
<td>2</td>
<td>9.2</td>
<td>Short hospital stay / supervised outpatient</td>
</tr>
<tr>
<td>3</td>
<td>14.5</td>
<td>Hospital, assess for ICU</td>
</tr>
<tr>
<td>4</td>
<td>40</td>
<td>Hospital, assess for ICU</td>
</tr>
<tr>
<td>5</td>
<td>57</td>
<td>Hospital, assess for ICU</td>
</tr>
</tbody>
</table>
If labs aren’t readily available ok to us CRB-65 instead of CURB-65. Lower index to send to hospital: if meets 1 or more - to ER.

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

<table>
<thead>
<tr>
<th>CRB-65 score‡</th>
<th>Deaths/total (%)*</th>
<th>Recommendation†</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2/212 (0.9)</td>
<td>Very low risk of death; usually does not require hospitalization</td>
</tr>
<tr>
<td>1</td>
<td>18/344 (5.2)</td>
<td>Increased risk of death; consider hospitalization</td>
</tr>
<tr>
<td>2</td>
<td>30/251 (12.0)</td>
<td></td>
</tr>
<tr>
<td>3 or 4</td>
<td>39/125 (31.2)</td>
<td>High risk of death; urgent hospitalization</td>
</tr>
</tbody>
</table>
**Other Scoring Systems: PSI**

### Demographics
- Age (1 point per year)
- Male Yr
- Female Yr -10
- Nursing home residency +10

### Co-morbidities
- Neoplasia +30
- Liver disease +20
- CHF +10
- Cerebrovascular disease +10
- Renal disease +10

### Physical exam / vital signs
- Mental confusion +20
- Respiratory rate +20
- SBP +20
- Temperature +15
- Tachycardia +15

### Laboratory / imaging
- Arterial pH +30
- BUN +20
- Sodium +20
- Glucose +10
- Hematocrit +10
- Pleural effusion +10
- Oxygenation +10

### Risk class (Points) | Mortality (%) | Recommended site of care
--- | --- | ---
I (<50) | 0.1 | Outpatient
II (51–70) | 0.6 | Outpatient
III (71–90) | 2.8 | Outpatient or brief inpatient
IV (91–130) | 8.2 | Inpatient
V (>130) | 29.2 | Inpatient
Superiority of Scoring Systems

Guidelines support the usage of a clinically validated scoring system.

Outpatient physicians are more able to use a simplified scoring system which does not require extensive lab variables and calculations.

In the ED, physicians have access to more numbers.

If a hospital has resources like an EMR which can calculate PSI on its own, there is more research validating the Pneumonia Severity Index though other scoring systems are gaining in popularity.
**Other Scoring Systems: SMART-COP**

<table>
<thead>
<tr>
<th>50 years old or less</th>
<th>more than 50 years old</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>S</strong> systolic BP less than 90 mm Hg</td>
<td><strong>S</strong> systolic BP less than 90 mm Hg</td>
</tr>
<tr>
<td>2 points</td>
<td>2 points</td>
</tr>
<tr>
<td><strong>M</strong> multilobar CXR involvement</td>
<td><strong>M</strong> multilobar CXR involvement</td>
</tr>
<tr>
<td>1 point</td>
<td>1 point</td>
</tr>
<tr>
<td><strong>A</strong> albumin less than 35 g/L</td>
<td><strong>A</strong> albumin less than 35 g/L</td>
</tr>
<tr>
<td>1 point</td>
<td>1 point</td>
</tr>
<tr>
<td><strong>R</strong> respiratory rate 25 br/min or more</td>
<td><strong>R</strong> respiratory rate 30 br/min or more</td>
</tr>
<tr>
<td>1 point</td>
<td>1 point</td>
</tr>
<tr>
<td><strong>T</strong> tachycardia 125 bpm or more</td>
<td><strong>T</strong> tachycardia 125 bpm or more</td>
</tr>
<tr>
<td>1 point</td>
<td>1 point</td>
</tr>
<tr>
<td><strong>C</strong> confusion (acute)</td>
<td><strong>C</strong> confusion (acute)</td>
</tr>
<tr>
<td>1 point</td>
<td>1 point</td>
</tr>
<tr>
<td><strong>O</strong> oxygen low</td>
<td><strong>O</strong> oxygen low</td>
</tr>
<tr>
<td>PaO₂ less than 70 mm Hg, or</td>
<td>PaO₂ less than 60 mm Hg, or</td>
</tr>
<tr>
<td>O₂ saturation 93% or less, or</td>
<td>O₂ saturation 90% or less, or</td>
</tr>
<tr>
<td>PaO₂/FiO₂ less than 333</td>
<td>PaO₂/FiO₂ less than 250</td>
</tr>
<tr>
<td>2 points</td>
<td>2 points</td>
</tr>
<tr>
<td><strong>P</strong> pH less than 7.35</td>
<td><strong>P</strong> pH less than 7.35</td>
</tr>
<tr>
<td>2 points</td>
<td>2 points</td>
</tr>
</tbody>
</table>

**Total points score (maximum 11)**

A score of 3 or more has a 92% ppv for patients requiring intensive vasopressors or respiratory support, much more sensitive than PSI (74%) and CURB-65 (39%)
Other Scoring Systems: SOAR

Score of 1 or more - to hospital
SOAR score is more accurate for predicting 30-day mortality and ICU admission than the CURB-65 and CRB-65 in nursing home patients
Estimating PaO2/FiO2 ratio

Room Air = 21% which is considered 0.21

To get a P:F ratio < 250 the PaO2 would be < 52.5

If someone is maintaining sats > 90% on room air, the approximate PaO2 is 60 mmHg

Consider situations which shift the oxyHb dissociation curve
Predictors of Mortality

Each scoring systems tends to score similarly for predicting mortality

Using a validated scoring system is better

Other labs and physical findings with an association to mortality

- Hypoglycemia
- Low O2 sat $<90\%$
- Thrombocytopenia
- Leukopenia
- Hyponatremia or Hypernatremia
Our patient

50 yo male with no significant medical comorbidities, does not appear confused

SBP 115, RR 24, SpO2 91% on RA

\[ \text{CRB-65} = 0 \]

\[ \text{SOAR} = 0 \]

Safe to try outpatient antibiotics

Had we changed one thing in his story, could have sent him to ER
Disease Severity

Severity of disease is based on 2 factors

Patient Risk Factors
Pathogen virulence
Patient Risk Factors

Age

Personal Habits

Alcohol and smoking

Comorbidities

COPD, bronchiectasis, CHF, CKD, liver disease, cancer, diabetes, dementia, CVA, and immunodeficiency
Pathogen Virulence

Mild CAP
- Strep pneumoniae
- Mycoplasma pneumoniae
- Chlamydia pneumoniae
- Haemophilus influenzae
- Respiratory viruses

Severe CAP
- Strep pneumoniae
- Enteric gram negative bacilli
- Staph aureus
- Legionella pneumophila
- Mycoplasma pneumoniae
- Haemophilus influenzae
- Respiratory viruses
Subjective Factors

Despite the use of clinical scoring systems, there are additional subjective factors which may be considered.

Reasons for admission of low risk patients

- Complications of the pneumonia
- Exacerbations of other chronic diseases
- Inability to reliably take oral medications or receive outpatient care
- Other risk factors which place patient just below the score
Back to the case

After obtaining CXR which shows pneumonia, you have determined your patient is low risk and stable for treatment as an outpatient. What is the next treatment step?

A. Obtain sputum cultures
B. Obtain urine antigen and sputum cultures
C. Treat empirically for typical causes of pneumonia
D. Treat empirically for atypical causes of pneumonia
E. Treat empirically for both typical and atypical causes of pneumonia
Back to the case

After obtaining CXR which shows pneumonia, you have determined your patient is low risk and stable for treatment as an outpatient. What is the next treatment step?

A. Obtain sputum cultures
B. Obtain urine antigen and sputum cultures
C. Treat empirically for typical causes of pneumonia
D. Treat empirically for atypical causes of pneumonia
E. Treat empirically for both typical and atypical causes of pneumonia
Necessity of pathogen evaluation in outpt

Guidelines do not support the need to search for a causative pathogen in patients with mild pneumonia who can be treated as an outpatient

Only investigate if the answer would significantly alter the treatment pathway

If there is any concern of unusual pathogens like endemic fungi or mycobacterium tuberculosis

If there is any concern for a pathogen which would not be covered by usual coverage- like psittacosis or tularemia
Diagnostic Testing

Sputum culture considered optional

Urine antigen testing for strep pneumo or legionella

Empiric antibiotics should cover for both of these bacteria, so testing would not change the course of therapy

During influenza season, it is a good idea to check a Flu swab on all pneumonia patients

Prompt recognition and antiviral therapy improves outcomes and reduces mortality
<table>
<thead>
<tr>
<th>Indication</th>
<th>Blood culture</th>
<th>Sputum culture</th>
<th>Legionella UAT</th>
<th>Pneumococcal UAT</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensive care unit admission</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X^a</td>
</tr>
<tr>
<td>Failure of outpatient antibiotic therapy</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Cavitary infiltrates</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X^b</td>
</tr>
<tr>
<td>Leukopenia</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active alcohol abuse</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic severe liver disease</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe obstructive/structural lung disease</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asplenia (anatomic or functional)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X^c</td>
</tr>
<tr>
<td>Recent travel (within past 2 weeks)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X^d</td>
</tr>
<tr>
<td>Positive <em>Legionella</em> UAT result</td>
<td></td>
<td></td>
<td>X</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Positive pneumococcal UAT result</td>
<td>X</td>
<td>X</td>
<td></td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Pleural effusion</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X^e</td>
</tr>
</tbody>
</table>
Procalcitonin

Point-of-Care Procalcitonin testing is being studied to help with risk stratification and to guide in the need of antibiotics

- Normal $<0.15$
- Indeterminate $0.15-2$
- Definite Sepsis $>2$

Only positive in bacterial infections, not viral

The higher the number, the more severe the sepsis (levels $>4$ in ICU associated with higher mortality)
What percentage of patients with community acquired pneumonia have pathogens identified?

A. 5%
B. 25%
C. 38%
D. 50%
What percentage of patients with community acquired pneumonia have pathogens identified?

A. 5%
B. 25%
C. 38%
D. 50%

**In a recent clinical study using extensive diagnostic testing for all hospitalized patients with CAP, the rate of pathogen detection was 38%, True pathogen detection is much lower if patients treated as outpatients are considered rate 10-25% are more correct**
Pathogen detection: EPIC study

EPIC: Etiology of Pneumonia in Community

Study population: Patients with CXR confirmed pneumonia who were hospitalized for CAP

Even with the extensive diagnostic tests for detection of pathogens including: sputum gram stain and culture, PCR on sputum, blood cultures, urine antigens, etc

The results showed only 38% of patients with pneumonia have a causative pathogen identified
EPIC Study Pathogens

Pathogens were detected in 38% of patients

27% viral
14% bacterial

Top 3

Human rhinovirus- 9%
Influenza virus- 6%
Strep pneumoniae- 5%
EPIC Study Pathogens- Continued

Mycoplasma pneumoniae, legionella pneumophila, and chlamydia pneumoniae combined to 4%

Staph aureus- 2%

Enterobacter and other gram negative enteric pathogens were 1%

Thought to be low due to exclusion of patients with known risk factors for these bacteria—recently hospitalized, severe immunosuppression, or nursing home residents
EPIC- Children

Among children hospitalized for pneumonia, a viral or bacterial pathogen was detected 81% of the time

1 or more viruses 66%, bacterial 15% of the time

The top 2 viruses were Respiratory Syncytial Virus (28%) and Human rhinovirus (27%). The other most common were Human Metapneumovirus, Influenza A and B, Parainfluenza, Adenovirus, and Coronavirus

Mycoplasma pneumoniae and Strep pneumoniae were the two most common bacterial causes of pneumonia
Bacterial Pathogens by the Ages

Strep pneumoniae is the most common bacterial pathogen of all ages

Younger patients and older patients have similar number of atypical organisms

Mycoplasma, Legionella, and Chlamydia

Due to the considerably larger numbers of older patients with pneumonia the proportion of atypical organisms is much higher in younger patients
Staph Aureus Pneumonia

Rates of Staph aureus pneumonia in CAP are relatively low at 2%

Interestingly, nearly ⅓ of patients hospitalized with severe CAP are treated with anti-MRSA therapy as empiric initial antibiotics

The clinical presentation overlaps heavily with typical Strep pneumo pneumonia

Patients with MRSA CAP had more severe clinical outcomes than those with pneumococcal CAP, including intensive care unit admission (86.7% vs 34.8%) and in-patient mortality (13.3% vs 4.4%)
Community Acquired MRSA

In past 10 years, a new variant of MRSA has emerged as a pulmonary pathogen.

Community-acquired MRSA (CA-MRSA) contains a cassette for resistance called SCCmec type IV and an exotoxin called PVL (panton valentine leukocidin)

This strain is more virulent, harder to treat, with a higher mortality than traditional MRSA

Now there is overlap between hospital and community acquired MRSA
You’ve decided to treat your patient with empiric antibiotics covering for typical and atypical organisms, what is best first line medication?

A. Macrolide or doxycycline
B. Beta lactam
C. Respiratory fluoroquinolone
You’ve decided to treat your patient with empiric antibiotics covering for typical and atypical organisms, what is best first line medication?

A. Macrolide or doxycycline
B. Beta lactam
C. Respiratory fluoroquinolone
Goals of Treatment

Choose empiric antibiotics that will cover the common causes of pneumonia

**Strep pneumoniae**

Beta lactams, respiratory fluoroquinolones, macrolides, and doxycycline all have good coverage

**Atypicals**

Respiratory fluoroquinolones, macrolides, and doxycycline all have good coverage
Treatment Guidelines: Outpatient

In previously healthy individuals with no recent antibiotic use in past 3 months and no major medical comorbidities

Macrolide

Doxycycline
Treatment Guidelines: Outpatient

Comorbid conditions: Chronic Heart, Lung, Liver, Kidney Disease, Diabetes, Alcoholism, Asplenia, Malignancies, Immunosuppressed Conditions or using medications which cause Immunosuppression

Respiratory Fluoroquinolone

or

Beta Lactam plus Macrolide
Macrolide Resistance

Other circumstances where you would jump to recommendation #2 for antibiotics are if you live in a place with a high prevalence of macrolide resistant Strep pneumoniae.

The increasing prevalence of macrolide resistance has raised concerns about its current usage in therapy.

As of 2012, the US as a whole had 34% macrolide resistance.
Community-Acquired Pneumonia (CAP)

Published: Clinical Infectious Diseases; 2007; 44: S27 - S72

"Community-Acquired Pneumonia in Adults: Guidelines for Management"

Improving the care of adult patients with community-acquired pneumonia (CAP) has been the focus of many different organizations, and several have developed guidelines for management of CAP. Two of the most widely referenced are those of the Infectious Diseases Society of America (IDSA) and the American Thoracic Society (ATS). In response to confusion regarding differences between their respective guidelines, the IDSA and the ATS convened a joint committee to develop a unified CAP guideline document. Link to full text guideline

*Projected Publication, Summer 2018
Last word on Macrolides

So although many pulmonologists have the suspicion that recommendations regarding macrolides may be changing soon...

There is a method to the madness

The goal is to discourage the use of respiratory fluoroquinolones in healthy patients with CAP to attempt to control the spread of fluoroquinolone resistance

The EPIC study confirmed that a large number of patients with pneumonia may actually have viral cause to the pneumonia
Treatment Guidelines: Inpatient

Inpatient, Non ICU

   Respiratory Fluoroquinolone

   Or

   Beta Lactam plus Macrolide

Inpatient, ICU

   Beta Lactam plus Either a Macrolide or Respiratory Fluoroquinolone

Never monotherapy
Which Fluoroquinolone?

Cipro has NO activity against Strep pneumoniae so should never be used as a single agent for treatment of CAP

Respiratory fluoroquinolones:

- Moxifloxacin
- Levofloxacin
- Gemifloxacin
Which Beta Lactam?

Outpatient, oral

High dose Amoxicillin

High dose Amoxicillin-clavulanate

In PCN-allergic, can use selected cephalosporins, though they are not preferred over the above agents (less in vitro activity against Strep pneumo)

Cefpodoxime

Cefuroxime
Which Beta Lactam?

Inpatient, Non-ICU
- Cefotaxime
- Ceftriaxone
- Ampicillin
- Ertapenem

Inpatient, ICU
- Cefotaxime
- Ceftriaxone
- Ampicillin-sulbactam
Antibiotic Stewardship

In hospitalized patients

We do check cultures more often than the outpatient setting

Plan to tailor antibiotic therapy for the appropriate organism

If patient is clinically improving by Day 3 on IV regimen, transition to an adequate PO therapy that could be continued at home

Hospitals which employ protocols which transition to po as soon as possible have shorter length of stay
Duration of Antibiotics

Patients with CAP should be treated for a minimum of 5 days

Continue treatment until afebrile for 48-72 hours

Have no signs of clinical instability

Classical treatment for CAP has been 7-10 days

Longer treatment courses do not lead to better outcomes

Certain pathogens or concurrent extrapulmonary sites of infection may warrant a longer duration of therapy (ie MRSA- 14 days)
Other Likely Changes to CAP Guidelines

We know that a major change from the HAP/VAP Guidelines will affect the CAP guidelines

Previously there was an entity known as HCAP- a term still widely used today

IDSA/ATS wants to do away with that terminology and plan to address “HCAP” in the CAP guidelines

Will now refer to it as special populations who have

“high risk for pseudomonas or MRSA”
**Risks for Enterobacteriaceae or Pseudomonas**

- Chronic oral steroid use
- Chronic bronchopulmonary disease
- Alcoholism
- Frequent antibiotic use
- Recent Hospitalization/Exposure to healthcare setting

*Pt’s without these risk factors have virtually zero chance of having pseudomonas*
Treatment Failure/Nonresponding Pneumonia

6-15% of patients with CAP will fail the initial treatment regimen

Mortality rate for those with treatment failure is higher than responders— as high as 27-49%

As many as 45% of patients who are ultimately treated in ICU with CAP are initially admitted to general medical floor and transferred due to deterioration

It is thought that inadequate host response rather than inappropriate antimicrobials therapy, resistant organisms, or unexpected microorganisms
Patterns and Etiologies of Treatment Failure

Failure to Improve

Early (<72 hours): Considered normal response

Delayed:

- Resistant organism
- Parapneumonic effusion/empyema
- Nosocomial superpathogen
- Noninfectious: Misdiagnosis or Drug fever
Patterns and Etiologies of Treatment Failure

Deterioration

Early (<72 hours):
- Severity
- Resistant organism
- Infection spread
- Inaccurate diagnosis

Delayed:
- Nosocomial superinfection
- Exacerbation of comorbid illness
- Intercurrent comorbid disease
Treatment Failure Options

Transfer to a higher level of care

Further diagnostic testing

Repeat blood and sputum cultures or invasive sampling via bronchoscopy

Chest CT can search for PE, pleural effusion, or abscess

Thoracentesis if there is a significant sized pleural effusion

Escalation or change of treatment regimen
Pneumonia in the Elderly

Sir William Osler wrote: “In old age, pneumonia may be latent, coming on without the chill, the cough and expectoration are slight, the physical signs are ill-defined and changeable, and the constitutional symptoms out of all proportion. Importantly, fever may be absent”

Elderly patients may present with confusion, may be too weak to cough

Although elderly patients may not have classic symptoms, most have at least one respiratory symptom
Pneumonia in the Elderly

Increased risk of in-hospital mortality in elderly patients hospitalized with hip fracture, COPD, and CVA who have concurrent pneumonia

Pay special attention to nutrition, swallowing, early mobilization, and stabilization of comorbid conditions in elderly patients

   Early mobilization out of bed to chair and ambulating 20 minutes in hallway day 1 is associated with shortened hospital length of stay
Long Term Prognosis

Patients hospitalized with pneumonia have a worse prognosis than age matched cohorts hospitalized for other reasons.

Thought is that pneumonia activates an inflammatory cascade which may portend to other comorbid conditions like cardiac events.
Cough: Defense Mechanism or Symptom

General rule is that if the cough is productive, it should not be suppressed.

Expectorant added in the case of thick sputum.

There does come a time when the cough itself becomes the biggest complaint.

Cough side effects including: insomnia, exhaustion, musculoskeletal pain.

Judicious use of cough suppressant after 3 days of appropriate antibiotic therapy and signs of clinical improvement especially once sputum purulence has improved.
Vaccination

2015 Advisory Committee recommends:

All adults age 65 and older receive both the Prevnar (PCV13) and the Pneumovax (PPSV23)

Preferably Prevnar first followed by Pneumovax 12 months later

If Pneumovax was already given, the Prevnar should be given 12 months later, followed by the Pneumovax again (assuming 5 years have passed since the Pneumovax)
Vaccination

Indications for Pneumovax prior to age 65

- Diabetes
- Chronic heart or lung disease
- Tobacco Use
- Alcoholism
- Chronic liver disease or cirrhosis
- CSF leaks
- Cochlear implants
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