Pneumonia and Lung Infections

Severe CAP criteria and care, steroids, Legionella and influenza, VAP sampling and empiric therapy, aspiration, Pneumocystis, latent TB, and inhaled anti-infectives

ICU Basics
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SEVERE CAP: ONE MAJOR OR THREE MINOR CRITERIA

ATS/IDSA 2019. Severe community-acquired pneumonia (CAP) is one major criterion or three or more minor criteria.

TYPE	CRITERION
Major	Septic shock needing a vasopressor
Major	Respiratory failure needing mechanical ventilation
Minor	Respiratory rate 30/min or more
Minor	PaO_2/FiO_2 250 or less
Minor	Multilobar infiltrates
Minor	Confusion or disorientation
Minor	BUN 20 mg/dL or more
Minor	WBC below 4,000/µL (from the infection, not chemotherapy)
Minor	Platelets below 100,000/µL
Minor	Core temperature below 36 °C
Minor	Hypotension needing aggressive fluid resuscitation

- A vasopressor or a ventilator means direct admission to the ICU.
- With neither, count the minor criteria and add clinical judgment: three or more is severe CAP and points to a higher level of care.
- PaO_2/FiO_2 is the PaO_2 divided by the FiO_2 as a decimal: 70 mm Hg on FiO_2 0.50 is 140.

SEVERE CAP: TESTS AND TREATMENT

STEP	WHAT THE GUIDELINES SAY
Cultures	Blood cultures and a sputum or tracheal aspirate Gram stain and culture, before antibiotics
Urinary antigens	Pneumococcal and Legionella in severe CAP; Legionella also after recent travel or in an outbreak
Legionella	The antigen finds serogroup 1 only: add culture or PCR of lower respiratory secretions
Antibiotics	β-lactam plus a macrolide, or β-lactam plus a respiratory fluoroquinolone; do not wait on procalcitonin
MRSA, Pseudomonas	Cover only with locally validated risk factors; stop if cultures do not grow them
Influenza positive	Oseltamivir on any day of illness, and keep the antibacterial drugs at the start
Corticosteroid	Severe CAP, immunocompetent, not influenza: hydrocortisone 200 mg/day. Not for nonsevere CAP
Follow-up film	Not routine when symptoms resolve within 5–7 days

VENTILATOR-ASSOCIATED PNEUMONIA (VAP)

- Pneumonia arising more than 48 hours after intubation. Start treatment on clinical criteria alone, not procalcitonin or a score.
- Sample with an endotracheal aspirate for semiquantitative culture; bronchoscopic lavage, protected brush and mini-lavage have not improved outcomes.
- Every empiric regimen covers Staphylococcus aureus, Pseudomonas aeruginosa and other gram-negative bacilli.
- Resistance risk factor or high unit resistance: add an MRSA drug (vancomycin or linezolid) and a second antipseudomonal drug from another class.
- Risk factors: IV antibiotics in the past 90 days, septic shock, ARDS before VAP, 5 or more hospital days before VAP, acute renal replacement therapy.
- Narrow to the culture result and treat for 7 days.

ASPIRATION, PNEUMOCYSTIS AND LATENT TB

PROBLEM	RECOGNIZE	DO
Aspiration pneumonitis	Witnessed aspiration of gastric contents; immediate hypoxemia, wheeze, crackles	Suction, oxygen, ventilatory support; bronchoscopy for solid material; no routine antibiotics or steroids
Aspiration pneumonia	Often unwitnessed; progressive, with fever and an infiltrate in a dependent segment	Antibiotics; anaerobic coverage only for abscess or empyema
Pneumocystis pneumonia	Immunocompromised; dry cough and exertional dyspnea over days to weeks; desaturation on walking; ground-glass on CT	Induced sputum, then lavage; TMP-SMX for 21 days; prednisone if room-air PaO_2 is under 70 mm Hg or the A–a gradient is 35 mm Hg or more
Latent TB infection	Positive blood test or skin test, no symptoms, normal radiograph	Not contagious, no isolation; treat with a 3 to 4 month rifamycin-based regimen

INHALED ANTI-INFECTIVES AND INFLUENZA

DRUG	HOW IT IS GIVEN	WATCH FOR
Amikacin liposome (Arikayce)	One 590 mg vial once daily, Lamira nebulizer only; refractory MAC lung disease, with other drugs	Boxed warning: hypersensitivity pneumonitis (stop the drug), bronchospasm, hemoptysis, exacerbation
Zanamivir (Relenza)	Dry powder by Diskhaler: 10 mg (2 inhalations) twice daily for 5 days	Never nebulize it or give it through a ventilator; bronchospasm; not for asthma or COPD
Oseltamivir	75 mg twice daily by mouth or feeding tube	The drug for hospitalized influenza, even after 48 hours of illness

EXAM PEARLS

EXAM TIP No vasopressor and no ventilator can still be severe CAP: count the minor criteria. Influenza plus a lobar infiltrate: antibiotics and oseltamivir together. Severe CAP after travel: Legionella urinary antigen plus a respiratory culture or PCR. Witnessed aspiration: suction and oxygen first, not antibiotics. A PaO_2 above 70 mm Hg in Pneumocystis: calculate the A–a gradient before saying no to prednisone.

Sources (22) are listed with links at icubasics.com/sheets/rt-pneumonia-lung-infections.html. For education and exam preparation only. Not medical advice; follow current guidelines and your institution's protocols. ICU Basics is an independent study aid not affiliated with any certifying body.