POST-ACUTE & LONG-TERM CARE MEDICINE

Pneumonia in Post-Acute and Long-Term Care

A 5-Year Evidence Update

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FMDA Best Cares Practice 2026 Annual Conference • November 1, 2026

Disclosures & Objectives

Diagnose

Apply updated diagnostic criteria and emerging tools (POCUS, CRP)

Treat

Select goal- and risk-concordant antibiotics in the post-HCAP era

Prevent

Deploy current vaccine and prevention strategies

Integrate

Bring goals-of-care and hospital-transfer decisions into every step

- Disclosures: None

Why This Matters in PALTC

~4%

of community-onset pneumonia is caused by MDR organisms

- Leading cause of hospitalization, functional decline, and death in PALTC
- S. pneumoniae and respiratory viruses remain the dominant pathogens
- MDROs are uncommon — broad-spectrum therapy is usually unnecessary

Roadmap

- Diagnosis
- Population
- Treatment
- Aspiration
- Viral Infections
- Prevention

SECTION 1

Diagnosis

DIAGNOSIS

Atypical Presentation

- Dyspnea, acute confusion, and functional decline often outweigh fever/cough
- Tachypnea (>25/min) is one of the most reliable early signs
- Fever is absent in a large minority of confirmed cases — don't anchor on it

Two Criteria Sets, Two Purposes

Revised McGeer

- Retrospective surveillance
- Tracks infection rates over time
- Reaffirmed by 2025 multisociety guidance

Loeb Minimum Criteria

- Bedside threshold to start antibiotics
- A real-time treatment decision
- Not interchangeable with McGeer

- Mixing the two causes over-treatment — a high-yield stewardship distinction

DIAGNOSIS

Two Criteria Sets, Two Purposes

Table 3. Respiratory Tract Infection (RTI) Surveillance Definitions

Syndrome	Criteria	Selected Comments*
Common cold syndrome or pharyngitis	***Must fulfill at least 2 criteria.*** □ Runny nose or sneezing □ Stuffy nose or nasal congestion □ Sore throat, hoarseness, or difficulty in swallowing □ Dry cough □ Swollen or tender glands in the neck (cervical lymphadenopathy)	• Fever may or may not be present • Symptoms must be new and not attributable to allergies
Influenza-like illness	***Must fulfill both 1 AND 2.*** □ 1. Fever □ 2. At least three of the following criteria □ Chills □ New headache or eye pain □ Myalgias or body aches □ Malaise or loss of appetite □ Sore throat □ New or increased dry cough	• If both criteria for influenza-like illness and another upper or lower RTI are met, only record diagnosis of influenza-like illness
Pneumonia	***Must fulfill 1, 2, AND 3.*** □ 1. Chest X-ray with pneumonia or a new infiltrate □ 2. At least one of the following criteria □ New or increased cough □ New or increased sputum production □ O_2 sat <94% on room air, or >3% decrease from baseline O_2 sat □ New or changed lung exam abnormalities □ Pleuritic chest pain □ Respiratory rate ≥25 breaths/min □ 3. At least one of the following criteria □ Fever □ Leukocytosis □ Acute mental status change □ Acute functional decline	• Conditions mimicking the presentation of RTI (e.g., congestive heart failure or interstitial lung diseases) should be excluded
Bronchitis or Tracheo-bronchitis	***Must fulfill 1, 2, AND 3.*** □ 1. Chest X-ray not performed, or negative for pneumonia or a new infiltrate □ 2. At least two of the following criteria □ New or increased cough □ New or increased sputum production □ O_2 sat <94% on room air, or >3% decrease from baseline O_2 sat □ New or changed lung exam abnormalities □ Pleuritic chest pain □ Respiratory rate >25 breaths/min □ 3. At least one of the following criteria □ Fever □ Leukocytosis □ Acute mental status change □ Acute functional decline	• Conditions mimicking the presentation of RTI (e.g., congestive heart failure or interstitial lung diseases) should be excluded

□ RTI criteria met **□ RTI criteria NOT met**

Suspected Infection Syndrome	Minimum Criteria for Starting Antibiotic Therapy
Urinary tract infection *without catheter*	Either one of the following criteria □ Acute dysuria, OR □ Temp >37.9 °C (100 °F) or 1.5 °C (2.4 °F) above baseline, AND ≥1 of the following new or worsening symptoms □ Urgency □ Frequency □ Suprapubic pain □ Gross hematuria □ Urinary incontinence □ Costovertebral angle tenderness
with catheter	At least one of the following criteria □ Rigors □ Temp >37.9 °C (100 °F) or 1.5 °C (2.4 °F) above baseline □ New onset delirium □ New costovertebral angle tenderness
Note: *Residents with intermittent catheterization or condom catheter should be categorized as 'without catheter'* *Urine culture should be sent prior to starting antibiotics* *Antibiotics should not be started for cloudy or foul smelling urine*	
Lower respiratory tract infection *with temp >38.9 °C (102 °F)*	At least one of the following criteria □ Productive cough □ Respiratory rate >25 breaths / minute
with temp >37.9 °C (100 °F) or 1.5 °C (2.4 °F) above baseline	Both of the following criteria □ Cough, AND □ At least one of the following criteria □ Pulse >100 beats / minutes □ Delirium □ Rigors □ Respiratory rate >25 breaths / minute
afebrile with COPD and >65 years old	Both of the following criteria □ New or increased cough □ Purulent sputum production
afebrile without COPD	All of the following criteria □ New cough □ Purulent sputum production □ At least one of the following criteria □ Delirium □ Respiratory rate >25 breaths / minute
with new infiltrate on chest X-ray consistent with pneumonia	At least one of the following criteria □ Productive cough □ Temp >37.9 °C (100 °F) or 1.5 °C (2.4 °F) above baseline □ Respiratory rate >25 breaths / minute
Note: *Consider ordering chest X-ray and CBC with differential for febrile residents with cough and any of these criteria (HR >100, worsening mental status, or rigors)* *Antibiotics should not be used for up to 24 h after large-volume aspiration in those without COPD but with temp ≤38.9ºC (102 ºF) and non-productive cough*	
Skin and soft-tissue infection	Either one of the following criteria □ New or increasing purulent drainage, OR □ At least two of the following criteria □ Redness (erythema) □ Temp >37.9 °C (100 °F) or 1.5 °C (2.4 °F) above baseline □ Tenderness □ New or increasing swelling at affected site □ Warmth
Note: *These criteria do not apply to residents with burns* *Surgical consultation and hospitalization are required for certain soft-tissue infections (e.g., necrotizing fasciitis or gas gangrene)*	
Fever where the Focus of Infection is Unknown	Both of the following criteria □ Temp >37.9 °C (100 °F) or 1.5 °C (2.4 °F) above baseline, AND □ At least one of the following criteria □ Rigors □ Delirium
Note: *Antibiotic should not be started in residents with fever and altered mental status that does not meet delirium criteria (e.g., reduced functional activities, withdrawal, loss of appetite)*	

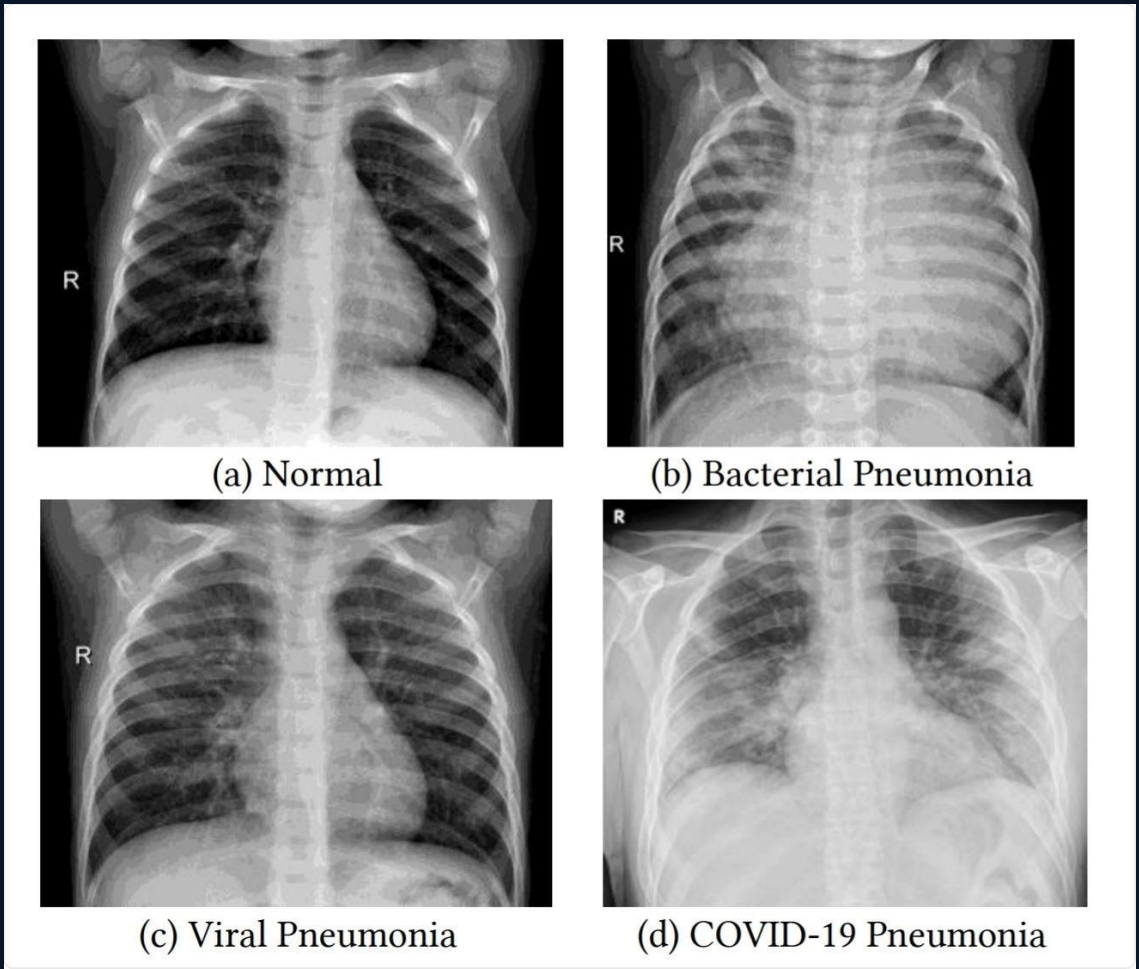
Nonlocalizing Signs (SHEA 2022)

Falls, confusion, and functional decline are not reliable sole indicators of infection.

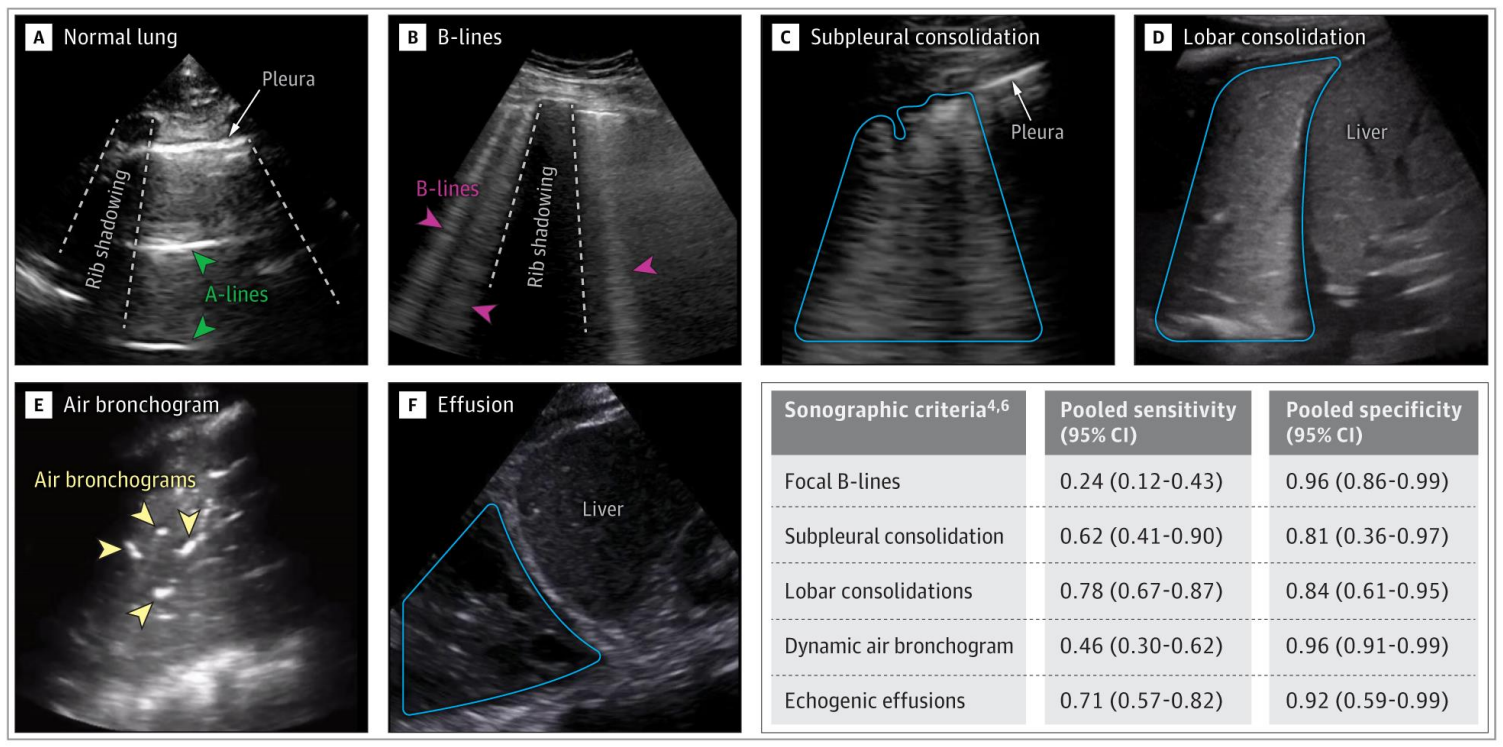
- Consider noninfectious causes first
- Active monitoring is a legitimate, evidence-based order — not inaction

DIAGNOSIS

Imaging: Chest Radiography Limits



Lung Ultrasound (POCUS)



Sonographic criteria[4,6]	Pooled sensitivity (95% CI)	Pooled specificity (95% CI)
Focal B-lines	0.24 (0.12-0.43)	0.96 (0.86-0.99)
Subpleural consolidation	0.62 (0.41-0.90)	0.81 (0.36-0.97)
Lobar consolidations	0.78 (0.67-0.87)	0.84 (0.61-0.95)
Dynamic air bronchogram	0.46 (0.30-0.62)	0.96 (0.91-0.99)
Echogenic effusions	0.71 (0.57-0.82)	0.92 (0.59-0.99)

- CHEST meta-analysis: overall AUC ~0.93 for pneumonia
- Feasible in PALTC, but few studies — training and 24/7 access are barriers

Biomarkers: CRP Point-of-Care

↓29%

antibiotic prescribing for LRTI with CRP point-of-care testing (UPCARE)

- 47% vs 82% initial-consult prescribing, without more hospitalization
- Cutoffs: <20 / 20–60 / >60 mg/L
- 2019 ATS/IDSA: don't use procalcitonin to withhold initial antibiotics

Diagnosis Summary

Think atypical

Confusion, decline, tachypnea often outweigh fever/cough

Separate the criteria

McGeer for surveillance; Loeb to start treatment

Don't treat reflexively

Nonlocalizing signs warrant monitoring, not panculture

Use the emerging tools

CRP POCT and, increasingly, lung ultrasound

SECTION 2

Short-Stay vs Long-Stay

Two Populations, One Backbone

Short-Stay Post-Acute

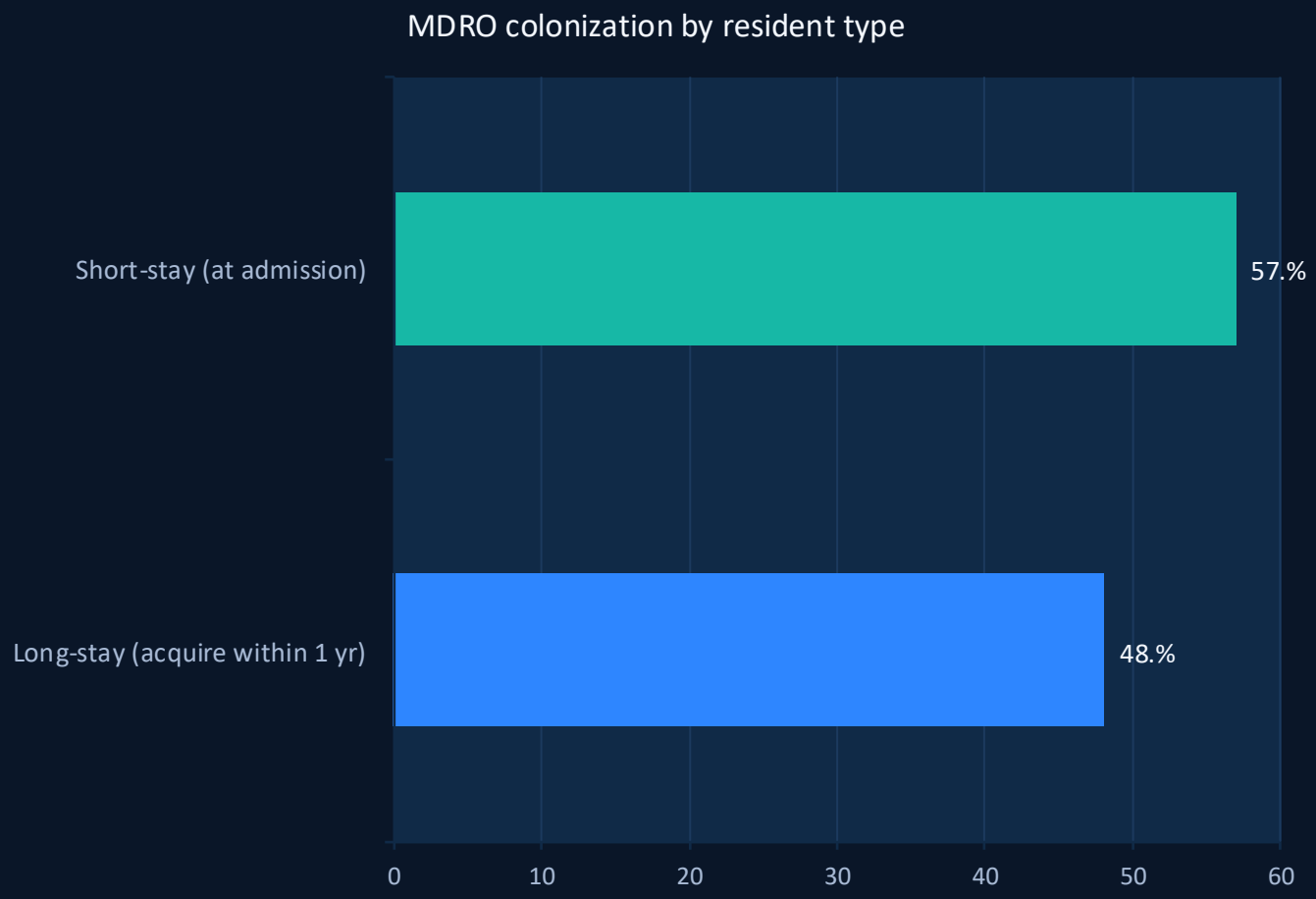
- Restorative, discharge-home goals
- Hospital-imported MDRO risk
- Recently hospitalized / in rehab

Long-Stay Chronic

- Frailty, often advanced dementia
- Comfort-oriented goals
- MDROs accumulate gradually

- Same CAP backbone: intensity, thresholds, and disposition diverge

Colonization and MDR Risk



- Short-stay: MRSA 16%, VRE 33%, resistant GNB 32% — hospital-imported
- Long-stay: gradual accumulation, tied to quinolone/cephalosporin exposure
- Colonization is not infection — the central diagnostic trap

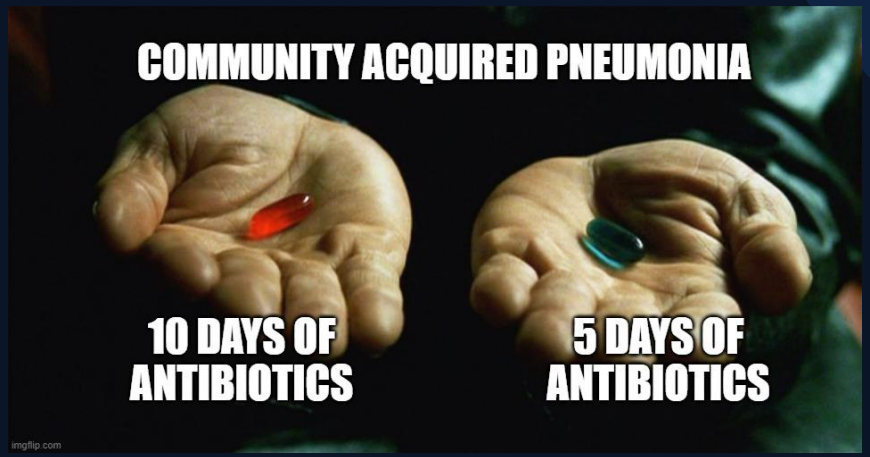
Side-by-Side Management

Domain	Short-Stay Post-Acute	Long-Stay Chronic
Primary goal	Restorative; discharge home	Comfort (>90% of proxies)
MDRO colonization	High at admission (~57%)	Accumulates over time (~48% at 1 yr)
Dominant phenotype	Bacterial CAP ± MDR risk factors	Aspiration pneumonia; viral
Empiric antibiotics	CAP regimen; broaden for validated risk	CAP regimen; amox-clav if aspiration
Route / resources	IV/PICC often available	Oral preferred; SC ceftriaxone, hypodermoclysis
Hospitalization	Lower threshold; avoid readmission	Higher threshold; DNH orders
Diagnostic workup	Full (CXR, cultures, MRSA PCR)	Minimal if comfort-only
6-month mortality	Variable; ~21% 30-day readmission	~50% after an episode
Key modifiable lever	48h de-escalation; med review	DNH orders; structured ACP

Bottom line: intensity and disposition are set by trajectory and goals, not the "nursing home" label

SECTION 3

Treatment: Antibiotics & Stewardship



The Retirement of HCAP

HCAP is retired — treat most residents as CAP.

- 2016 HAP/VAP and 2019 ATS/IDSA CAP guidelines abandoned HCAP
- 2026 CHEST review: S. pneumoniae dominant, MDROs uncommon, yet broad-spectrum overused

Risk-Based Empiric Therapy

- Treat as CAP; add MRSA/Pseudomonas coverage only for validated individual risk factors
- Prior respiratory isolation, recent parenteral antibiotics, or recent hospitalization
- Supported by local microbiology; de-escalate at 48 hours if cultures are negative

Empiric Regimen Table

Clinical Scenario	Preferred Empiric Regimen
Mild–moderate, treat in facility	Amoxicillin-clavulanate or cefpodoxime; doxycycline or respiratory FQ alt.
Severe / failing / hospitalized, no MDR risk	Ceftriaxone + azithromycin, or respiratory fluoroquinolone
Validated MRSA risk factor	Add vancomycin or linezolid
Validated Pseudomonas / resistant GNR risk	Cefepime or piperacillin-tazobactam

Fluoroquinolone caution: tendinopathy, neuropathy, aortic events, C. difficile — shifts the benefit–harm balance in frail elders

The DRIP Score

≥4

DRIP score threshold to broaden empiric antibiotics

Major Risk Factors		
Antibiotic use within 60 days	No 0	Yes +2
Long term care resident Not including assisted living or group home facilities	No 0	Yes +2
Tube feeding NG, nasojejunal, or PEG	No 0	Yes +2
Prior drug-resistant pneumonia diagnosis within 1 year	No 0	Yes +2

Minor Risk Factors		
Hospitalization within 60 days	No 0	Yes +1
Chronic pulmonary disease	No 0	Yes +1
Poor functional status Karnofsky Performance Status <70 or non-ambulatory status	No 0	Yes +1
H2 blocker or PPI within 14 days	No 0	Yes +1
Active wound care at time of admission	No 0	Yes +1
MRSA colonization within 1 year	No 0	Yes +1

Duration: Shorter Is Better

3 days

β-lactam stop, noninferior to 8 days (PTC trial, stable CAP)

- 2019 guideline: minimum 5 days, guided by clinical stability
- PTC: day-15 cure 77% vs 68%; no mortality difference (2% vs 1%)
- PALTC: 5–7 days for most; 7 days for proven MRSA/Pseudomonas

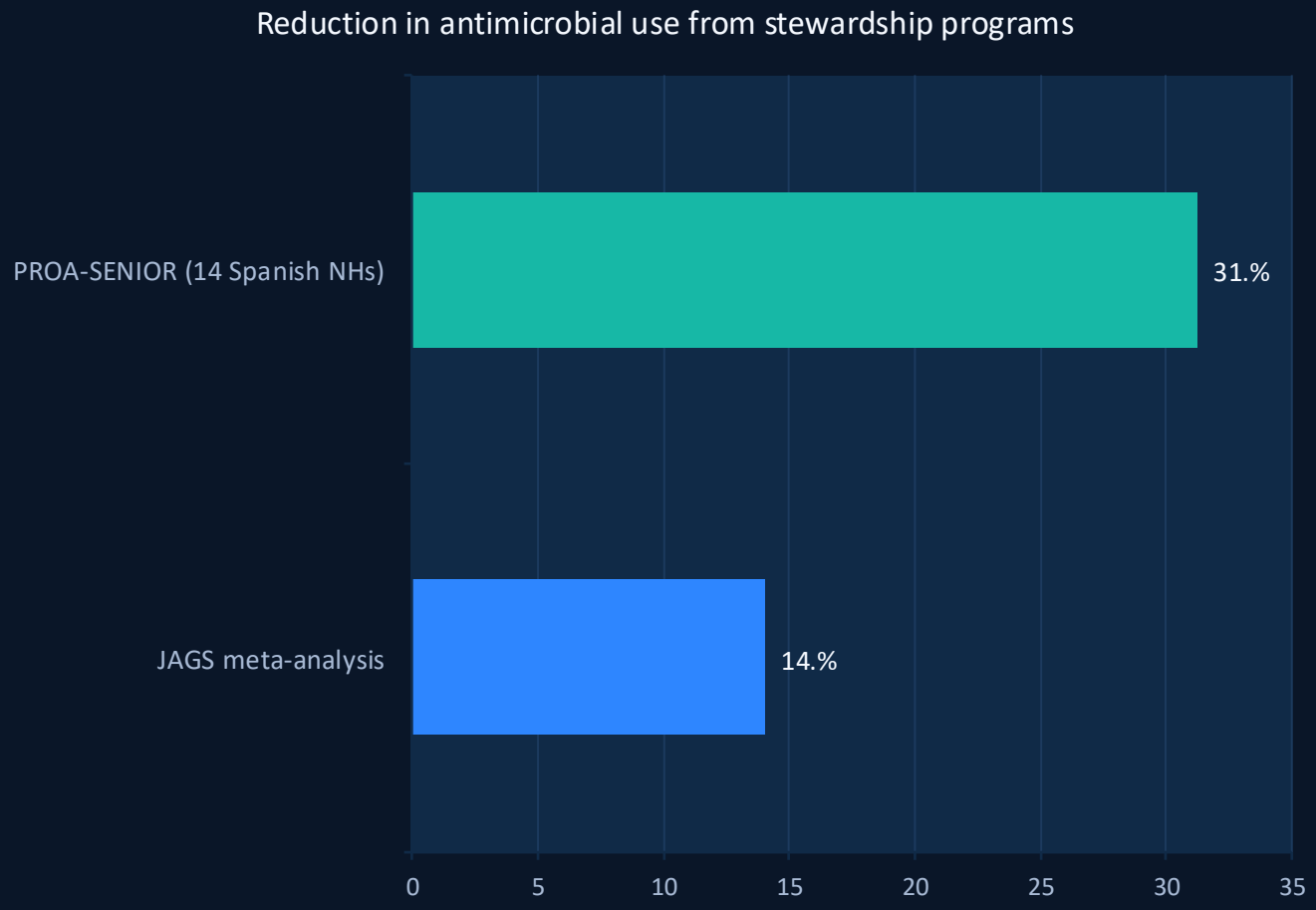
Adjunctive Corticosteroids in Severe CAP

RR 0.67

33% relative reduction in 30-day mortality — geriatric meta-analysis (Ali 2025)

- CAPE COD: hydrocortisone cut 28-day mortality 11.9%→6.2% in severe CAP
- Benefit confined to severe (ICU-level) CAP — not non-severe disease or influenza
- Hyperglycemia is the consistent harm; ESCAPe and REMAP-CAP did not confirm benefit

Antimicrobial Stewardship Framework



- CMS mandates ASPs in all LTC facilities; CDC Core Elements provide the framework
- PROA-SENIOR also cut quinolone use 52.2% and MDRO prevalence 24.7%→17.4%

The Antibiotic Time-Out

A structured 48–72 hour reassessment: narrow, stop, or switch to oral.

- Are cultures back? Is the resident clinically stable? Define a stop date.

Treatment Setting & Resources

- Most pneumonia is treatable in-facility regardless of resident type
- Short-stay: IV/PICC access often available for parenteral therapy on-site
- Long-stay: oral mainstay; SC ceftriaxone and hypodermoclysis are feasible alternatives
- Loeb pathway and staff IV-training programs increase in-facility treatment without excess mortality

SECTION 4

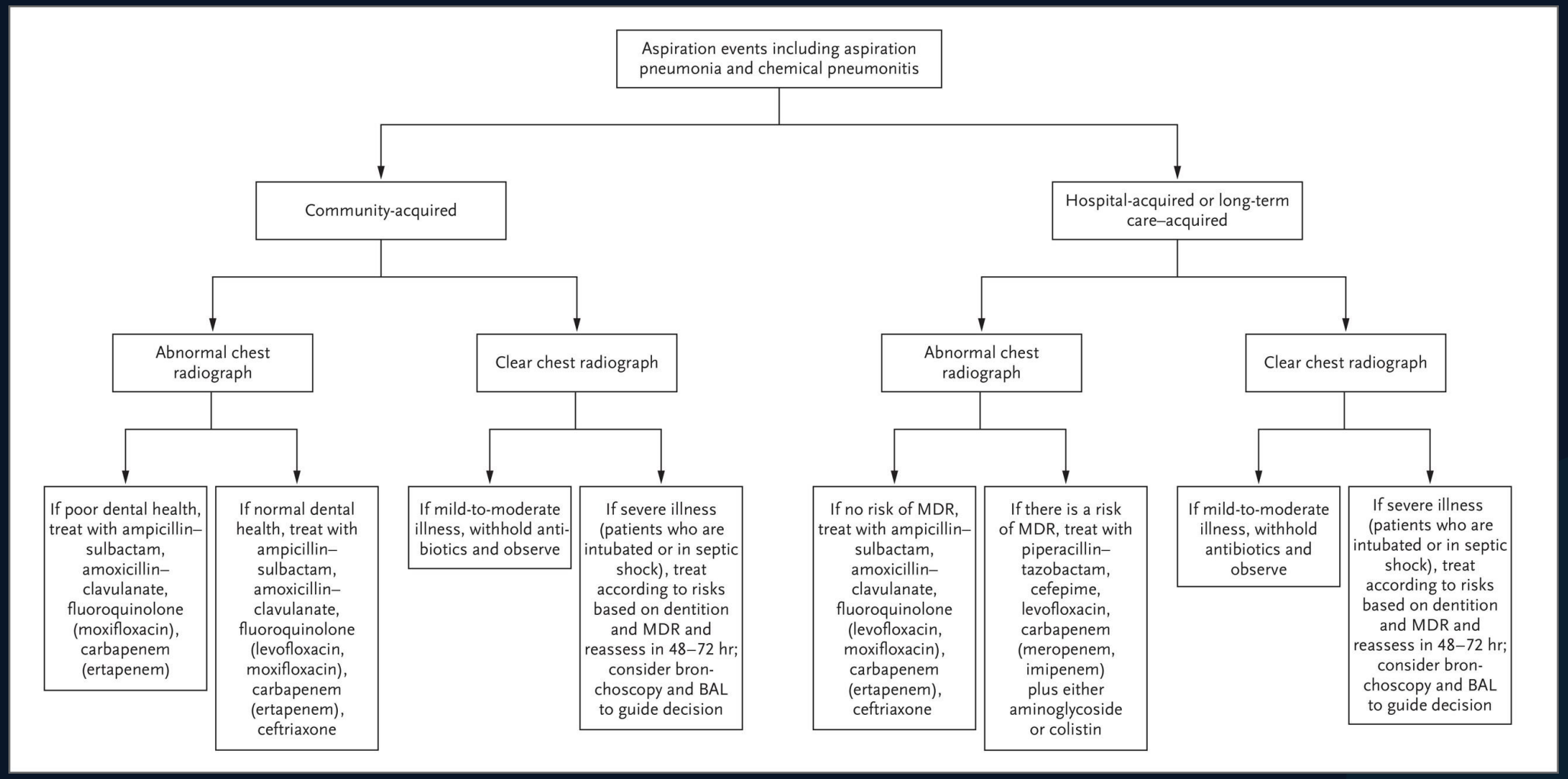
Aspiration & Dysphagia

Pneumonitis vs Pneumonia

Aspiration pneumonitis is chemical and often self-limited; antibiotics are not always needed.

- Distinguish from bacterial aspiration pneumonia using site-of-acquisition and severity
- Mild-moderate, abnormal film: withhold antibiotics and reassess at 48 hours

Pneumonitis vs Pneumonia



The Anaerobic-Coverage Reversal

0

mortality benefit from added anaerobic coverage (2024 CHEST cohort, n≈ 4,000)

- 2019 ATS/IDSA: no routine anaerobic coverage unless abscess/empyema
- Extended coverage caused significantly more C. difficile colitis
- Reserve for abscess, empyema, or necrotizing pneumonia with poor dentition

Dysphagia: Thickened Liquids

Thickened liquids reduce aspiration on videofluoroscopy but have not improved clinical outcomes.

- Propensity-matched cohort in hospitalized dementia: no mortality benefit, more respiratory complications

Feeding Tubes & Prevention Bundles

31%

reduction in non-ventilator HAP with a 5-component prevention bundle (Wolfensberger)

- Feeding tubes in advanced dementia: not recommended — no survival, nutrition, or pressure-ulcer benefit
- AGS/Choosing Wisely favor careful hand feeding instead
- Bundle: oral care, dysphagia screening, mobilization, PPI review, respiratory therapy

SECTION 5

Viral Respiratory Infections

Viral Testing Capacity

- Influenza, SARS-CoV-2, RSV, and hMPV cause a large share of PALTC respiratory illness
- 2025 multisociety guidance recommends point-of-care testing capacity
- 2026 cluster RCT: on-site multiplex PCR didn't reduce outbreak size but cut ED transfers and sped antiviral start by ~2.5 days

COVID-19 Treatment

~18%

of NH COVID-19 cases received any antiviral through 2022

- 2025 IDSA: nirmatrelvir-ritonavir first-line for high-risk; remdesivir (3-day IV) alternative
- Molnupiravir last-line; 41% of facilities never treated anyone
- Ritonavir drug interactions and inability to crush tablets are key practical barriers

Influenza Treatment & Outbreak Prophylaxis

Prophylaxis to ≥70% of residents within 2 days of outbreak detection reduces hospitalization.

- Oseltamivir first-line for treatment and outbreak chemoprophylaxis
- Treat symptomatic; prophylax all others regardless of vaccination status; continue ≥14 days

RSV & hMPV

RSV is now a major PALTC pathogen — with no approved adult antiviral.

- Prevention via vaccination is the only lever

SECTION 6

Prevention & Vaccination

Vaccines: Highest-Yield Intervention

Vaccination is the single highest-yield intervention in PALTC pneumonia.

- Best evidence, lowest risk, of any intervention in this talk

Pneumococcal Vaccination

≥50

new ACIP age threshold for PCV-naïve adults (2024)

- Single dose of PCV20 or PCV21 (or PCV15→PPSV23) covers naïve adults
- PCV20/PCV21 recipients need no further pneumococcal doses

Influenza Vaccination

24%

greater relative efficacy of high-dose vs standard-dose influenza vaccine

- ACIP preferentially recommends enhanced (high-dose/adjuvanted/recombinant) vaccines ≥65
- Gravenstein cluster-RCT, 823 US nursing homes: fewer respiratory and pneumonia-related hospitalizations with high-dose

RSV Vaccination

73%

VE against RSV hospitalization in NH residents (2026 Medicare study)

- ACIP: all adults ≥75; 50–74 at increased risk, explicitly including NH residence
- 56% VE against RSV death; strongest protection in long-stay residents

COVID-19 Vaccination & Oral Care

60%

reduction in non-ventilator HAP with enhanced oral care (HAPPEN trial)

- Annual COVID vaccine + additional dose for ≥65 and immunocompromised residents
- 2024 JAMA IM meta-analysis: daily toothbrushing reduced hospital-acquired pneumonia
- Present HAPPEN and the nvHAP bundle as bundle-ready for PALTC — not yet NH-proven

Prevention Summary

Vaccinate

Pneumococcal ≥50; enhanced flu ≥65; RSV ≥75/at-risk; annual COVID

Daily oral care

Low-cost, low-risk mechanical oral care

nvHAP bundle

Oral care, dysphagia screening, mobilization, PPI review, respiratory therapy

Dysphagia-aware feeding

Careful hand feeding over thickened liquids or feeding tubes

SECTION 7

Goals of Care, Hospitalization & Palliation

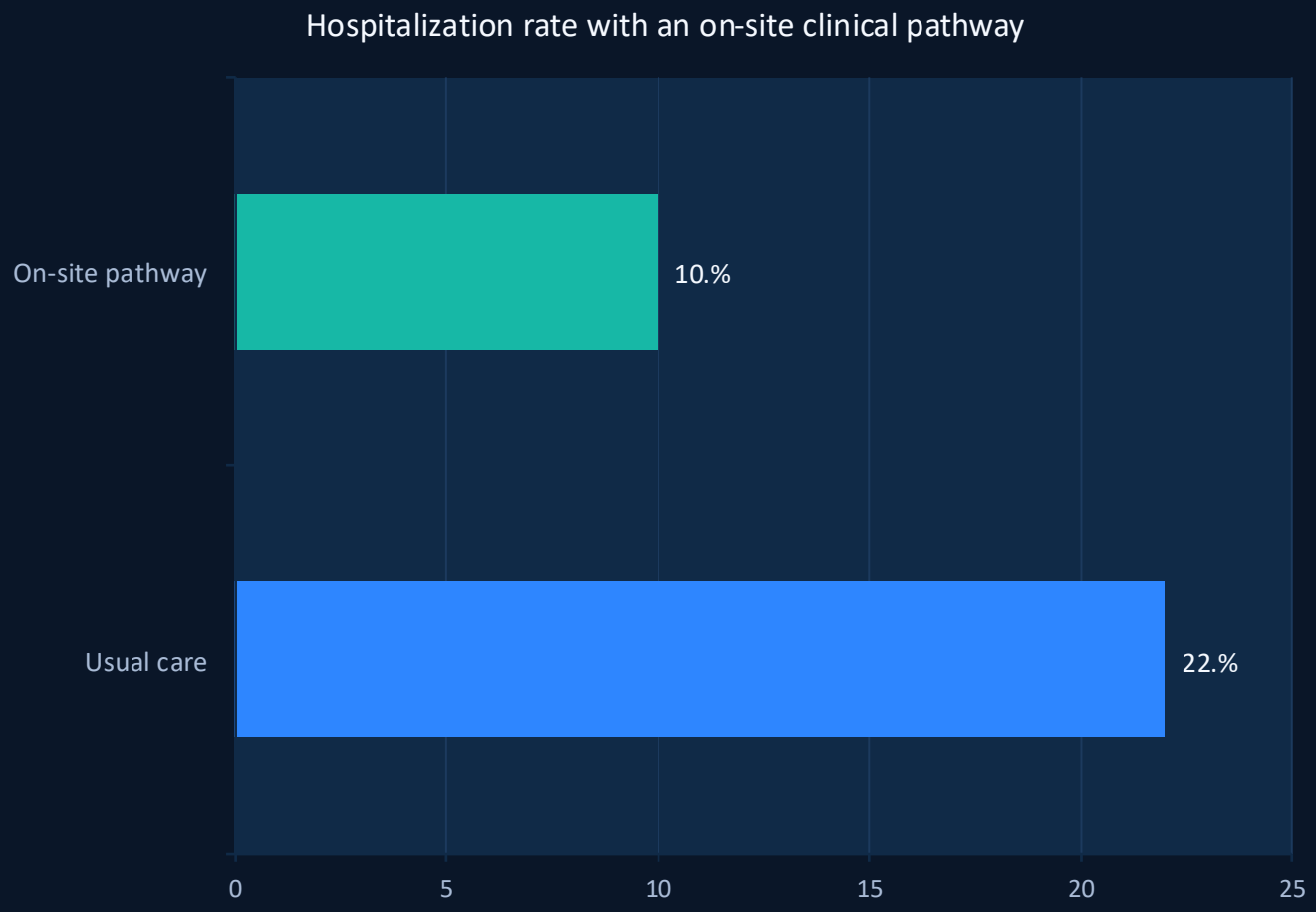
Pneumonia as a Sentinel Event

47%

6-month mortality after a pneumonia episode in advanced dementia (CASCADE)

- Advanced dementia is comparable to metastatic cancer in trajectory
- Pneumonia is a marker of the terminal trajectory, not just an infection

Treat In-Facility vs Hospitalize



- No difference in mortality or quality of life, at lower cost (Loeb cluster-RCT)
- 89.9% of hospitalized NH residents had severe disability or death — incl. 53% with no baseline ADL limits

Antibiotics at End of Life

Antibiotics may prolong survival — but do not clearly improve, and may worsen, comfort.

- ~273 days average prolongation in CASCADE; mortality didn't differ by route (oral/IM/IV)
- Choose the least burdensome route — route doesn't change survival

Symptom-Focused Management

- Opioids are first-line for dyspnea
- Routine oxygen-saturation targeting is de-emphasized
- Hypoxemia often does not explain dyspnea in this population

Advance Care Planning & Transfer Decisions

↓50%

hospital transfers with the Hanson goals-of-care decision aid

- DNH orders are the strongest modifiable factor
- PROVEN and INTERACT: no ITT effect — fidelity of implementation is the limiting factor
- National transfer rates fell ~56%→45% for advanced dementia, without rising mortality

The TRAIN-AD Algorithm

TRAIN-AD integrates goals-of-care assessment with minimal (Loeb) criteria for antibiotic initiation.

- A ready-made framework for the long-stay approach in advanced dementia

SECTION 8

Integration & Close

The Integrated Decision Tree

1. **Entry gate** — *Loeb criteria to start antibiotics; avoid nonlocalizing-sign reflexes*
2. **Resident type & goals pivot** — *Short- vs long-stay; comfort/DNH path splits to palliative management*
3. **DRIP-based antibiotic selection** — *Treat as CAP; ≥4 broadens; short course; no routine anaerobes; 48h time-out*
4. **Disposition** — *Treat-in-place by default (SC ceftriaxone/hypodermoclysis) vs goal-concordant transfer*

DRIP OR 0.62 • Loeb 22%→10% • ~50% 6-month mortality in advanced dementia

Current US Guidance at a Glance

Domain	Current US Position
Classification	HCAP abandoned; treat as CAP with individual MRSA/Pseudomonas risk assessment
Duration	Minimum 5 days, guided by stability; 7 days if MRSA/Pseudomonas
Aspiration	No routine anaerobic coverage unless abscess/empyema
Feeding tubes	Not recommended in advanced dementia; careful hand feeding
Stewardship	CMS-mandated ASP; CDC Core Elements; audit-feedback, time-outs
Pneumococcal	PCV20 or PCV21 (or PCV15→PPSV23) for adults ≥50
Influenza	Enhanced (high-dose/adjuvanted/recombinant) preferred ≥65
RSV	All ≥75; 50–74 at increased risk, incl. NH residence
COVID-19	Nirmatrelvir-ritonavir first-line; annual vaccine + booster ≥65
Influenza outbreak	Treat symptomatic + prophylax ≥70% within 2 days, ≥14 days

Evidence Gaps

- No RCTs define the optimal empiric regimen specifically for NHAP; no dedicated guideline exists
- POCUS is promising but understudied in PALTC
- No trials compare antibiotics vs. palliation-only in advanced dementia
- COVID-19 antivirals lack PALTC-specific RCTs and remain markedly underused
- Implementation fidelity — not efficacy — is the recurring barrier

Bottom Line / Take-Home

1. **Stratify, don't reflex**
   The through-line for the whole hour

2. **Diagnose thoughtfully**
   Atypical presentation; avoid over-reliance on nonlocalizing signs; consider CRP POCT and emerging LUS

3. **Treat most as CAP**
   Narrow-spectrum, short-course antibiotics, with stewardship built in

4. **Prevent aggressively**
   Pneumococcal/influenza/RSV/COVID vaccination plus daily oral care

5. **Align with the resident's goals**
   Every decision — including antibiotics and transfer — recognizing advanced-dementia pneumonia as a sentinel terminal event

Stratify, don't reflex.

Acknowledgments

Thank you to the interdisciplinary PALTC teams whose bedside judgment this evidence is meant to support.

- Special thanks to my mentors Dr. Schweitzer, Dr. Suchak, and Dr. Danforth

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Questions & Discussion

Thank you — Gaurav Kiri, MD • FMDA Best Cares Practice 2026 Annual Conference • November 1, 2026