Health PEI

ANTIMICROBIAL STEWARDSHIP SUBCOMMITTEE

Hospital Acquired Pneumonia

Definition

- **Hospital Acquired Pneumonia (HAP):** pneumonia that develops 48 hours or more after admission to hospital.

Most Common Organisms

- *S. aureus* (MSSA or MRSA), Gram-negative bacilli (e.g., *E. coli*, *H. influenzae, K. pneumoniae*, *Enterobacter spp., P. aeruginosa*), or *S. pneumoniae.*
- *Enterococcus* and *Candida* are commonly isolated in sputum cultures of hospitalized patients; however, these organisms are generally considered colonizers and do not warrant antimicrobial therapy

Diagnostic Considerations

- A diagnosis of HAP generally requires:
  - Demonstration of an infiltrate on chest imaging AND
  - Compatible signs or symptoms, such as dyspnea/tachypnea/hypoxia, cough, purulent sputum, or fever
- **Microbiological analyses:** Blood cultures x 2 sets PLUS sputum culture, , and ± Legionella urinary antigen.
- For patients with HAP requiring intubation, a culture of endotracheal secretions is recommended.

Treatment Considerations

- If the patient received an antibiotic in the past 3 months, choose an antibiotic from a different class, regardless of clinical success.
- If MRSA risk factors, consider empiric coverage for MRSA (see empiric treatment table).
- If history of infection or colonization with Gram-negative bacilli producing AmpC or Extended Spectrum beta-lactamases (ESBL), empiric use of meropenem is encouraged (may consider fluoroquinolones if susceptibility known, stable and no risk factors).
- **Empiric double coverage of *Pseudomonas aeruginosa***:
  - Consider only for patients who are critically ill (i.e. septic shock or requiring ventilatory support) (see empiric treatment table)
  - Used to maximize the likelihood of having at least one active antimicrobial (due to increased risk of resistance with *Pseudomonas*).
  - Re-evaluate use after 48 hours. If *Pseudomonas* is isolated, step-down to monotherapy (according to susceptibility data).
    - Maintaining double coverage once susceptibilities are known is not required
  - Use of aminoglycosides (e.g., tobramycin and gentamicin) as monotherapy for the treatment of pneumonia is NOT recommended (even if susceptibility is confirmed).
- DO NOT use DAPTOmycin to treat pneumonia; DAPTOmycin is inactivated by pulmonary surfactant. If MRSA infection, use vancomycin (or linezolid if vancomycin is ineffective or inappropriate).
- **To avoid prolonged use of broad-spectrum antibiotics, it is essential to de-escalate therapy according to the results of microbiologic culture and sensitivity results.**

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Empiric Treatment

Risk Factors	Empiric Treatment Regimen∞
NO Risk Factors	amoxicillin-clavulanate 875 mg PO q12h* **OR** cefTRIAXone 2 g IV q24h If **true immediate allergy** to a beta-lactam at risk for cross-reactivity with amoxicillin or cefTRIAXone▲ OR **severe delayed reaction to a beta-lactam‡:** levoFLOXacin 750 mg IV/PO q24h*§ OR moxifloxacin 400 mg IV/PO q24h§
Presence of ANY ONE of the following risk factors for MDR Gram-negative pathogens or poor outcomes: – Requiring ICU care: septic shock and/or mechanic intubation – In ICU when symptoms appear, or transferred from ICU in the last 48 hours – Prior intravenous antibiotic use within 90 days – Immunosuppression – Structural lung disease (e.g., bronchiectasis, cystic fibrosis) – Colonization or recent prior infection with *Pseudomonas* or other resistant Gram-negative bacilli (e.g., ESBL or AmpC)	piperacillin-tazobactam 4.5 g IV q6h* **If true immediate penicillin allergy▲ OR history of ESBL or AmpC:** meropenem 500 mg IV q6h* (consider 2 g IV q8h if septic shock) **If severe delayed reaction‡ to a beta-lactam:** levoFLOXacin 750 mg IV q24h*§ PLUS tobramycin 7 mg/kg IV q24h* PLUS vancomycin IV* (See Health PEI IV manual or firstline app for dosing)
Evaluate for Modifying Factors:	**Regimen Adjustment**
MRSA Risk Factors: – history of MRSA infection or colonization – household contact with a MRSA colonized individual – IV drug use – crowded living conditions (e.g., homelessness, incarcerated persons) – recent travel to or residing in an MRSA endemic region or community	**No above risk factors for poor outcome, then ADD:** sulfamethoxazole+trimethoprim 800+160 mg to 1600/320 mg PO q12h* **OR** doxycycline 100 mg PO q12h **OR** vancomycin IV (See Health PEI IV manual or Firstline app for dosing) **Any ONE of above risk factor(s) for poor outcome, then ADD (if not already receiving):** vancomycin IV* (See Health PEI IV manual or Firstline app for dosing
Consider double coverage for *Pseudomonas aeruginosa* if critically ill (i.e. septic shock or requiring ventilatory support)	**Consider ADDING a second anti-pseudomonal antimicrobial to either piperacillin-tazobactam or meropenem standard regimen (not necessary if already receiving levofloxacin plus tobramycin), options include:** tobramycin 7 mg/kg IV q24h* **OR** ciprofloxacin 400 mg IV q8h*

* Dose adjustment required in renal impairment.

∞ If microbial cause of infection known, treat according to culture and sensitivity.

▲ Immediate, IgE mediated allergies include, but are not limited to, anaphylaxis, urticaria, angiœdema, hypotension, bronchospasm, stridor, and pruritic rash. Refer to the Health PEI Beta-Lactam Allergy guidelines to determine which beta-lactams share similar side chains.

‡ Severe delayed hypersensitivity reactions to beta-lactams are caused by mechanisms that are not well known and require that subsequent use of beta-lactams be avoided. Severe delayed hypersensitivity reactions can include interstitial nephritis, immune hepatitis, hemolytic anemia, serum sickness, severe cutaneous reactions such as Stevens-Johnson syndrome, toxic epidermal necrolysis, and drug rash with eosinophilia and systemic symptoms (DRESS).

§ Special authorization required from PEI Pharmacare

Duration of Therapy

- Studies have shown that, compared with standard treatment durations of 10 days or more, 7-day treatment durations were associated with fewer relapses caused by multiresistant pathogens WITHOUT affecting mortality rate.
- **Treat for no more than 7 days if good clinical response, regardless of bacterial etiology.**
- **If diagnosis of HAP was questionable and patient quickly improves, consider stopping therapy after 3 days.**
- Treatment duration could be prolonged for more than 7 days in certain situations (e.g., empyema, lung abscess, cavitating or necrotizing pneumonia, extrapulmonary infections, *S. aureus* bacteremia, immunosuppression, etc.)

IV-to-PO Conversion

- **If initially on IV therapy, change to PO when:**
  - Hemodynamically stable
  - Clinically improving
  - Afebrile for at least 24 hours
  - Able to take PO medications and have a functioning GI tract

Recommendations for IV-to-PO Step-Down	
No positive microbiology to guide de-escalation	amoxicillin-clavulanate 875 mg PO q12h* **OR** If true immediate▲ penicillin allergy or severe delayed‡ reaction to a beta-lactam: levoFLOXacin 750 mg PO q24h* OR moxifloxacin 400 mg PO q24h
No positive microbiology to guide de-escalation AND presence of MRSA risk factors, then ADD to above:	sulfamethoxazole+trimethoprim 800+160 mg to 1600/320 mg PO q12h* **OR** doxycycline 100 mg PO q12h
Available positive microbiology	De-escalate according to culture and susceptibility reports

* Dose adjustment required in renal impairment

▲ Immediate, IgE mediated allergies include, but are not limited to, anaphylaxis, urticaria, angiœdema, hypotension, bronchospasm, stridor, and pruritic rash. Refer to the NB-ASC Beta-Lactam Allergy guidelines to determine which beta-lactams share similar side chains.

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These guidelines are an adaptation of New Brunswick Anti-infective Stewardship Committee
Hospital Acquired Pneumonia in Adults May 2023

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