

## Genesis Procalcitonin Guidelines

### GENESIS HEALTH SYSTEM OR MEDICAL CENTER

[X] GMC – Aledo

[X] GMC – Davenport

[X] GMC – DeWitt

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#### Population:

Patients 18 years of age or older being treated with antibiotics for sepsis, meningitis, pneumonia, and/or COPD exacerbation.

#### Inclusion Criteria:

- Patients 18 years of age or older being treated with antibiotics for sepsis, meningitis, pneumonia, and/or COPD exacerbation

#### Exclusion Criteria:

- Age <18 years of age
- Situations where PCT levels may be elevated due to non-bacterial cause:
  - Acute graft vs host disease
  - Malaria
  - Pancreatitis
  - Concurrent use of procalcitonin stimulating agents (i.e. OKT3, anti-lymphocyte globulins, alemtuzumab, IL-2, granulocyte transfusion)
  - Hepatic dysfunction (Child-Pugh Class C)
  - End stage renal disease (ESRD), hemodialysis (HD), peritoneal dialysis (PD)
  - Massive stress (i.e. severe trauma, surgery, burn, cardiogenic shock, organ perfusion abnormalities)

#### Skill Level:

- Advanced Practice Professionals
- Pharmacist
- Physician

#### Definitions:

- Procalcitonin (PCT): a biomarker specific for bacterial infection

#### General Considerations:

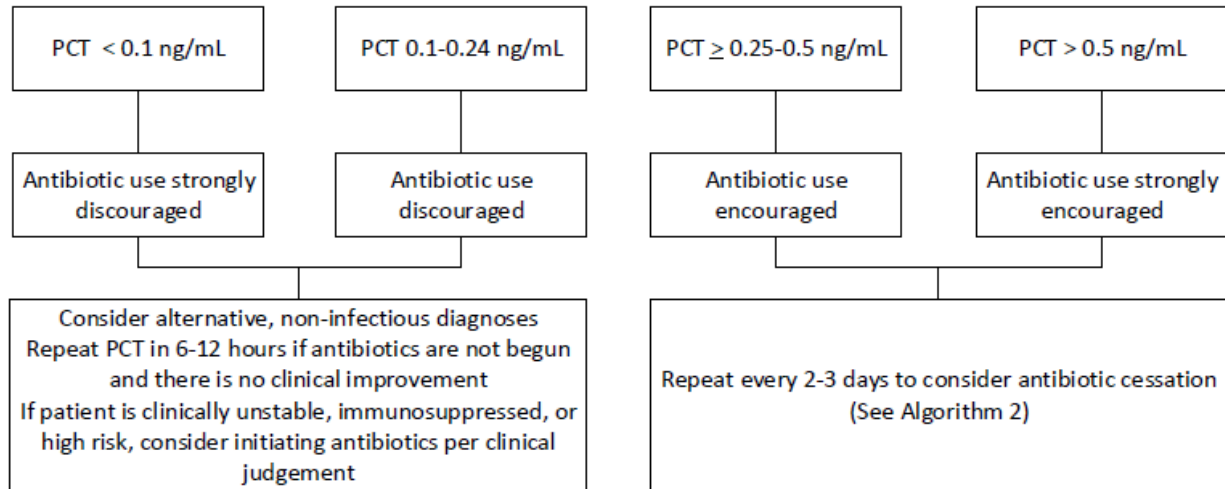
Procalcitonin (PCT) can be used to help to differentiate between bacterial and viral infections, thereby leading to reduced antibiotic use and improved antibiotic stewardship.

- PCT levels increase 6-12 hours after initial bacterial infection and 2-4 hours after onset of sepsis
- PCT levels <0.1 ng/mL have a high negative predictive value (96.3%) for excluding bacterial infections
- PCT levels >0.1 ng/mL are more indicative of a bacterial infection
- PCT levels might be falsely low in cases of subacute endocarditis, localized infections (such as osteomyelitis and abscess), or if PCT is checked too early in the course of the bacterial infection

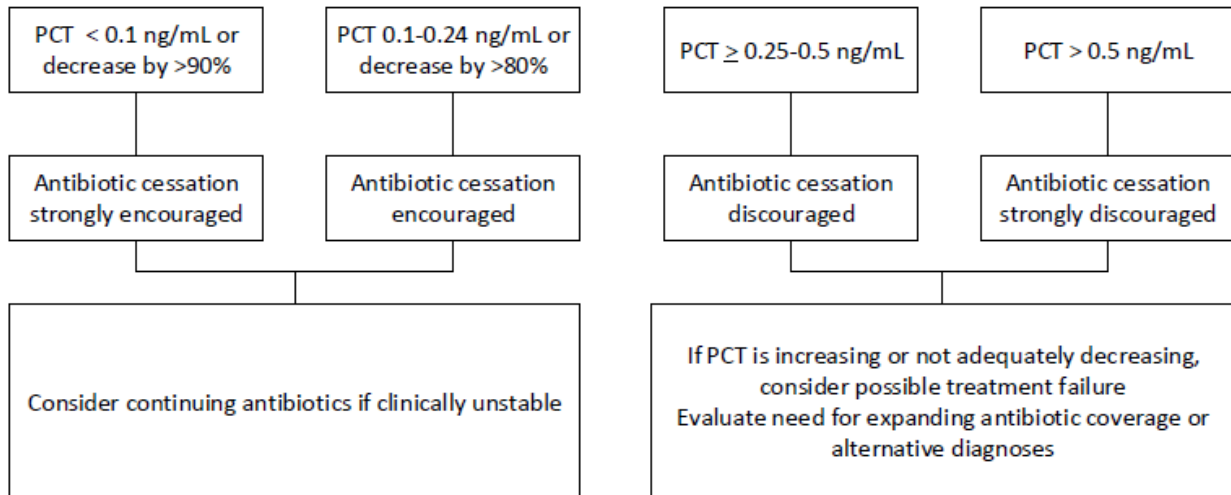
Repeat PCT measurements are recommended per Algorithms 1-4 depending on clinical situation. Antibiotics should **NOT** be initiated just because a PCT >0.1 ng/mL. Decisions regarding cessation of antibiotics should **NOT** be based solely on a PCT level, but PCT levels should be used to help guide decisions regarding antibiotics in combination with clinical presentation and other patient-specific factors.

Pharmacists may order procalcitonin levels as judged clinically appropriate and contact physician regarding appropriate antibiotic de-escalation and cessation.

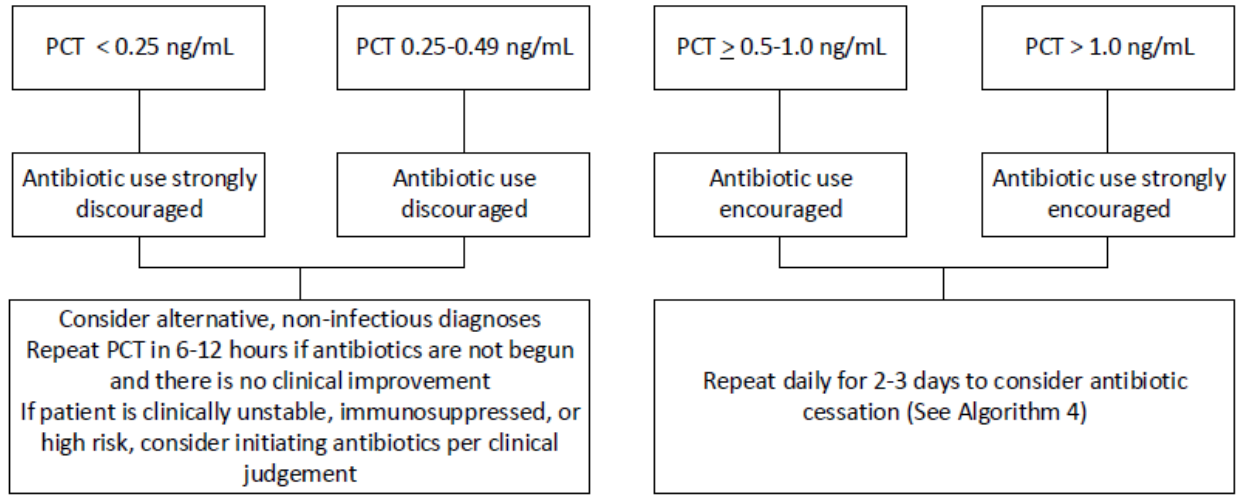
**Algorithm 1: Initial Pneumonia, COPD Exacerbation, and Meningitis Procalcitonin (PCT) Level**



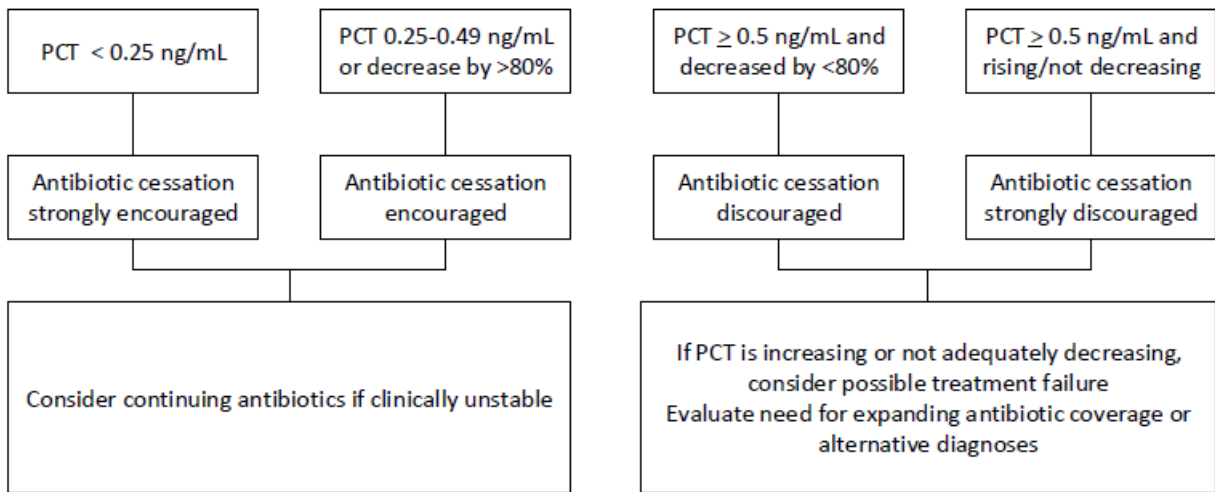
**Algorithm 2: Repeat Pneumonia, COPD Exacerbation, and Meningitis Procalcitonin (PCT) Level**



**Algorithm 3: Initial Sepsis Procalcitonin (PCT) Level – IF HIGH SUSPICION FOR SEPSIS, INITIATE ANTIBIOTICS REGARDLESS OF PROCALCITONIN LEVEL**



**Algorithm 4: Repeat Sepsis Procalcitonin (PCT) Level**



**Orders:**

- Procalcitonin

**Sources:**

- Broyles MR. Impact of Procalcitonin-Guided Antibiotic Management on Antibiotic Exposure and Outcomes: Real-world Evidence. Open Forum Infect Dis. 2017 Oct 3;4(4):ofx213. doi: 10.1093/ofid/ofx213. PMID: 29164170; PMCID: PMC5695623.
- Cleland DA, Eranki AP. Procalcitonin. [Updated 2022 Aug 8]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK539794/>
- Grace E, Turner RM. Use of procalcitonin in patients with various degrees of chronic kidney disease including renal replacement therapy. Clin Infect Dis. 2014 Dec 15;59(12):1761-7. doi: 10.1093/cid/ciu732. Epub 2014 Sep 16. PMID: 25228701.

- Iankova I, Thompson-Leduc P, Kirson NY, Rice B, Hey J, Krause A, Schonfeld SA, DeBrase CR, Bozzette S, Schuetz P. Efficacy and Safety of Procalcitonin Guidance in Patients With Suspected or Confirmed Sepsis: A Systematic Review and Meta-Analysis. *Crit Care Med*. 2018 May;46(5):691-698. doi: 10.1097/CCM.0000000000002928. Erratum in: *Crit Care Med*. 2018 Sep;46(9):1560. PMID: 29271844.
- Samsudin I, Vasikaran SD. Clinical Utility and Measurement of Procalcitonin. *Clin Biochem Rev*. 2017 Apr;38(2):59-68. PMID: 29332972; PMCID: PMC5759088.
- Schuetz P, Chiappa V, Briel M, Greenwald JL. Procalcitonin algorithms for antibiotic therapy decisions: a systematic review of randomized controlled trials and recommendations for clinical algorithms. *Arch Intern Med*. 2011 Aug 8;171(15):1322-31. doi: 10.1001/archinternmed.2011.318. PMID: 21824946.
- Schuetz P, Wirz Y, Mueller B. Procalcitonin Testing to Guide Antibiotic Therapy in Acute Upper and Lower Respiratory Tract Infections. *JAMA*. 2018 Mar 6;319(9):925-926. doi: 10.1001/jama.2018.0852. PMID: 29509850.
- Simon L, Gauvin F, Amre DK, Saint-Louis P, Lacroix J. Serum procalcitonin and C-reactive protein levels as markers of bacterial infection: a systematic review and meta-analysis. *Clin Infect Dis*. 2004 Jul 15;39(2):206-17. doi: 10.1086/421997. Epub 2004 Jul 2. Erratum in: *Clin Infect Dis*. 2005 May 1;40(9):1386-8. PMID: 15307030.
- Soni NJ, Samson DJ, Galaydick JL, Vats V, Huang ES, Aronson N, Pittrak DL. Procalcitonin-guided antibiotic therapy: a systematic review and meta-analysis. *J Hosp Med*. 2013 Sep;8(9):530-40. doi: 10.1002/jhm.2067. Epub 2013 Aug 17. PMID: 23955852.
- Voermans AM, Mewes JC, Broyles MR, Steuten LMG. Cost-Effectiveness Analysis of a Procalcitonin-Guided Decision Algorithm for Antibiotic Stewardship Using Real-World U.S. Hospital Data. *OMICS*. 2019 Oct;23(10):508-515. doi: 10.1089/omi.2019.0113. Epub 2019 Sep 11. PMID: 31509068; PMCID: PMC6806362.