

Procalcitonin Testing at WellSpan Health

The WSH Sepsis CET and Antimicrobial Stewardship Committee have established a standard for the utilization and interpretation of procalcitonin testing at inpatient facilities.

Procalcitonin is a biomarker measured using a blood test, which is produced by many body tissues during certain states of systemic inflammation. In the presence of bacterial infection, procalcitonin is quickly released from tissues and organs within 3-6 hours. This same response is not seen in viral infections. Bacterial infection clearance leads to a decrease in procalcitonin levels; it has a half-life of approximately 24 hours. Because of these properties, procalcitonin is used to aid in decisions around initiation and de-escalation of antibiotics. Procalcitonin can also be elevated due to noninfectious causes:

- Treatment with agents which stimulate pro-inflammatory cytokines
- Some forms of vasculitis and acute graft vs. host disease
- Significantly compromised renal function
- Small cell lung cancer or medullary C-cell thyroid carcinoma
- Prolonged, severe cardiogenic shock or organ perfusion abnormalities
- Neonates <48 hours old
- Malaria and invasive fungal infections
- Severe trauma/burns, major surgery

The Choosing Wisely Campaign recently recommended that procalcitonin should not be performed without an established, evidence-based protocol. Currently, the strongest literature around use of procalcitonin testing is for lower respiratory tract infections.

What do providers need to know?

1. **Procalcitonin testing is to be utilized as a marker to aid in decision making around de-escalation of antibiotics for bacterial *lower respiratory tract infections*.** Use outside of this indication is strongly discouraged; indications may be expanded as the literature around procalcitonin evolves.
2. To ensure the most accurate measurement, the first procalcitonin should be obtained prior to antibiotic administration. However, antibiotic administration in a patient with suspected lower respiratory tract infection should not be delayed for this testing.
 - PCT should only be ordered as a routine lab; STAT ordering is not necessary.
 - PCT can be added on to a previously collected blood specimen for up to 48 hours.
 - To facilitate appropriate ordering, **an orderable for Procalcitonin Now and q48H X 4 has been embedded in the CAP, HAP/VAP and sepsis (with pneumonia antibiotic selections only) order sets.**
3. See attached algorithm guiding response to procalcitonin results.
 - Antimicrobial stewardship pharmacists will be alerted to actionable PCT results ordered from the above order sets. As part of their usual stewardship activities, they will contact providers if PCT results indicate de-escalation per the algorithm.
 - If PCT results suggest de-escalation per the established algorithm and a provider is not comfortable discontinuing antibiotics, an infectious disease consult should be considered.

REFERENCES:

1. Barlam TF, Cosgrove SE, Abbo LM, et al. Implementing an Antibiotic Stewardship Program: Guidelines by the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America. CID epub. Available at <http://cid.oxfordjournals.org/>
2. Schuetz P, Chiappa V, Briel M, et al. Procalcitonin algorithms for antibiotic therapy decisions. Arch Intern Med 2011;171(15):1322-1330.
3. Schuetz P, Christ-Crain M, Thomann R, et al. Effect of procalcitonin based guidelines vs standard guidelines on antibiotic use in lower respiratory tract infections: the proHOSP randomized controlled trial. JAMA. 2009;302(10):1059-1066.
4. Stover KR, Kenney RM, King ST, et al. Evaluation of the use of novel biomarkers to augment antimicrobial stewardship program activities. Pharmacotherapy 2018;38(2):271-83.
5. <http://www.choosingwisely.org/clinician-lists/ascp-procalcitonin-testing/>

Algorithm for Interpreting Procalcitonin Results for Lower Respiratory Tract Infections

