

**Title: Evaluating the effect of the ANMC procalcitonin utilization pathway on clinical decision**

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**Abstract Text:**

**Background:**

The role of procalcitonin (PCT) in the infectious process and its utility in antimicrobial stewardship has been studied extensively in several types of infections. In a healthy individual procalcitonin is cleaved in the thyroid gland to produce calcitonin and has low concentrations in the bloodstream. During bacterial infections inflammatory markers increase the production of PCT in other parts of the body without cleaving it to calcitonin, creating a higher concentration of PCT in the bloodstream. Although there is a correlation between PCT, bacterial infections and reduced antibiotic exposure, the evidence of established cutoffs is strongest in lower respiratory tract infections (LRTI) and sepsis of unknown origin.

In July 2017, the Alaska Native Medical Center implemented a PCT clinical pathway as guidance for evidence-based decision making when using PCT as a marker to initiate or discontinue antibiotics. The clinical pathway is currently limited to lower respiratory tract infections and sepsis of unknown origins to provide recommendations based on established cutoffs. This review used data from the first year to evaluate the adherence of providers to the clinical pathway for ordering PCT for the appropriate indications and using it effectively to initiate or discontinue antibiotic therapy.

**Methods:**

This project has gained Institutional Review Board approval. PCT orders from 07/01/2017 to 8/31/2018 were included for review to determine if they were ordered appropriately for LRTI or sepsis of unknown origin, and if the clinical pathway was followed. Initially, PCT orders were stratified as meeting a pathway exclusion criteria or ordered for LRTI or sepsis of unknown origin. The PCT orders that met an exclusion criteria were stratified by the criteria so further education opportunities or changes to practice could be identified. The PCT orders for LRTI and sepsis of unknown origin were further categorized into four groups as: 1) PCT low, antibiotics started inappropriately 2) PCT low, antibiotics not started or appropriately overruled 3) PCT high, antibiotics started appropriately 4) PCT high, antibiotics not started. For sepsis of unknown origin, adherence was considered based on proper trending and managing antibiotics. In addition, each PCT order was categorized by service, internal medicine (IM), critical care unit (CCU) and emergency department (ED) to determine areas where more targeted education about PCT utilization may be useful.

**Results and Discussion:**

There were a total of 1244 PCT orders in the range that were reviewed, 1226 had sufficient data and were included for review. The overall adherence rate to the procalcitonin clinical pathway was 48.7%. Of the 629 PCT orders that were not adherent, 496 were not per the clinical pathway due to an exclusion criteria. The most common exclusion criteria present were coinfections (172 orders), CrCl < 30 mL/min (101 orders) and immunosuppression (88 orders). In addition, 118 and 15 PCT orders were not utilized appropriately in LRTI and sepsis of unknown origin respectively.

When looking at PCT orders by service, there was similar adherence rates between the three services that most commonly ordered PCT. The adherence rate for IM, CCU and the ED was 48.9%, 50.3%, and 48.8% respectively, indicating that hospital providers interpret the PCT value similarly, regardless of practice area.

**Conclusion:**

When PCT is ordered for only LRTI and sepsis of unknown origin the pathway is used appropriately the majority of the time to assist in managing antibiotics, however 40% of the PCT orders in the time frame reviewed were in conditions or infections in which the use of PCT has not been validated and were deemed as exclusions in the pathway.

The complex presentation of patients with multiple infections or respiratory symptoms are possible factors that lead to PCT orders meeting the exclusion criteria; however, other conditions such as renal function and immunosuppression can be more easily identified and PCT has not been validated by medical literature in those areas. Overall, the data reviewed will be helpful targeting education and sharing information with providers about the appropriateness of using PCT in different conditions.