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Block 9 Oral CAT

**Reference:**

Balk RA, Kadri SS, Cao Z, Robinson SB, Lipkin C, Bozzette SA. Effect of procalcitonin testing on healthcare utilization and costs in critically ill patients in the United States. *Chest*. 2017, 151(1):23–33.

**Question:**

Does the use of procalcitonin (PCT) testing on ICU day 1 have an effect on health-care utilization and costs?

**Introduction:**

Sepsis is the most expensive condition managed in the US and despite advances, continues to have high risks for morbidity and mortality. There is no gold standard diagnostic test which results in delays of treatment and potentially over diagnosis. Unnecessary antibiotic use has many consequences including increased length of stay, medication related adverse events, *C. difficile* infection, antibiotic resistance, and increased health care costs. Procalcitonin has been studied for the diagnosis of bacterial infections, sepsis prognosis and antibiotic treatment. PCT has been shown to reduce antibiotic duration with no changes to survival.

**Methods:**

This is a retrospective, propensity score-matched multivariable analysis that was performed on the Premier Healthcare Database. It included patients 18 or older who were admitted to the ICU with admitting or discharge diagnosis consistent with sepsis between January 2011 and May 2014. Patients were grouped based on those who received one to two PCT evaluations on day 1 of ICU admission versus those who did not have PCT testing performed. The database provided information on utilization, cost, and outcome data along with total antibiotic exposure. Due to lack of randomization of PCT testing a 1:3 propensity score matching was used to reduce bias. Multivariable regression models were then used to assess associations between PCT test and patient outcomes.

**Results:**

33,569 PCT patients were compared with 99,543 propensity score matched non-PCT patients. The multivariable regression analysis showed that PCT use was associated with decreased LOS (11.6 vs 12.7) and ICU LOS (5.1 vs 5.3), lower hospital costs (~\$3,000). There was less total antibiotic exposure in PCT managed patients and those patients were more likely to be discharged home. Mortality was not different in the groups.

**Discussion:**

Use of PCT testing on day one of ICU admission has been cleared by the FDA as a tool to assist in identifying patients with a high likelihood of sepsis. It has not yet been cleared to identify patients who would benefit from antibiotic treatment or as a guide for antibiotic stewardship to decrease antibiotic use. One of the strengths of the study is that it had such a large and diverse population that seems to reflect the diversity of US hospitals. The Premier Healthcare Database includes primarily smaller non-teaching hospitals, but also larger and academic centers. One limitation of the study is that the sample was not randomized. There is potential bias due to differences in patient severity and possibly other unmeasured confounders. Propensity score matching and the use of multivariable analysis attempted to control for the patients severity, but there is still the potential for other unmeasured sources of bias.

**Conclusion:**

The use of PCT testing on day one of ICU admission was associated with decreased hospital and ICU LOS along with decreased pharmacy costs and antibiotic use with no difference in mortality.

Procalcitonin testing effects on clinical outcomes requires additional testing, but it seems likely that it will be used in the future to help identify sepsis on ICU admission. This could translate to either avoiding costly treatments and ICU admissions in patients or recognizing and implementing appropriate sepsis management quicker. Although this may not have a big impact on initial ED management and resuscitation in critical patients, it may be an additional tool to add to our workup to help guide our colleagues in further hospital management.

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