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### The use of Procalcitonin as a sepsis marker in a community hospital: Preliminary analysis

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## Background

Procalcitonin (PCT) is a relatively new biomarker that aids in the diagnosing and monitoring of sepsis. Its levels begin to rise as soon as 3 – 6 hours after an infection is detected by the immune system. In academic and research centers, it has shown to be an early and highly specific marker in response to sepsis and severe systemic bacterial infections.

## Purpose

Explore and describe the use of PCT in a community hospital setting to include:

- A review of its diagnostic accuracy in predicting sepsis and if it is useful as an early marker.
- A review of PCT's utilization on direct cost and length of stay (LOS) for sepsis patients.

## Methods

Two methods are being utilized:

- Method 1: Exploratory descriptive case-control study using a secondary analysis of retrospective data over an 8-month period after implementation of PCT.
- Method 2: Retrospective quasi-experimental study using a historical control group of an 8-month period before implementation of PCT.

**Table 1: Septic patient characteristics and outcomes from January 2014-July 2015 (n=233)**

| Cases identified                  | 233  |
|-----------------------------------|--|
| <b>Age group</b>                  |  |
| 20-29                             | 5 (2.1%)                                     |
| 30-39                             | 8 (3.4%)                                     |
| 40-49                             | 11 (4.7%)                                    |
| 50-59                             | 24 (10.3%)                                   |
| 60-69                             | 39 (16.7%)                                   |
| 70-79                             | 58 (24.9%)                                   |
| 80+                               | 88 (37.8%)                                   |
| <b>Gender (% male)</b>            | 50.6%  |
| <b>Race</b>                       |  |
| White Hispanic                    | 179 (76.8%)                                  |
| White non-Hispanic                | 26 (11.2%)                                   |
| Black Hispanic                    | 5 (2.1%)                                     |
| Black non-Hispanic                | 9 (3.9%)                                     |
| Other                             | 14 (6.0%)                                    |
| <b>Discharge status</b>           |  |
| Home                              | 77 (33.0%)                                   |
| Discharge to specialty nursing    | 115 (49.4%)                                  |
| Expired                           | 25 (10.7%)                                   |
| Discharge to other acute facility | 11 (4.7%)                                    |
| Other                             | 5 (2.1%)                                     |
| <b>Average LOS (±SD)</b>          | 8.5 ± 11.2<br>Range (1-102)                  |
| <b>Average costs (±SD)</b>        | \$14,203 ± 23,021<br>Range \$1,306-\$197,862 |

## Preliminary Findings

The preliminary results in Table 1 show 233 cases of which:

- The majority of patients were 70 years or older (62.7%) and White Hispanic (76.8%).
- Nearly half (49.4%) required discharge to a specialty nursing facility.
- Both LOS (1-102 days) and direct hospital cost (\$1,306 to \$197,862) vary widely between patients.
- There is a significant correlation between PCT and lactic acid levels (Figure 1:  $r = 0.377$ ,  $p < 0.001$ ).

## Discussion

A diagnosis of sepsis has profound implications for our older patient population and the hospital including extended LOS, extended recovery after discharge, and high cost. Lactic acid have been considered the gold-standard marker for sepsis. We have demonstrated good correlation, in a community hospital setting, between PCT and lactic acid levels, suggesting that the earlier rise of PCT may be advantageous for diagnosing and treating sepsis. These preliminary results will drive the second portion of the study which will review direct cost and LOS pre- and post-implementation of PCT use.

## Implications for Practice

If PCT implementation results in improved outcomes, LOS and / or cost, consideration should be given to expanding its use throughout the Baptist Health South Florida system.

**Figure 1: Method 1 – Data collected from January 2014 – July 2015**

