Reviewer's report

Title: A latent class approach for sepsis diagnosis supports use of procalcitonin in the emergency room

Version: 2 Date: 28 March 2013

Reviewer: Iraklis Tsangaris

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Jaimes et al. offer an interesting study investigating the latent class analysis approach to determine the operative characteristics of C-reactive protein (CRP), D-dimer (DD) and Procalcitonin (PCT) as diagnostic tests for sepsis in ER patients. Although the paper contains potentially useful information, the authors need to address some issues before this manuscript could be acceptable for publication.

Minor Essential Revisions

The agreement between experts is low. A rate of 0.65 for sepsis-no sepsis and 0.73 for infection with and without sepsis is strongly undermining the validity of data. The authors should provide a good reasoning for the above and acknowledge it as a significant limitation.

The ‘cluster’ of 187 patients should be described in detail. Are these ‘cluster’ patients, patients with ‘severe sepsis’ or ‘and ‘septic’ shock? Have patients with severe sepsis and septic shock according to the traditional criteria been included in the LCA gold standard cluster (the severity of the cluster patients seems higher)? If not, could the authors provide the ‘identity’ of these cluster patients, as well as the ‘phenotype’ of the missed severe sepsis pts.

LCA approach carries methodological novelty in the field of infectious diseases. However the important question is whether this approach carries any advantage compared to the traditional one. Sepsis is not an illness, but a syndrome defined mainly on clinical criteria and the misdiagnosis of sepsis is associated with an extremely adverse outcome. The authors should discuss the above issues and underscore the issue of safety.

Given that 89% of pts had suspected infection as admission diagnosis, could the addition of clinical indices such as fever offer a better diagnostic performance following the LCA approach?

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable
**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**
I declare that I have no competing interests