Reviewer's report

Title: A hybrid decision support model to discover informative knowledge in diagnosing acute appendicitis

Version: 1 Date: 6 November 2011

Reviewer: Christian Ohmann

Reviewer's report:

Diagnosis of acute abdominal pain is a difficult clinical task with a still high error rate. Decision support tools would be highly valuable, if good results are produced. This is the case in the study presented. However, the reviewer has some problems with the manuscript:

1) Important for diagnostic accuracy is the definition of the population under study. The authors have included patients admitted to an emergency medical center with chief complaint of acute abdominal pain. This includes a variety of diagnoses including acute appendicitis. The other diagnoses are summarized under the heading "normal appendix", which is a very inhomogenous group of patients. The discriminatory ability of decision support depends strongly (more than the methods used) on the definition of the comparative group. There is no information, how this group is composed and whether there was any selection of patients (Major Compulsory Revisions).

b) No definitions are given for acute appendicitis, normal appendix and chief complaints. How was "right lower quadrant pain" defined? What is a normal appendix (normal clinical findings) when the patient is not operated? Is histology necessary for the diagnosis of acute appendicitis? Studies in the literature have attempted to standardize definitions (Major Compulsory Revisions).

c) This is a retrospective study, which should have missing data. This is important because missing data are worthening the diagnostic prediction. Unfortunately, there is no information about missing data in the study (Major Compulsory Revisions).

d) In the study cross-validation was performed adequately to estimate diagnostic accuracy. Figure 2 shows the final results for the full data set. It would be nice to know whether training on the different 90% samples resulted in different parameters selected in the multivariate model and with respect to the order of selection of parameters in the application of C5.0 decision tree algorithm (minor essential revisions).

e) The conclusions drawn are far too far-reaching. As long as the decision support-model is not independently evaluated, no recommendation for clinical use should be given. It is known from de Dombal and other studies that external evaluation may reduce diagnostic accuracy considerably (minor essential revisions).

f) The C5.0 decision tree algorithm is quite simple. These and other similar
approaches have not produced good results in the literature. The authors should explain why this is different in their study. Is it due to selection of patients, aggregation of other diagnoses in one group, inclusion of new parameters, better data quality, etc (minor essential revisions).

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

**Quality of written English:** Acceptable

**Statistical review:** Yes, and I have assessed the statistics in my report.

**Declaration of competing interests:**

'I declare that I have no competing interests’