Reviewer’s report

Title: Survey of Practitioners' Competency for Diagnosis of Acute Diseases Manifest on Chest X-ray

Version: 1 Date: 19 Feb 2017

Reviewer: Ernest Ekpo

Reviewer’s report:

General comment: The study examined the performance of non-radiology medical personnel in the diagnosis of acute chest conditions manifest on chest X-ray. The study is of relevance given the delayed interpretation of radiological images by specialist radiologists, arising from high workload and the need for timely intervention for patients with such conditions. However, the study has major statistical flaws, and requires a major revision.

Abstract:

Background: fine

Methods: P3lines 24-26, it is unclear what the phase "leading into a total score from..." refers to. please consider revising

Results: This is an observer performance study. A ROC or FROC analysis is required not the frequency and mean values reported

Introduction: fine

Methods:

Survey Preparation and Piloting: how many CXRs were used for the survey in total?

P6line21: In this Likert scale, is the level of confidence on a dichotomous scale (high or low), if so, what values represent low and high? If not, what values represent the different levels of confidence?

How were those cases where readers provided the correct answers but provided a low confidence rating of their answers analyzed?
Even among expert radiologists, inter-reader variability exists. The 100% consistency obtained, did the residents report the images independently and this level of consistency obtained or did they review them together and agreed on the same finding?

Survey dissemination: P8line60: Authors state that the same laptop was used to ensure consistency of image appearance. Was the laptop calibrated? Does the laptop meet the characteristics for reading medical images? Please state the display characteristics of the laptop or provide evidence to show that it is suitable for reading medical images.

P8line7: The statement '...leading into a total score from 0 to 10...' is unclear. Please consider revising. If the scoring was dichotomous "0 or 1", what do you mean by a total score from "0 to 10"?

Statistical analysis: This is hard to understand. Clearly state the parameters assessed and compared rather than identifying them as categorical or continuous variables, groups etc. Which are the groups being compared? GPs and Medical students? There are many non-parametric statistics, please provide the exact test used for your analysis of the non-parametric data

The analysis for reader performance is flawed. Being an observer performance study, where the true diagnosis is known and there is only one vignette per case and normal cases in the test-set, the best analysis would be ROC or FROC to obtain AUC, sensitivity and specificity for each reader and for all readers. A further analysis accounting for their confidence rating could also be performed.

P8lines 48-50: Please provide a rationale for excluding cases rated 3. A better way would be make ratings of 3-5 to represent certainty that their diagnosis is correct, with a higher value representing higher certainty like in any observer performance study. See previous comment about levels of confidence above. From this statement, it is clear that confidence was not on a dichotomous scale. Please make this clear

P8lines 53-55: Please clarify what you mean by "no real patients were included..." Are the images simulated? if not, then patient data was used as shown in the sentence immediately after, and this statement is incorrect

P8lines58-60: The statement that ethics approval was not required is untrue. The study used patient data and involved reading task by humans. Therefore it requires ethics approval

Results: See comment in the statistical analysis section for the results expected of this type of study.

Overall Score: Readers were scored either 0 or 1, why have a mean score of 3.57?
Certainty and Awareness of Own Responses: Please state the P-value obtained for the level of certainty associated with the correctness of diagnosis for each condition.

Self-reported Prior Exposure to The Topic: state p-values for each condition.

Self-Awareness of One's Performance: See previous comment about the exclusion of cases rated 3.

Predictors of Correct Answers: It is unclear how total certainty score would be a predictor of performance. I would think predictors should be related to reader characteristics that influence performance. E.g experience, years since graduation, period spent in Radiology department etc.

Discussion: A thorough grammatical revision is required.

There is not data to support the assertion that certainty should be based on knowledge and experience. These are examples of the parameters that should have been explored as predictors of performance.

The increasing demand for medical imaging has significantly increased radiologist's workload. Perhaps educational interventions that improve the X-ray interpretation performance of these medical professionals as well as radiographers may be an alternative. Reporting pathways exist for radiographers in the UK; Nigerian Radiographers have also been reported to demonstrate considerably good performance for CXR interpretation (see Ekpo et al, 2015: Radiographers' performance in chest X-ray interpretation: the Nigerian experience; Piper et al. Chest reporting by radiographers: findings of an accredited postgraduate programme). These avenues could be explored as ways to provide radiological information in acute chest conditions, where radiologists are not disposed.

Study limitations: It is true that expert radiologists would perform better than other professionals in this regard, however, not all non-radiologist professional perform sub-optimally in CXR interpretation (see the example of UK). Therefore, the findings should not be generalized to other countries.

Ethics approval: The study requires ethics approval given the use of patient data and the task of CXR interpretation by humans (students and GPs).
References: Articles that assessed non-radiologist's performance in CXR interpretation should be explored and refereed (see examples above). This will broaden readers' horizon about other non-radiologist professional's knowledge of this subject.

Figures:

Figure 2: Include the description of features representing pulmonary edema in the image. e.g bats wing appearance etc

Figure 3: See comment in Figure 2. E.g loss of pulmonary makings on the left with contralateral mediastinal shift

Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

No

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

Yes

Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

Yes

Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I recommend additional statistical review

Quality of written English
Please indicate the quality of language in the manuscript:

Needs some language corrections before being published
**Declaration of competing interests**

Please complete a declaration of competing interests, considering the following questions:

1. Have you in the past five years received reimbursements, fees, funding, or salary from an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

2. Do you hold any stocks or shares in an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

3. Do you hold or are you currently applying for any patents relating to the content of the manuscript?

4. Have you received reimbursements, fees, funding, or salary from an organization that holds or has applied for patents relating to the content of the manuscript?

5. Do you have any other financial competing interests?

6. Do you have any non-financial competing interests in relation to this paper?

If you can answer no to all of the above, write 'I declare that I have no competing interests' below. If your reply is yes to any, please give details below.

I declare that I have no competing interests

I agree to the open peer review policy of the journal. I understand that my name will be included on my report to the authors and, if the manuscript is accepted for publication, my named report including any attachments I upload will be posted on the website along with the authors' responses. I agree for my report to be made available under an Open Access Creative Commons CC-BY license ([http://creativecommons.org/licenses/by/4.0/](http://creativecommons.org/licenses/by/4.0/)). I understand that any comments which I do not wish to be included in my named report can be included as confidential comments to the editors, which will not be published.

I agree to the open peer review policy of the journal