PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	Now you see me: a pragmatic cohort study comparing first and final radiologic diagnoses in the emergency department
AUTHORS	Mattsson, Björn; Ertman, David; Exadaktylos, Aristomenis; Martinolli, Luca; Hautz, Wolf

VERSION 1 – REVIEW

REVIEWER	Mark L Graber MD President, Society to Improve Diagnosis in Medicine
REVIEW RETURNED	03-Nov-2017

GENERAL COMMENTS	The authors studied the impact of current medical practice in regard to imaging in the emergency department. Typically, 'preliminary' readings of imaging studies (provided by ER staff or radiology trainees) are used in clinical management, whereas the definitive readings (by credentialed radiologists) are often delayed by hours or days. This study identified a discrepancy rate of 20%, and over a third of these were clinically important - a change that would have altered management. The finding that so many of the discrepancies were potentially important ones is novel, and will hopefully stimulate future studies to address this significant safety concern. The methods are well described, the results are clear, the conclusions are appropriate and the limitations are adequately listed. I would have liked to see some examples cited of these concerns, and at least some mention in the discussion of a parallel finding in laboratory medicine where 'wet readings' may be discrepant from final pathological interpretation. It would have been nice to have also studied how many of the discrepancies were acted upon, but this would have been well beyond the scope of the current investigation. If data on this is available, it should be included. Minor issues: Spelling issues on p10 line 23 (lager); p 11 line 43 (constrains)

REVIEWER	Laura Zwaan Institute of Medical Education Research Rotterdam, Erasmus MC, The Netherlands
REVIEW RETURNED	16-Nov-2017

GENERAL COMMENTS	This manuscript describes a study that assesses the discrepancies between the first interpretation of medical images by emergency physicians/ junior radiologists and the later, more definitive interpretation by an expert radiologist. The study is methodologically sound, addresses a relevant research question, considers clinical relevance and the manuscript is well written. I only have a two comments for the authors' consideration: 1. How did the authors assess co-morbidity or more than one abnormal finding? Sometimes more than one abnormality could be expected (in case of trauma) and should probably all be identified by the ER physician or the junior radiologists. However, especially on more general images co-incidental findings could occur that may be clinically relevant but not related to the reason of the ER visit. How did the authors handle cases with more than one abnormality? Did they take co-incidental findings into account in this study? This could be one of the reasons why more general images (like CT whole body) has a high number of discrepancies, there is more to see and therefore by chance a higher likelihood that more than one abnormality is present. This could also explain the relatively few discrepancies in the MRI of the head. There was likely a specific hypothesis to perform the image and a low likelihood of a second or co-incidental abnormality. 2. There is an interesting discussion ongoing about whether non-radiologist should be allowed to interpret images. Some (including one of my opinion papers, Zwaan et al. Diagnosis, 2017 4(3)) say that non-radiologists should be better trained, especially now everyone (including patients) have access to medical images. Others say that non-radiologists should not be allowed to interpret any images, and that image interpretation should be excluded from the medical school curriculum (Naeger, J Am Coll Radiol, 2014 (11)). Given the results of this study, it would be of value to address the results in light of this discussion. Personally, I think some discrepancies could potentially be resolved with more education for non-radiologists , while for other images having an expert radiologist interpret the image immediately would be the best way to reduce the number of discrepancies. It would be valuable to see the authors' interpretation of this discussion in light of their findings.

VERSION 1 – AUTHOR RESPONSE

Reviewer: 1

Comment: The authors studied the impact of current medical practice in regard to imaging in the emergency department. Typically, 'preliminary' readings of imaging studies (provided by ER staff or radiology trainees) are used in clinical management, whereas the definitive readings (by credentialed radiologists) are often delayed by hours or days. This study identified a discrepancy rate of 20%, and over a third of these were clinically important - a change that would have altered management. The finding that so many of the discrepancies were potentially important ones is novel, and will hopefully stimulate future studies to address this significant safety concern.

The methods are well described, the results are clear, the conclusions are appropriate and the limitations are adequately listed.

Response: Thank you very much for your rather positive overall evaluation of the manuscript and your constructive comments below.

I would have liked to see some examples cited of these concerns,…
We included two examples in the results section, one judged clinically relevant, the other one judged as non-relevant discrepancy.

Comment: …and at least some mention in the discussion of a parallel finding in laboratory medicine where 'wet readings' may be discrepant from final pathological interpretation.

Response: Thank you for this comment. We now refer to error rates in other visual specialties such as dermatology and pathology in the discussion and cite your seminal review in BMJ Qual Safe on the issue. We however did not include a discussion on “wet readings” for two reasons: 1) The term implies the error to result from reading an image not fully developed yet (dry). The error may thus result from the quality of the image, not the quality of the reading. 2) Most radiographic images nowadays – including in our own center – are directly acquired digitally and thus a “wet reading” of a preliminary image do not exist anymore, at least not in our and most tertiary centers. We can thus rule out the discrepancies in our study to result from the “wet” stage of the image.

Comment: It would have been nice to have also studied how many of the discrepancies were acted upon, but this would have been well beyond the scope of the current investigation. If data on this is available, it should be included.

Response: We fully agree with this comment we are currently investigating how to set up a systematic follow up of these discrepancies, but for the cases studies here, unfortunately no follow-up data are available. We thus included your concern in the limitations section.

Minor issues: Spelling issues on p10 line 23 (lager); p 11 line 43 (constrains)

Response: Thank you. Corrected.

Reviewer: 2
This manuscript describes a study that assesses the discrepancies between the first interpretation of medical images by emergency physicians/ junior radiologists and the later, more definitive interpretation by an expert radiologist. The study is methodologically sound, addresses a relevant research question, considers clinical relevance and the manuscript is well written.
Thank you for your positive overall evaluation and your constructive suggestions below.
I only have a two comments for the authors' consideration:
1. How did the authors assess co-morbidity or more than one abnormal finding? Sometimes more than one abnormality could be expected (in case of trauma) and should probably all be identified by the ER physician or the junior radiologists. However, especially on more general images co-incidental findings could occur that may be clinically relevant but not related to the reason of the ER visit. How did the authors handle cases with more than one abnormality? Did they take co-incidental findings into account in this study? This could be one of the reasons why more general images (like CT whole body) has a high number of discrepancies, there is more to see and therefore by chance a higher likelihood that more than one abnormality is present. This could also explain the relatively few discrepancies in the MRI of the head. There was likely a specific hypothesis to perform the image and a low likelihood of a second or co-incidental abnormality.
Response: Thank you for this suggestion. We now describe how co-morbidity was handled in the methods section and discuss the implications of that approach. We further refer to the different a priori likelihoods of identifying coincidental findings for the different body regions in the discussion.

2. There is an interesting discussion ongoing about whether non-radiologist should be allowed to interpret images. Some (including one of my opinion papers, Zwaan et al. Diagnosis, 2017 4(3)) say that non-radiologists should be better trained, especially now everyone (including patients) have access to medical images. Others say that non-radiologists should not be allowed to interpret any images, and that image interpretation should be excluded from the medical school curriculum (Naeger, J Am Coll Radiol, 2014 (11)). Given the results of this study, it would be of value to address the results in light of this discussion. Personally, I think some discrepancies could potentially be resolved with more education for non-radiologists , while for other images having an expert radiologist interpret the image immediately would be the best way to reduce the number of discrepancies. It would be valuable to see the authors' interpretation of this discussion in light of their findings.
Response: Thank you for pointing us to this discussion and the sources above. We now refer to this aspect in the discussion of our results.

VERSION 2 – REVIEW

REVIEWER	Mark Graber Society to Improve Diagnosis in Medicine, USA
REVIEW RETURNED	30-Nov-2017

GENERAL COMMENTS	The revised version adequately addressed my concerns and suggestions.

REVIEWER	Laura Zwaan Institute of Medical Education Research Rotterdam, Erasmus MC, The Netherlands
REVIEW RETURNED	30-Nov-2017

GENERAL COMMENTS	The authors have addressed all comments. I think it is an interesting article, well writing and of importance to the field. I recommend to accept the paper.