Author's response to reviews

Title: Training auscultatory skills: computer simulated heart sounds or additional bedside training? A randomized trial on third-year medical students.

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Author's response to reviews: see over
Dear Editor,

Please find the revised manuscript

**MS: 1716898580284645 - Training auscultatory skills: computer simulated heart sounds or additional bedside training? A randomized trial on third-year medical students.**

By Øystein Sverdrup, Torstein Jensen, Svein Solheim and Knut Gjesdal,

Oslo, Norway.

We appreciate the valuable comments of the reviewers, and hereby forward a revised manuscript with point-to-point comments to each remark.

On behalf of the authors,
Kind regards Knut Gjesdal
EDITOR’s comments

1. Ethics. Experimental research that is reported in the manuscript must have been performed with the approval of an appropriate ethics committee. Research carried out on humans must be in compliance with the Helsinki Declaration (http://www.wma.net/e/policy/b3.htm), and any experimental research on animals must follow internationally recognized guidelines. A statement to this effect must appear in the Methods section of the manuscript, including the name of the body which gave approval, with a reference number where appropriate.

Response: We did not think that a study on teaching methods should require approval from a medical ethic’s board. Upon request, this was confirmed by the authority.

Change made: In Methods, we have added Ethics.
According to the regulations for medical research in Norway this study protocol could be performed without any consideration or approval by the Regional Committee for Medical Research Ethics (ref 0910-01a Gjesdal).

2. Please include a Conclusions section in your manuscript. Manuscript sections - Manuscript sections should include (in the following order): Abstract; Background; Methods; Results; Discussion; Conclusions; Abbreviations (if any); Competing interests; Authors’ contributions; Acknowledgements; References; Figure legends (if any); Tables (if any); Description of Additional files (if any).
Response: Accepted
Change made. A conclusion section has been added. References have been moved from end notes to correct place.
Conclusion: In a randomised design students who had received an introductory course in cardiac auscultation, underwent an additional 4 hours course based on computer simulated training, or had additional bedside training. When tested on patients with heart murmurs, the two groups had equal performance with respect to sound and murmur description and diagnosis.

3. Abstract. Please could you include information about the context of your study in the background section of your abstract.
Response: accepted.
Change made: added “at Oslo University Medical School”.

Reviewer's concerns
Reviewer: Alberto Dolara
The main limitation of the study by Sverdrup et al is that the time allocated to auscultation programs is too brief and the best score achieved is low (28 of 40 points-70%). What will be the long memory of this short intensive course as well as of those from other studies?
Response: We fully agree with the concerns of the referee: simple, intelligent examination followed by sound reasoning looses to the excitement around high-tech machines and computerized interpretation of data. Unfortunately, we could not obtain more time on the curriculum, and had to perform the study under this limitation. However, we (as the reviewer does) feel that such is the scenario today, and that our experience is shared at other medical schools. We did not test the long memory of the brief course, but see no reason for the two interventions to differ in this respect.

Reviewer 2: Chun-Ju Hou
A. Major compulsory revisions
1. Introduction and Discussion:
Authors should further clarify the research hypothesis and purpose of this study and interpret the results in discussion. They posed the question whether teaching programs with technical devices facilitate learning skills or if the benefits merely are due to more time spent on the subject. The CAS is made for aiding auscultation learning as a bedside training is inconvenient or not available. It
cannot replace a bedside training.
Response: The hypotheses have been clarified in Background. Unfortunately, the lack of a pre-intervention test precludes evaluation of the effect of additional teaching. This has been expressed in Discussion.
Changes made: In Background we added: “Possibly, the program of computer-generated sounds and murmurs might facilitate learning due to its didactic approach. Alternatively, the auscultation of patients might be better, mimicking clinical real life.”

Authors expected to find advantages of using the CAS. However, the results show the mean score sum in CAS and bedside training groups is low. They explained that students have poor auscultation skills due to too brief auscultation training. I agree to authors’ proposition that proficiency in auscultation skills might be due to more time spent on learning auscultation or higher motivation. The score difference between two groups has no statistical significance. It implies two groups have the same effect on auscultation learning.
Response: We agree.

2. Methods:
1) Design of the study
The procedure and duration from training to examination for two groups should be described in detail. Authors described the time span between training to exam was 5-6 weeks. In the study the period of teaching was two weeks. What was the design of the experiment during the following 3-4 weeks?
Response: In the time interval between the intervention and the test, students’ curriculum was mainly pulmonary and renal pathophysiology and clinics. The intervention startet by the end of their cardiology sessions.
Changes made: Added in Methods: “The present intervention study started when they had finished the main cardiology part of the term.”
“The intervention courses started after the main cardiology teaching of the term had taken place, and their main curriculum topics during this period were pulmonary and renal pathophysiology and clinics.”

2) Test of auscultation skills
Totally seven patients participated in the experiment, but only four patients had been assigned number in Table 1.
Response: The students each met 4 patients. Since not all patients were available for all three days, we had to use a total of 7 patients. This, we admit, should be expressed more clearly.
Change made: The Figure text now reads: Cardiac diagnoses of seven patients who each participated for 1-3 days in the auscultation tests. Each student was exposed to four patients. In the Table, Patient 1 is replaced by “Test 1” etc.

3) Statistics
Authors should describe the purpose of Pearson test in the study.
Change made: In Methods: “The Pearson test was used to examine if the time between teaching and testing were related to the outcome.”

3. Results:
Authors has described that student’s t test is used for comparing the CAS group to bedside training group. The reason why post hoc analysis was used is not described in Method.
Change made: In Methods: “We could not estimate the statistical power before the study, but performed a post hoc-analysis.”

4. Conclusions:
The text of the article has not a ‘conclusions’ section.
Change made: Now added.

B. Minor essential revisions
1. References The format is in need of revision.
Change made: