Author’s response to reviews

Title: Student tutors for hands-on training in focused emergency echocardiography - a randomized controlled trial

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Author’s response to reviews:

Dear editor,

we would like to thank you and the reviewers for the positive review and the helpful comments. The revised manuscript is attached.

Reviewer: Thomas Huges

Comment 1:
Overall this is a good study, but due to the small numbers involved does not have the power to make the statements it claims
Author’s reply:
We rephrased our conclusions in order to weaken the statements (page 10)

Comment 2:
No power calculation was carried out.
Author’s reply:
We performed a post hoc power analysis (page 10), which suggested that our study was sufficiently powered to detect the observed differences (1-ß=0.72).

Comment 3:
Confidence intervals not specified although? SD was specified - did not say.
Author’s reply:
The results were shown as mean ± SD. We specify 95% confidence interval for the improvement of OSCE scores in the results section (page 10).

Comment 4:
Method of randomization needs to specified.
Author’s reply:
The students were randomized using a table with random numbers. We added this information in the methods section (page 6).

Comment 5:
Concealment (or lack thereof) needs to be specified further.
Author’s reply:
Both expert echocardiographers and student tutors introduced themselves with their first names only and did not mention their qualifications. We added this information in the methods section (page 6).

Comment 6:
How is inter-observer reliability rated? Should this be kappa ???
Author’s reply:
Our statistician recommended the method of Shrout and Fleiss[1] for the calculation of interrater reliability because absolute agreement was rare on a scale of 25 and Cohen’s kappa would have underestimated the interrater reliability. The corresponding reference is listed in the reference section. The two-way mixed effects model for single measures, testing for consistency, was used. The resulting value is essentially a correlation coefficient (0.96), demonstrating excellent correlation of the scores given by the reviewers.

Comment 7:
If you take the 3rd year students out of the analysis, does it still hold true?
Author’s reply:
Yes, without the 3rd year students the results in the post-test were 16.6 ± 3.2 points (EC) versus 13.7 ± 2.5 points (ST), p = .02.

Comment 8:
With these numbers, would non-parametric statistics be more appropriate?
Author’s reply:
Since the knowledge-gain followed normal distribution, we used a t-test.

Comment 9:
What does this tell us about the educational process going on, and why might this be different from the other ultrasound investigations that are taught by peers?
Author’s reply:
One might speculate that echocardiography is somewhat more difficult than other ultrasound techniques owing to both the dynamic and functional aspects of this diagnostic tool. As a consequence we adjusted the training requirements for the echocardiography tutors (four weeks of clerkships in the echocardiography lab in comparison to three weeks of clerkships in the ultrasound lab) and restructured the contents of our echocardiography tutorial. However, students taught by their peers made a remarkable learning progress in a skill, which is of great importance in emergency medicine. We therefore assume that a peer-assisted learning model for echocardiography is feasible and merits further study in regard to its optimization and curricular implementation.

Comment 10:
Are some activities better taught as peer-led than others? Why?
Author’s reply:
In our experience, with appropriate training of the student tutors most skills with limited complexity are eligible for peer teaching. We successfully employ this concept for peripheral and central venous lines, abdominal and cervical sonography, arterial puncture, pleural and bone marrow puncture, sutures and many other skills [2]. Echocardiography is probably on the border on being too complex to be taught efficiently by student tutors or the contents of our echocardiography training were too ambitious. We added this aspect in the discussion (page 11).

Reviewer John Chambers

Comment 1:
This study compares the increase in scores for identifying echocardiographic structures as taught by trained students vs. expert echocardiographers. This is a highly topical area and the study is interesting. I have a number of questions and suggestions:

The type of echocardiogram being taught was unclear. Much of the description was about basic studies (FATE and FEEL) but the authors discuss multiple views and measurements including ranges for grading valve disease which is standard echocardiography. Is their echocardiogram designed to identify or exclude critical disease e.g. inactive LV or tamponade or is it something else?

Author’s reply:
The contents of the echocardiography training comprised the contents of FATE and FEEL but also some basic parts of the standard echocardiographic examination. Grading a valve disease was explicitly not part of the training, we aimed at recognizing whether there is a major valve disease or not. We added this information in the methods section (page 8).

Comment 2:
There are three controversial steps here, one the basic echo itself, the second teaching this to students and the third using student trainers. I personally think we have enough information to justify the first (although others do not) and the
authors give a good background in support of the concept. I also agree that medical students will probably be using echo as routine in the near future although this is still a new concept in Europe. There is a study by Joe Kisslo from Duke University that would be relevant to this discussion. But finally what is the evidence that student trainers are valid and accurate. I felt that this needed expansion.

Author’s reply:

We added the study by Prof. Kisslo into the discussion. The concept peer teaching versus faculty training has been evaluated for various skills, and to our knowledge all studies so far have shown equality or even superiority of teaching by student tutors compared to the faculty. However, the skills in peer-assisted learning investigated so far, were usually very well defined tasks of a rather low complexity level. It still remains elusive at which point the skills become too complex to be taught by student tutors. In our opinion there are three possibilities to explain the difference to findings of other studies comparing peer teaching with faculty staff training:

1. Echocardiography is a skill too complex for peer teaching
2. Our student tutors were not trained well enough
3. The contents of our echocardiography training were too ambitious

We emphasize this topic in the discussion. Yet the question remains whether the difference in knowledge gain between peer teaching and faculty staff teaching is clinically relevant. We expanded the discussion (page 11).

Comment 3:
In 2a of hands-on training the views were not clear. Which apical views?

Author’s reply:

We aimed for the parasternal short axis, parasternal long axis, four- and five-chamber views from the apical acoustic window, and finally the subcostal acoustic window (page 7).

Comment 4:
What was being rated using the Likert scale? Given that the medical students were novices they would not be able to assess the accuracy of their tutors.

Author’s reply:

The students gave an overall rating of their teachers. The students were not asked to specifically assess their teachers’ competence. To rate the overall satisfaction aimed at excluding a major Hawthorne effect. We wanted to make sure that the students did not fail to tap their full potential in the assessment because they were dissatisfied with their teacher.

Comment 5:
The students were tested on recognizing structures and not on getting views. This was not therefore a study of hands-on ability. Furthermore a student with a good echo window is not a clinically realistic test model.
Author’s reply:
The students were tested on both since they had to generate the pictures on which they labeled the structures themselves. We agree that we tested the students under good conditions, but this is in accordance with our study goals. Echocardiography training as proposed by Hofer et al. [3] comprises three steps:

1. Lecture on the theory
2. Hands on-training in small groups under good conditions
3. Supervised practice on patients with real pathologies

Our study aimed at the second step, which should enable the students to learn what and how to do, but it cannot and shall not replace training and experience. We added this information in the methods section (page 8) and the discussion (page 12)

Sincerely yours,
Matthias Kühl
Nora Celebi