Reviewer's report

Title: The role of a simulator-based course in coronary angiography on performance in real life cath lab - A case control study

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Reviewer: Lars Konge

Reviewer's report:

Thank you for the opportunity to read the interesting manuscript by Dr. Jensen et al. The authors have set up an impressive simulation-based coronary angiography training program and are now trying to explore the impact of the program using a nationwide database. I totally agree with the authors that there still is a need for good studies investigating the transfer of skills learned in the simulation centre into actual practice on patients. Recognizing the many practical difficulties in setting up a properly powered randomized controlled training study I find it appropriate to use the case-control approach - however the many limitations of this much be carefully contemplated.

Overall I think this could be an important article in the field of simulation-based procedural training; adding to the discussion of transfer of skills and discussing the possible negative effects. However, I strongly believe that major revisions are necessary:

1. Background: The lengthy description of existing studies concerning transfer of skills is unsystematic, missing important references, and should be rewritten. I believe reference number 12 is flawed - it is not a systematic review of 109 studies. Furthermore, to state that (only!) 3 reviews about 'the effectivenes of medical simulators have been published up-to-date', and to call Lynagh's six years old review 'the most recent' shows a lack of careful review of the litterature. For instance, David Cook published a major review in JAMA a couple of years ago. A manuscript presenting national data covering 6 years deserves a (correct and) thorough description of existing litterature!

2. In my opinion the secondary aim does not add to the paper. That people training on a simulator improve their performance on the simulator has been shown (too!) many times and is merely quality control of only local interest.

3. Ethics: Here it is stated that the procedures were video-recorded. It is not mentioned in the Methods section where (sim centre?, Cath lab?) and why this was done, and I am also not sure what Results have come from these recordings. This must be clarified. It is stated that all patients (4472 procedures) gave informed consent to participate in a training study comparing performance of trainees who had underwent simulation-based training with trainees without simulator training. If this is true it is an amazing effort - if it is not it should be removed from the paragraph.
4. Results: Course assessment compares some simulator metrics to some unpublished data. Participants course evaluation shows that participants like simulator training. I believe that it would add to the clarity of the manuscript to leave out these two redundant paragraphs.

5. Figures: I fail to see the relevance of Figures 3a and 3b. Please explain why it is necessary to divide results into femoral and radial access. The same is true for retention time: The relevance of this is not mentioned in the background or stated as a research question. In stead, it is suddenly treated in Figures 4a and 4b and 'introduced' in the discussion. Both issues are confusing and remove focus from the (important!) main finding of the paper.

6. Discussion: A possible detrimental effect of training is a very important finding and should be discussed in more detail with more references and using a proper theoretical framework. The sentence: '... previously described as simulator behaviour' must be properly referenced.

7. 'Future RCT'? I realize that the peer-review process can be long and sometimes exhausting. However it is necessary to carefully review the manuscript before each resubmission. Reading the manuscript for the first time in October 2013 it is annoying to hear abot a RCT that will be completed in early 2013 - making the role for future VR training clearer. Makes me wonder why I am reading the current manuscript in stead of seeing the results of a study finished more than six months ago?

8. Limitations: The important limitation of using flouroscopy time as a parameter for competency should be mentioned and discussed in further detail.

I find the topic of this paper very important and respect the effort of creating a systematic training program and exploring the possible transfer into patient care. Unfortunately I must advise against publication in its present form. I hope the authors have the stamina to rewrite the manuscript as suggested above - especially focusing on, and discussing the possible detrimental effect of simulation-based training. I would be happy to re-assess a thoroughly revised version of the manuscript.

Best regards,

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**Level of interest:** An article of importance in its field

**Quality of written English:** Needs some language corrections before being published

**Statistical review:** No, the manuscript does not need to be seen by a
statistician.

Declaration of competing interests:

I declare that I have no competing interests