Reviewer’s report

Title: A study to investigate the effectiveness of SimMan as an adjunct in teaching preclinical skills to medical students

Version: 2
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Reviewer: David Cumin

Reviewer’s report:

This work attempts to add to the literature on the utility of simulation in undergraduate simulation. The study is well designed and there are a range of measures used which is important for thorough evaluation. The work shows that the use of a simulator with the capabilities of providing heart and lung sounds was useful in increasing student knowledge of and confidence in differentiating between normal and abnormal cardiorespiratory signs. However, tutor-scored performance improved with examination of peers, rather than the manikin. Together with student feedback about the different methods, the authors conclude that simulation is a useful adjunct to more traditional pedagogic methods.

Major compulsory Revisions

The major criticism of this study is that it is an almost identical study with almost identical results was published by the same group in BMC Medical Education in 2013 (doi:10.1186/1472-6920-13-20). Other than a different, and larger, cohort of students, the addition of tutor-assessment and student free-text feedback are the only contributions. While the previous study was framed as a pilot, the results were convincing and this paper adds little to them. The authors reference their previous study in the introduction to argue that students evaluate the use of a manikin in developing preclinical skills as positive. There is no other reference to the original work.

There are also many details in this study that are missing in the manuscript that make rigorous interpretation of the data impossible:

1) Details around the intervention itself are missing. For example, it would be useful to know:
   a. Did each student have an opportunity to examine a peer and the manikin?
   b. How were abnormal findings presented to the peer group, if at all (i.e. how could they have been expected to correctly answer the questions)?
   c. What were the tutor-student ratios in each group?
   d. Were the peer-exams also held in a “clinical environment”? What effect might that have?

2) The authors make no mention of the methods for dividing the students into two groups or report any demographics of the two groups that could contribute to
differences in learning. It would also be useful to know why this number of students was chosen for the study.

3) It would be useful to understand what the “seven knowledge-based questions” were and how that translates into a “maximum score of twelve” and what, if any, evidence is there for using these questions.

4) The confidence questionnaire would also be useful to include – what were the four questions and how was a score calculated from this? Similarly, there are no details of the numbers used to calculate the significant difference.

5) There is limited detail on how the free text evaluation feedback was analysed. How many researchers viewed the text, how were themes generated and verified?

   a. It seems that many of the quotes in “Improved clinical contextualisation” and other themes should actually be in “Abnormal signs and external equipment useful”.

The authors discuss limitations of the manikin used in this study as “Also students cannot perform certain steps of examination [with the mankin]”. Similarly, the authors state that “SimMan, a simulated patient cannot provide learning experience that is derived from real patients in clinical practice [sic]”. Please could the authors elaborate on these points in the context of the study.

Minor Essential Revisions

1) The second sentence in the abstract conclusions, that “…it helps prepare students for future patient contact.”, is not supported by the data as there is no evaluation of future patient contact. Perhaps the authors meant “Students perceived the incorporation of mannikin-based examinations to prepare them for patient contact.”

2) The reference for “SimMan can be programmed with a range of clinical examination findings [2].” does not seem to support the statement. I would advise the authors to check all references.

3) This paper focuses on a particular simulation device and would be well served by a discussion of other alternatives, for example Harvey® or .

4) This work fails to acknowledge a growing body of literature utilising simulation for undergraduate teaching of clinical skills. Some references that might be of interest:


5) The statistical methods should be described, at least in brief form, in the methods rather than referring to the results section.

6) The results section includes discussion points. Sentences such as “This could be because they were performing examination [sic] on SimMan…” should be moved to the discussion.
7) The authors conclude with “Integrated learning by using SimMan… can be exciting and motivating…”. However, there are no data to support this statement.

Discretionary Revisions
1) It would be appropriate to acknowledge the trademark of “SimMan” in the paper. Similarly, replacing “SimMan” with “manikin” in many instances would make the paper easier to read.

2) The authors report “All students … had previously performed examinations on their peers”. It is interesting to note that repeated exposure to presumably similar training, does not improve knowledge of skills.

3) The flow chart provided is useful but is not referenced in the text. It would be advisable to give the figure a label and reference it as per the tables.

4) It may be interesting to consider if any particular knowledge questions were most improved when the manikin was used compared with the peer examination?

5) The evaluation results could be presented elegantly as a table that could make the paper easier to read.

6) There are also some areas of the manuscript where English could be vastly improved. Some examples are listed below:
   - “equipments” in the last sentence of paragraph 3 in the methods section
   - Remove comma after “which” in the sentence starting “The students then answered…” in paragraph 4 in the methods section
   - The first sentence of the paragraph below the flow chart “Anonymised data was analysed with specific statistical analysis which is described…” needs to be reworded to at least consider the analyses as plural. As above, the statistical approaches should be outlined in the methods and not in the results.
   - The free text evaluation results are not “Their responses” but rather the themes as identified through thematic analysis and examples.
   - The formatting of quotes in the free-text evaluation results is inconsistent.

Level of interest: An article of limited interest

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

Statistical review: Yes, and I have assessed the statistics in my report.

Declaration of competing interests:
I declare that I have no competing interests.