Reviewer's report

Title: Teaching ultrasound in a curricular course according to certified EFSUMB standards during undergraduate medical education is feasible and beneficial A prospective study

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Reviewer: Srikar Adhikari

Reviewer's report:

The subject is interesting especially with the increasing use of point-of-care ultrasound by physicians. The study addresses an important component of medical student education. The study design is straightforward and the manuscript is easy to read. The findings are presented clearly and succinctly. Appropriate statistical methods were used for data analysis. The data matches the study design and methods employed in the study.

Background:

The introduction tries to build a logical case for the study.

In the second paragraph authors state “So far ultrasound has only been incorporated into undergraduate medical student curricula only to a limited degree (3, 4) and has not been systematically implemented as a curricular course in undergraduate medical teaching.” Authors need to be more specific, if they are referring to medical student education in Germany. Several U.S. medical schools have graduated medical students who have participated in a four-year vertical curriculum in clinical ultrasound.

Second paragraph—Authors state “The quality of sonographic findings is due to legibility of the image plane as compared to other imaging modalities that work with standardized planes, dependant on the investigator’s technical skills.” This sentence needs to be rephrased.

Methods:

Authors state “In groups of five, students worked on high-end ultrasound devices (Hitachi EUB 5500 HV)”. Availability of high-end ultrasound systems may not be possible at other institutions, limiting the generalizability.

Authors state “During each lecture, live-demonstration of interesting sonographic findings on patients was performed after written or oral informed consent had been obtained from the patients. Moreover, ultrasound scanning techniques were efficiently presented during lectures” The details of the curriculum are lacking. This affects
the external validity of the study. Based on the information provided by authors, it would be difficult to replicate this curriculum at other medical schools.

Some points require clarification:
1. Did investigators use human models?
2. Any simulation equipment used for teaching?
3. Did the investigators use clips, still images, interactive presentations?

Were the investigators involved in assessment of students? This could have introduced some bias.

What components of scanning skills were assessed? Holding the probe, adjusting gain, depth, focal zones, performing any dynamic maneuvers?

Results:

Please present confidence intervals for percentages.

Any technical difficulties encountered by students while performing the ultrasound examinations?

Authors state “The measurement of organs (1.69; 95%-CI 1.62-1.76), description of procedure (1.84; 95%-CI 1.77-1.99) and the giving of background information (1.79; 95%-CI 1.66-1.91) met our expectations” What is giving the background information?

Discussion:

The discussion section is too long and can be condensed.

The discussion should compare and contrast the results with those of other studies that have previously been published. The discussion section should focus on interesting findings of this study and put them into context, including a brief discussion of the prior studies.

Some limitations to address:
1. No randomization to compare if this novel curriculum is truly effective.
2. Small sample size
3. Done at a single institution, may not be generalizable
4. As with any survey study, results are dependent on the validity of the self-reported data.
5. The amount of time available for the ultrasound teaching sessions secondary to many didactic requirements of the medical students is limited.
6. Investigators did not evaluate long-term retention of ultrasound concepts taught during focused sessions.

References:

Too many references. Can delete at least 10 references.
Missing relevant references:

Overall, this study adds something new to the existing evidence and in my opinion, this study is suitable for publication.

**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'