Title: Case-based exercises fail to improve medical students' information management skills: a controlled trial

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Author's response to reviews: see over
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To the Editor:

MS Revisions: 1045357097898007 - Case-based exercises fail to improve medical students' information management skills: a controlled trial

Thank you for the opportunity to revise our manuscript in the light of the reviewers’ comments and suggestions. This letter constitutes a point by point response to the reviews and a detailed description of the revision.

Reviewer 2: Amy Blue

The authors have given consideration to several factors which may have contributed to their findings (intervention did not adequately teach information management skills, the SP case did not accurately evaluate information management skills, or students could not apply the information skills practiced in the sessions to a one-on-one SP encounter). Additionally, I am wondering if the students were not able to apply/transfer the skills taught in the case-based discussions to the SP encounter because the nature of the skills to be used in the SP encounter were different in context (checking drug interaction, knowing how to counsel about international travel) than those learned in the case-based discussions (select appropriate cardiac diagnostic studies, guide diagnosis and management, develop a management plan, etc.). The authors may want to consider this possibility.

Response: We agree with Dr Blue and thank her for the observation. In response, we have added the following sentence in paragraph 1 of the Discussion section.

Also, students may have failed to apply/transfer the information management skills from the case-base discussions to the SP experience because the learning context changed from paper cases to a mock clinical encounter.

Reviewer 1: George Bergus

We thank Dr Bergus for his constructive, helpful comments and suggestions. In response, we have substantially expanded our Discussion section.

Was the intervention a failure because the students did not acquire the information management skills? Any light the authors can shed on this question will be helpful.

Response: Yes, the intervention failed partly because students did not acquire information management skills. If we group information management skills into two levels – Level 1 (access and retrieval) and Level 2 (integration and application), our students did demonstrate some skills on both levels. However, their performance on Level 2 skills was generally poor. Between 83% and 100% of students accessed the
Internet and retrieved travel information, but even in our best-performing group only 67% consulted their PDAs to investigate drug interactions. Although almost all students accessed a reputable site and retrieved travel information for Botswana, most only integrated and applied information pertaining to malaria prophylaxis. We have added the above content to our discussion section.

If the students acquired these new skills then the problem could be one of transfer—students were not able to apply what they had learned in a classroom to a setting outside of the classroom. If this is the case then it is important to know if this failure was related to a) near transfer (applying a skill to a situation very similar to one students were able to handle in the classroom) or b) far transfer. The type of transfer failure would depend on whether a travel medicine case was included in the classroom information management exercises. More detail (going beyond Table 1) would be helpful.

Response: This point is similar to that made by Dr Blue, and again we agree. We addressed near transfer in our response to reviewer 2. We address far transfer by adding the following sentence to our discussion:

In addition, students do not learn the clinical content (travel medicine) during any third year rotation, so we were testing on a content area that we had not formally taught. However, we deliberately chose travel medicine for our case because we considered that the lack of formal teaching ‘leveled the playing field’ for finding the travel information that was easily retrieved from the Internet.

Perhaps the students acquire the information management skills, were able to use these skills in the clinical setting, but the means of assessment was not valid. Two potential problems that come quickly to mind are: a) forcing students use computer/PD equipment they were familiar with during the SP encounter or b) not provide the students with adequate time during the encounter to use the equipment. The intervention students very well could still be at the novice stage making them very time sensitive. Although the encounters were 20 minutes in length how did the authors assess whether the seemingly failure of the education intervention was actually due to testing failure? For example, did the students make use of all 20 minutes or did a majority end the case early (as is often the case in our simulated encounters)?

Response: No student used unfamiliar equipment. We have clarified this by adding the flowing sentence to our “Evaluation – the SP case” paragraph. “Students had the same access to the Internet and their PDAs during the SP encounter as during the case based discussions and/or the family medicine clinic” Short of reviewing every encounter tape, we cannot report how many students left the room early and therefore failed to use all the available time. However, we consider insufficient time to complete the case to be a more likely source of testing error. Fortunately, time pressure did not feature as a major problem. On our SP case feedback forms, we routinely ask students whether they had enough time to complete the case. Usually, 2-3 students per group per case report insufficient time. For the
Travel case, no student reported insufficient time. Therefore, we conclude that time pressure was not a major source of testing error in this case. We have added the above content to our Discussion section.

*It is eye opening that so few of the students correctly identified the drug interaction between doxycycline and antacids. (I have to admit that I didn't realize there was one although this is well documented in the PDA drug program I use). The authors raise the possibility that students did not know how to use the drug database program on the PDAs. Could they provide us more information about the training the students got on the program? This would help answer this question. In addition, it would be useful to know what drug program the students had access to. Some programs are much more user friendly than others.*

Response: More excellent points. We have added the following paragraph to our discussion.

Two potential explanations for this lack of PDA use are that students did not know how to use the drug database program or they incorrectly assumed that they knew the answer. In our institution, all third year students are given PDAs equipped with patient logging software and the medication program Epocrates©. They receive formal training on logging patient encounters, but they receive no formal training on using the drug database. Our experience with this highly Internet savvy generation is that most students quickly master the capabilities of their PDAs, but we cannot report any empiric data on the numbers of students who could not operate the drug database versus those who chose not to consult it.

Lastly, as the authors point out, the problem could also be one of metacognition—students did not correctly assess that they did not know. (Previous research suggests medical providers may not self-assess their knowledge deficient particularly well.) As a part of the educational intervention, were students taught when to use their new information mastery skills?

Response: One of our clerkship goals is to teach students to incorporate information management technology into the clinical encounter wherever it proves useful. It would seem that we still have some work to do towards this goal! It is possible that students don’t know how to judge when information technology is and is not useful. However, we do not feel qualified to speculate about this from our limited intervention. It’s a very interesting question, though, and one that we will address in future studies.

*Table 2 is informative but more difficult to understand than need be. It is not immediately obvious that the first 4 columns under “student performance” are actually pairs resulting from the dichotomization of the last column. If the sample size of each of the student categories were provided this would be more obvious.*

Response: We have clarified the table as suggested.
Thank you again for the opportunity to revise this manuscript, and for the ideas for future studies.

Sincerely,

Heidi Chumley, MD