Author’s response to reviews

Title: Curricular changes: The impact on medical students knowledge of neuroanatomy

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Version: 2 Date: 28 Sep 2019

Author’s response to reviews:

Dear Ana Donnelly,

Many thanks to the referees and Editors for the helpful comments on the manuscript ID MEED-D-19-00091R1 entitled "Curricular changes: The impact on medical students knowledge of neuroanatomy" which we submitted to Anatomical Sciences Education.

Attached is a revised version in which we have attempted to address all issues raised in the referees and Editors’ comments. We agree with the suggestions and we have, therefore, changed the manuscript accordingly. We believe the manuscript is much improved as a result.

More specifically, regarding Reviewer 1:

1. Line 2 (first sentence of section), this sentence does not make sense in English. This type of issues is peppered throughout the manuscript. I would recommend working with a native English speaker to refine the syntax of the manuscript, as this will improve readability and comprehension.
   ** We agree with Reviewer and therefore we changed the first sentence of section to “Over the past decades, we have assisted to major curriculum reform in undergraduate medical education”. To ensure that our work is written in correct scientific English, we commit to hire an English Language Editing Service before publication (i.e., language editing of the final version of the manuscript).

2. Page 4 Lines 1-14: Would it be possible to expand into the why behind these findings? This may help contextualize the results and discussion a bit more.
** We agree with the Reviewer and we reworked the paragraph, to try to expand into the why behind those findings. “McKeown et al.14, in their study, found that the medical students knowledge of surface anatomy was lower in those who undertook a system-based curriculum compared to those who undertook a traditional curriculum. McKeown et al. explained these findings by the reduction in teaching time in the system-based curriculum, with the loss of surface anatomy classes. Findlater et al.15 found that the move to supported self-directed learning resulted in an improvement in anatomy examination scores. They believe that students with supported self-directed learning are being provided with a more engaging approach to teaching than was offered previously, resulting in improved understanding of anatomy and retention of anatomical knowledge, while staff is able to devote time to the explanation of difficult principles and concepts. Klement et al.16 showed higher or equivalent subject examination average scores of an integrated curriculum for first-year basic science courses, specifically for morphology, biochemistry, physiology, and neurobiology. Klement et al. explained these findings by the increase in time for independent study, which is beneficial for student well-being and performance. In fact, a survey administered at the end of the year of the basic science courses showed that students were very pleased with the revised curriculum. There was an overall student satisfaction with the new elements adopted in content coverage and arrangement, the daily schedule, and the examination process. To highlight that 92% of students responders felt that the topics presented within the each basic science courses correlated well between courses.”

3. Methods: The impact of the final results would be enhanced with a clearer outline (maybe a figure?!) on 1. When the original course was administered vs. 2. When the study was conducted. This will allow the reader to understand what the "retention" time is for the knowledge taught. ** We agree with Reviewer and therefore we introduced a chronogram (please see Tables).

4. Results: Would it be possible to include the exam as supplemental material? If not, a breakdown of types of questions (first order vs. higher order) may be helpful. Essentially the results are linked to this exam, so understanding the types of content covered in the exam is important for contextualizing the results. ** We agree with the Reviewer and we included a breakdown of types of questions of the exam as supplemental material.

5. First of all the two groups representing exclusively 3 years medical students in one group and 4th year in another. Several confounders regarding the time of exposure to the material, other background educational demographics and exposure that maybe different between the two groups were never presented and therefore could weigh heavily on how these results panned out. For instance the 3rd year students who completed the course more recently may have performed better merely because the information was more fresh in their mind? This could explain why they performed better as a group then the traditional students on the subsections that include more complex neuroanatomical networks like the cerebellum, subthalamus etc. Perhaps the 4th year traditional group did better on senses and hearing because more of them have completed a subspecialty rotation in ENT.
** We agree with the Reviewer and we apologize for not mentioning this in more detail in the submitted article. However, it is possible to verify, according to the schedule suggested by the reviewer 1, that the time elapsed between teaching MorphoNS and the exam and the time elapsed between teaching NeuroAnat and the exam was the same. More specifically, we were careful to apply the test in the same year, but in different semesters (in the 2nd semester of the 3rd year for the MorphoNS group and in the 1st semester of the 4th year for the NeuroAnat group), so that both student groups had 4 semesters between the end of teaching the neuro component and the exam application.

We also changed the last sentence of the second paragraph of the discussion and introduced a new sentence in this paragraph: “The reason of better knowledge scores among the students of MorphoNS group on the subsections that include more complex neuroanatomical networks may result from the special educational efforts to focus on functional aspects and not in excessive anatomical details. Perhaps the students of NeuroAnat group did better on the topic “mechanisms of hearing”, because some of them have already completed a subspecialty rotation in Ear, Nose and Throat (ENT)”.

We also introduced, in the discussion, a new paragraph with limitations: “There are several limitations to our study. First, we compare groups of students that are at two different levels of medical school training (one group representing exclusively 3th year medical students and another 4th year medical students). Second, the percentage of students that completed the examination was low, resulting in a weaker data set than desirable. Third, the assessment was a multiple choose examination, which can somehow condition their answers. Nonetheless, this study is the first attempt to compare the knowledge acquired by medical students from two different pedagogical approaches to neuroanatomy”.

6. Also no mention of how these classes may compare in terms of number of neuroscience education prior and during medical school? Without this information, it becomes quite cloudy in terms of interpreting the results that these two approaches appear to provide similar outcome efficacy?

** We agree with the Reviewer and therefore we included a new paragraph in the METHODS (Data collection).

“Both MorphoNS and NeuroAnat students had no neuroscience education prior medical school. During the first three years of medical school, neuroscience education is focus on the teaching of neuroanatomy in MorphoNS or NeuroAnat subject. Rotation in Neurology, in the fourth or fifth years of medical school, complete neuroscience education”.