How We Teach

Can medical students teach? A near-peer-led teaching program for year 1 students

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Jackson TA, Evans DJ. Can medical students teach? A near-peer-led teaching program for year 1 students. Adv Physiol Educ 36: 192–196, 2012; doi:10.1152/advan.00035.2012.—The General Medical Council states that United Kingdom graduates must function effectively as educators. There is a growing body of evidence showing that medical students can be included as teachers within a medical curriculum. Our aim was to design and implement a near-peer-led teaching program in an undergraduate medical curriculum and assess its acceptability among year 1 students. Students received six tutorials focusing on aspects of cardiac, respiratory, and blood physiology. Tutorials ran alongside standard module teaching. Students were taught in groups of ~30 students/group, and an active teaching approach was used in sessions where possible. Using anonymous evaluations, student feedback was collected for the program overall and for each tutorial. The program was voluntary and open to all first-year students, and 94 (of 138) medical students from year 1 at Brighton and Sussex Medical School were recruited to the study. The tutorial program was popular among students and was well attended throughout. Individual tutorial and overall program quantitative and qualitative feedback showed that students found the tutorials very useful in consolidating material taught within the module. Students found the small group and active teaching style of the near-peer tutors very useful to facilitating their learning experience. The end-of-module written examination scores suggest that the tutorials may have had a positive effect on student outcome compared with previous student attainment. In conclusion, the present study shows that a near-peer tutorial program can be successfully integrated into a teaching curriculum. The feedback demonstrates that year 1 students are both receptive and find the additional teaching of benefit.

small group teaching; physiology tutorials; student teachers

ALTHOUGH THE MEDICAL PROFESSION has been built upon the transmission of knowledge to its trainees (both undergraduate and postgraduate), the opportunity to teach as an undergraduate is rare. There is a growing body of evidence that demonstrates that the experience of teaching as an undergraduate medical student is beneficial for the trainee tutor, the student learners, and the program (18).

The concept of peer teaching is not new. In 1988, Whitman and colleagues (20) discussed peer teaching in higher education and its psychological benefits for students. Peer teaching has arisen in many guises for centuries, and, more recently, the implementation of problem-based learning has expanded the emphasis of peer teaching in many courses (6). In cases where tutoring involves experienced students at a more advanced stage of their education, the term “near-peer teaching” is more suitable (2).

In 2006, Ten Cate and Durning (18) surveyed the medical education literature for examples of peer and near-peer teaching and analyzed the rationales for applying peer teaching. One aspect they discussed was the cognitive congruence between the teacher and student. Cognitive congruence describes how the near-peer teacher and student share a similar knowledge base, and this allows peer teachers to use language that the learners understand and explain concepts at an appropriate level (10). Interestingly, in a situation where the near-peer teacher is several years ahead in their education, a small cognitive distance is present, and hence there is a degree of cognitive incongruence. It appears that this slight incongruence is important. Where there is no cognitive distance, a much more collaborative learning process occurs (18); however, there is some evidence to show that this collaborative process may be no more effective than individual study (14). Rogers et al. (12) found that collaborative study was less effective in learning surgical skills than independent study. Currently, there is no evidence that highlights the optimum educational distance.

In the United Kingdom, the General Medical Council’s Tomorrow’s Doctors: Recommendations on Undergraduate Medical Education (8a) states that medical graduates must “function effectively as a mentor and teacher.” Therefore, implementing a near-peer teaching program within an undergraduate curriculum could help prepare medical students for their future role as educators. Dandavino and colleagues (4) reviewed the medical education literature to explore the significance of “learning how to teach” as a medical student. They concluded that because all doctors have teaching roles, medical students should receive training in educational principles during their undergraduate medical education (4). A near-peer teaching program, which is appropriately implemented and supervised, could provide students with this teaching experience. The literature also suggests that students who engage with teaching activities may have a greater retention and grasp of the subject matter they teach (18). The teaching task itself can serve as a powerful motivation for deeper learning (18). Tang and colleagues (17) suggested peer teaching can be an effective model to refine the knowledge of the student tutor in the subject area being taught.

The present study describes the design and implementation of a near-peer teaching program and evaluates the student learner perceptions of the usefulness of the program.

METHODS

Program design and development. Brighton and Sussex Medical School has an integrated undergraduate medical curriculum. The first 2 yr include a focus on the basic science that underpins medicine, delivered as six integrated systems-based modules over the first 2 yr.
Table 1. Topics covered during each tutorial over the 6-wk period

<table>
<thead>
<tr>
<th>Tutorial</th>
<th>Title</th>
<th>Description</th>
<th>Time, h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tutorial 1</td>
<td>Interpreting an ECG</td>
<td>Students were guided through how an ECG represents electrical activity in the heart and shown how to interpret the basics of an ECG.</td>
<td>1</td>
</tr>
<tr>
<td>Tutorial 2</td>
<td>Cardiac Ion Physiology</td>
<td>Students were guided through the ionic basis behind the cardiac action potential.</td>
<td>1.5</td>
</tr>
<tr>
<td>Tutorial 3</td>
<td>I Hate Respiratory Physiology</td>
<td>The aim for the tutorial was to cover some challenging concepts within the respiratory physiology theme.</td>
<td>1.5</td>
</tr>
<tr>
<td>Tutorial 4</td>
<td>How to Interpret an Arterial Blood Gas</td>
<td>The aim for the tutorial was to give students a clear and systematic approach to approaching the interpretation an arterial blood gas.</td>
<td>1</td>
</tr>
<tr>
<td>Tutorial 5</td>
<td>Hematopoiesis and Anemia—Clarifying Concepts (Part 1)</td>
<td>Working with the near-peer teachers, students produced the hematopoiesis map on the medical school foyer floor. The hematopoiesis map was used to teach the students about the different leukemias affecting myeloid and lymphoid cell lines.</td>
<td>2</td>
</tr>
<tr>
<td>Tutorial 6</td>
<td>Hematopoiesis and Anemia—Clarifying Concepts (Part 2)</td>
<td>A didactic approach was used to introduce the hemostatic mechanisms of clotting. Students worked to assemble the clotting cascade on the medical school foyer floor.</td>
<td>2</td>
</tr>
</tbody>
</table>
and $f = \text{not at all useful or relevant}$. Quantitative student feedback from each tutorial is shown in Table 2.

Students were also asked to complete a feedback questionnaire regarding the tutorial program as a whole (Fig. 1) using the same criteria as for the individual tutorial feedback. The questions on the overall program feedback differed to assess student reactions to the overall program. The overall program received positive feedback from the students, with the average response to the five questions asked being 4.95 (Fig. 1).

Table 3 shows qualitative comments made by students about the near-peer-led tutorial program in the formal end-of-module anonymous questionnaire. All students were given the opportunity to contribute to open-ended qualitative comments over three categories: best aspects of the module, favorite aspect of the module, and aspects requiring improvement. The end-of-module questionnaire deliberately did not contain specific questions about the near-peer-led tutorials so that nonsolicited comments could be gathered.

Analysis of student achievement was carried out using the results from written examination questions that were taken at the end of the module. All questions were standard set using the Angoff method to determine the overall pass mark for the exam (1). The standard setting panel was not aware that the near-peer-led tutorials were being evaluated. Table 4 shows mean student scores for the examination questions in each theme of the module for the 2010/2011 academic cycle, when the extratutorials were introduced. The corresponding results from the previous academic cycle were also included for comparison (Table 4). The near-peer-led tutorials covered material in themes 2–4. Learning objectives in themes 1 and 5 were not covered in the supplementary tutorials. The overall average student mark saw an 8% rise compared with the previous academic cycle. This was largely characterized by a 20% rise in theme 2.

**DISCUSSION**

The results show that the implementation of a near-peer-led teaching program within the first year of an undergraduate medical school curriculum appeared to be successful, with 98.73% of students finding the program “very useful” in

### Table 2. Quantitative student feedback on tutorials 1–6

<table>
<thead>
<tr>
<th>Question</th>
<th>Tutorial 1</th>
<th>Tutorial 2</th>
<th>Tutorial 3</th>
<th>Tutorial 4</th>
<th>Tutorial 5</th>
<th>Tutorial 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Was this tutorial useful in consolidating material taught in the lectures?</td>
<td>4.93 (0.26)</td>
<td>4.77 (0.46)</td>
<td>4.89 (0.33)</td>
<td>4.82 (0.42)</td>
<td>4.80 (0.43)</td>
<td>4.83 (0.41)</td>
</tr>
<tr>
<td>Did you find this tutorial useful in consolidating important or difficult concepts?</td>
<td>4.92 (0.28)</td>
<td>4.72 (0.50)</td>
<td>4.91 (0.30)</td>
<td>4.88 (0.36)</td>
<td>4.71 (0.56)</td>
<td>4.79 (0.47)</td>
</tr>
<tr>
<td>Was the interactive nature of tutorial a useful way of helping to consolidate your knowledge and understanding?</td>
<td>4.86 (0.35)</td>
<td>4.74 (0.50)</td>
<td>4.85 (0.40)</td>
<td>4.84 (0.37)</td>
<td>4.60 (0.72)</td>
<td>4.89 (0.31)</td>
</tr>
<tr>
<td>Did you find being taught in a small group useful to your learning experience?</td>
<td>4.89 (0.31)</td>
<td>4.86 (0.47)</td>
<td>4.87 (0.49)</td>
<td>4.91 (0.29)</td>
<td>4.77 (0.48)</td>
<td>4.89 (0.36)</td>
</tr>
<tr>
<td>Do you think the tutorial will be useful in preparing you for the module?</td>
<td>4.89 (0.31)</td>
<td>4.86 (0.38)</td>
<td>4.95 (0.24)</td>
<td>4.94 (0.30)</td>
<td>4.77 (0.45)</td>
<td>4.86 (0.39)</td>
</tr>
<tr>
<td>Averaged score over the five questions</td>
<td>4.90</td>
<td>4.79</td>
<td>4.90</td>
<td>4.91</td>
<td>4.91</td>
<td>4.73</td>
</tr>
</tbody>
</table>

Values are means (SD); average scores represent the average scores of the five questions asked for each tutorial. Students were asked to rate their response to a series of questions about each tutorial immediately after participation. A five-point Likert scale was used, where 5 = very useful and relevant, 4 = useful and relevant, 3 = adequate, 2 = not very useful or relevant, and 1 = not at all useful or relevant.

Fig. 1. Quantitative student feedback — overall program feedback. Feedback was rated on a five-point Likert scale, where 5 = very useful and relevant, 4 = useful and relevant, 3 = adequate, 2 = not very useful or relevant, and 1 = not at all useful or relevant.
consolidating material taught in the module (Table 2). Furthermore, 28 students rated the near-peer-led tutorials as their “favorite” or the “best” aspect of the module in the formal end-of-module questionnaire (Table 3).

Year 1 students were highly receptive to the concept of the program. Despite students usually being receptive to extra teaching/learning resources or opportunities, the popularity of the tutorials was far greater than expected, with the program initially designed to support only 34 students. The overwhelming positive response led to a change in program design to facilitate all 94 students that applied. The positive student attitude toward the program was also reflected by the average attendance (95%) of the tutorials. The program also had a low student “dropout” rate (1.06%), with only one student not attending the final two tutorials. This showed that students were keen to engage with the tutorials despite them not being an “official” part of the curriculum, suggesting that the high student attendance was intrinsically driven.

The results show that students felt that every tutorial impacted positively on their learning (Fig. 1). When students reflected on the overall program, 98.73% of them found the tutorials very useful in consolidating material taught in the module. The consistent and positive quantitative feedback regarding student learning was greater than anticipated and shows that students really valued the program’s contribution to their learning.

The educational environment or learning atmosphere is important for enhancing student learning (13) and is always taken into account when developing medical education programs (15). The design of the program meant that students were taught in groups of 15–30 students/group. Two or three near-peer tutors were always present during the tutorial, giving a teacher-to-pupil ratio of 1:15 or 1:10. This is in contrast to a large percentage of the core module teaching, where students are taught as an entire year group (138 students) by a single lecturer. Small-group learning is effective because it promotes active learning or, more precisely, interactive learning (16). Student learners were able to direct the session to their learning needs; this is effective as it leads to an active and engaging learning experience (9). In the overall program feedback, student learners rated teaching within small groups highly. Although the school provides students with tutorials that form part of core module teaching, students expressed in the formal end-of-module questionnaire that “more near-peer led tutorials” and “more small group teaching” would improve the module. The data presented here only support the well-established idea that learning is not a passive process and that educators should therefore encourage and facilitate interactions in their teaching (5).

The response to small-group interactive teaching was positive. The quantitative data showed that students found this active style of teaching within a more personal learning environment engaging, stimulating, and effective in consolidating difficult concepts within the module. However, facilitating teaching in groups of this size and incorporating active teaching demands time and increased numbers of teaching staff. The successful use of medical students in this program demonstrates how senior medical students can be used to facilitate this valued teaching method. Such an outcome has been demonstrated in another study (6).

Students in the academic year studied performed well in the end-of-module exam, demonstrating a higher average level of knowledge compared with the previous year. There was no reason to expect any difference in the intellectual level of the current cohort of students compared with previous groups. Admissions criteria to the medical course were the same, and similar results were achieved in the preceding module assessments. The examination questions used were blueprinted to the same learning outcomes to ensure that similar material was being assessed. The questions were also deemed to be of a similar level, as judged by the standard setting panel. However, it is true that the students did sit for different examination papers. A comparison of the current students with those of the previous cohort showed that the addition of the tutorials had not negatively impacted on student learning. Assessing if the supplementary tutorials had had a positive effect on student attainment is difficult; however, there was a 20% rise in attainment in the blood theme. This may be attributed to the supplementary hematology teaching that students received this academic cycle, as there were no other significant changes in the teaching during this academic cycle.

There was a variation in attainment across the three themes incorporated within the tutorial program. The cardiovascular and respiratory themes did not appear to be adversely affected by the tutorials and may have helped some students. The marked increase in attainment for the hematology theme may be explained by the longer and more active nature of these tutorials compared with others. Incorporating both active participation and didactic teaching, along with more comprehensive posttutorial notes, may inform how future tutorials are designed and structured. It was also interesting to note the increase in attainment in the lifestyle theme, which did not appear to have an obvious explanation.

The near-peer led tutorials were successfully implemented and received positive comments from the students involved; however, there were some limitations to the program. The aim of the program was to provide academic support and guidance for students during a complex module. Although the majority of the year cohort applied to the program, 44 students did not apply. Their reasons for not applying were not elucidated and were likely to be varied. However, it is possible that the students who lacked the motivation to apply were the students who could have benefitted most from the extra tuition. Another potential limitation is that module 103 is commonly regarded

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Table 4. Average scores for each theme and overall student averages for 2010/2011 and 2009/2010 in the end-of-module exam for module 103

<table>
<thead>
<tr>
<th>Theme 1: Anatomy</th>
<th>Theme 2: Blood Physiology</th>
<th>Theme 3: Cardiovascular Physiology</th>
<th>Theme 4: Respiratory Physiology</th>
<th>Theme 5: Lifestyle</th>
<th>All Student Averages</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010/2011</td>
<td>69</td>
<td>70</td>
<td>54</td>
<td>60</td>
<td>68</td>
</tr>
<tr>
<td>2009/2010</td>
<td>73</td>
<td>50</td>
<td>52</td>
<td>60</td>
<td>60</td>
</tr>
</tbody>
</table>

All values are expressed as percentages.
as challenging by students. Consequently, it could be argued that students would have been receptive to any form of additional teaching. Future work may include implementing the program across other modules to assess its acceptability in general. One clear outcome of implementing the program of tutorials was that students were open to investing extra time in their learning.

The near-peer-led tutorials were a new addition to the curriculum and something that students had not experienced before. It is possible that the highly positive student reaction was due to the novelty of the program as opposed to the quality of the teaching. However, it was encouraging that student feedback on the individual tutorials remained constantly high throughout the program, suggesting that the feedback was based on the learning experience and not the novelty of the program.

In conclusion, the overall aim of this present study was to design and implement a near-peer-led teaching program in an undergraduate medical curriculum and to elucidate if such a program was an acceptable learning intervention among student tutees. The results from this study showed that year 1 students embraced the concept of near-peer teaching, rating every aspect of the program highly. The educational theory supporting near-peer teaching is strong (2–4, 6, 8, 10, 11, 17–19), with the present study adding to this body of literature.

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DISCLOSURES

No conflicts of interest, financial or otherwise, are declared by the author(s).

AUTHOR CONTRIBUTIONS

Author contributions: T.A.J. and D.J.E. conception and design of research; T.A.J. performed experiments; T.A.J. analyzed data; T.A.J. and D.J.E. interpreted results of experiments; T.A.J. prepared figures; T.A.J. and D.J.E. drafted manuscript; T.A.J. and D.J.E. edited and revised manuscript; T.A.J. and D.J.E. approved final version of manuscript.

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