Lectures versus case discussions: randomised trial of undergraduate psychiatry teaching

Meinou Simmons,[1] Paul Wilkinson[2]

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[1]The Phoenix Centre, Ida Darwin Hospital, Cambridge; [2]University of Cambridge, Cambridge

Correspondence to Meinou Simmons (meinou.simmons@gmail.com)

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Aims and method To test whether medical students find case-based discussion of child psychiatry more educationally stimulating and more enjoyable, and whether this leads to greater knowledge acquisition than traditional didactic lectures. Four cohorts of Cambridge medical students ($n = 54$) were randomised to case-based discussion or traditional didactic lectures for two topics in their psychiatry placements. Enjoyment and stimulation were determined by feedback forms; knowledge acquisition was tested by an end-of-placement exam.

Results Students in case-based discussion groups scored significantly higher than students in the lecture groups in the extent to which they enjoyed the teaching session ($P = 0.006$); the extent to which they understood the principles of management of real-life patient problems ($P = 0.044$); and their interest in looking up further information ($P = 0.003$). There was no significant difference in exam performance ($P = 0.9$).

Clinical implications Medical students find case-based discussion more engaging and enjoyable than didactic lectures, with no reduction in exam performance.

Declaration of interest None.

According to modern educational theory, active engagement with learning materials improves enjoyment and interest in clinical cases. Kaufman[1] wrote from a constructivist view, 'teachers should engage students in their learning in an active way, using relevant problems and group interaction'. A number of studies have experimented with non-didactic teaching methods in a variety of specialties within medical schools. Fischer *et al*'s study[2] relating to obstetrics and gynaecology is one example. In their study, students rated group discussion significantly better in terms of enjoyment as well as educational stimulation than didactic teaching, with no significant difference in test scores. Costa *et al*[3] carried out a similar study comparing lectures with group discussion in orthopaedic surgery at the same teaching hospital as our current study. They found that students in the interactive discussion group rated the presentation of their teaching more highly than did the lecture group. However, there was no significant difference in their rating of the content of the sessions. The students in the discussion group also performed better in their end-of-placement written exam.

There appears to be a striking lack of studies that compare teaching methods in psychiatry in particular, in relation to generating enjoyment and interest in the subject, as well as academic performance. This is surprising, as psychiatry is a subject that could be considered to be well suited to case discussions, reflected by the dominance of case-based discussions in postgraduate workplace-based assessments.[4] Garralda[5] commented on ways of making the child and adolescent psychiatry attachment interesting, including use of interactive seminars, as long ago as 1984.

The aim of this study was to test whether clinical medical students find case-based discussion of child and adolescent psychiatry more enjoyable and more educationally stimulating; and whether this leads to greater knowledge acquisition than traditional didactic lectures. This study forms part of a wider review of undergraduate psychiatry teaching at the University of Cambridge that is being led by one of the authors (P.W., the undergraduate speciality director for psychiatry). At Cambridge, psychiatry has historically been taught through traditional didactic lectures; child and adolescent psychiatry has lecture days within the psychiatry block. Interactive teaching methods have, however, become more mainstream across UK medical schools, which make use of problem-based learning in addition to a range of other teaching strategies. A review of the formal teaching of psychiatry was deemed necessary as attendance and feedback for lectures was variable, and sometimes poor. It was agreed that a formal randomised controlled trial would be most informative in guiding us as to the most appropriate teaching style. In addition, P.W. is a member of the Royal College of Psychiatrists' Undergraduate Teaching Leads Forum, and it has been agreed that this study would contribute to the ongoing national review of psychiatry teaching methods. Psychiatry is a recruiting specialty and in need of freshness in its

teaching approach to make it both more attractive to medical students, and aligned with modern educational theory.

Method

Medical students from each year group are split into five cohorts for psychiatry teaching in the University of Cambridge clinical medicine course. Students receive weekly lectures as a full cohort and are placed in small groups in regional hospitals for clinical experience. Four successive cohorts of medical students undertaking their psychiatry attachment in 2010 were approached several weeks before the study, and again on the morning of the study lectures. They were told about the study, given information sheets and asked whether they would take part in this study.

Consenting students within each cohort were randomised to receive teaching in one of two different styles (case-based discussion or traditional didactic lecture) for two topics on the lecture course: (a) attention-deficit hyperactivity disorder (ADHD); and (b) child/adolescent depression, anxiety and self-harm. These teaching sessions were delivered concurrently. Each of the two teaching sessions lasted approximately 45 min. Before the teaching sessions occurred, teachers attended a meeting with an investigator (M.S.) and were given email instructions to guide them in preparing for the two different teaching methods, including a model plan of a teaching session. For the lectures, teachers were instructed to deliver a traditional medical lecture format with a data projector, using headings such as epidemiology, clinical presentation, diagnosis, management and prognosis. For the case-based discussions, teachers were instructed to use a case vignette with some prepared exploratory questions related to the case that would be discussed in the group. The teachers in the case-based discussion group were asked to address all of the relevant headings as they came up in the discussion prompts. Teachers in both groups were instructed to signpost students to relevant further study resources as is standard practice in departmental teaching.

Sessions were delivered by four different teachers who were consultants or specialist registrars in child and adolescent psychiatry. Each teacher taught a pair of traditional lectures to one cohort and ran a pair of case-based discussions with one other cohort. This reduced confounding from teacher quality effects: each teacher taught a similar number of students with each of the teaching styles.

Students were told that they were free not to take part in the study, and if that was the case, they should attend the traditional didactic lecture. Simple randomisation took place using an online programme (www.random.org). Consent was obtained from the participants and they were allocated ID numbers before randomisation, ensuring allocation concealment.

Participants were told in advance that we would use results from the end-of-placement exam and their feedback forms to compare the teaching styles. All students sit a 90-minute psychiatry exam at the end of their placement (1 month after child and adolescent psychiatry teaching) to test whether they have acquired enough theoretical knowledge. The exam is composed of a mixture of multiple choice and short written answer questions, which focus on knowledge acquisition of psychiatry topics, rather than problem-solving skills. Alignment of the assessment methods to the two teaching strategies was considered, but it was decided that the existing assessment methods should be preserved for ease of comparison of the teaching strategies using traditional assessment techniques in a small study. Each exam during the study therefore contained one question on ADHD and one question on paediatric depression; exam performance was only analysed on the basis of these specific questions. These questions were not repeated for different cohorts in the study.

Participants were given feedback forms at the end of the exam, which asked about their opinions of the teaching with the following questions, on a six-point Likert scale.

a How enjoyable were these teaching sessions?
b How well are you able to understand the principles of real-life management of a relevant case as a result of the teaching session?
c How much did the teaching session make you want to learn more about the conditions [ADHD and depression]?

Information bias was minimised using several methods: exams were marked by the attachment director (P.W.), who was masked to which type of teaching each student had received; the exam was set by the attachment director, who was unaware of the content of the teaching sessions; teachers were not aware of the assessment questions at the time of teaching; and data analysis was done in a masked fashion: at the time of analysis, the investigators were not aware which group was represented by which code.

Ethical approval for the study was received from the University of Cambridge Psychology Research Ethics Committee.

Statistical analysis

Standard between-groups analyses such as Student's *t*-test assume that all observations are independent.[6] This assumption is not met in this study: the participants were split into four cohorts. Members within each cohort shared the same exam and the same teaching sessions and teachers, but these variables differed between cohorts. We would expect this to lead to significant intraclass correlation (i.e. the within-cluster variance being a significant proportion of the total (within plus between cluster) variance). Therefore we used multilevel modelling, using the Stata 11 xtreg function, with students as level 1 variables and teaching cohorts as level 2 variables.[7] Results gave accurate β coefficients for the actual difference between groups, accounting for the clustering, and a *P*-value for the difference between teaching groups.

Costa *et al*[3] found a between-teaching styles standardised difference of 0.78 in presentation of lectures. We calculated that a sample size of 50 was needed for 80% power to find a standardised mean difference of 0.78 with a *P* threshold of 0.05.

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Results

Fifty-four students consented to taking part in the study. The number of participants in each cohort varied from 7 to 19. One cohort was unusually small ($n = 7$) as the teaching session was delivered a few weeks prior to the pathology final MB examination, therefore many students were absent as they were engaged in personal revision. The three other cohorts contained 13–19 students, which is typical of attendance for psychiatry teaching sessions. A total of 30 participants were randomised to case-based discussion, of whom 28 completed feedback questionnaires; 24 participants were randomised to lectures, of whom 23 completed feedback questionnaires. Details of participants in each cohort are shown in Table 1.

All participants attended the class they were randomised to and completed the end-of-placement exam. Intraclass correlation, which is a measure of how strongly each teacher's scores resembled each other, varied from 0.08 (interest) to 0.27 (enjoyment). This demonstrates significant non-independence of observations, and the need to use multilevel modelling.

The results are summarised in Table 2. Figure 1 illustrates the participants' ratings of teaching styles. There was no difference in results between groups in terms of the end-of-placement exam questions on ADHD and paediatric depression ($P = 0.9$). Students in the case-based discussion groups scored significantly higher than students in the didactic lecture groups in the extent to which they enjoyed the teaching session ($P = 0.006$), were able to understand the principles of real-life case management ($P = 0.044$) and found they wanted to learn more about the conditions ($P = 0.003$). For all four cohorts, enjoyment and wishing to learn more were greater in the case-based discussion group. For three out of four cohorts, understanding was greater in the case-based discussion group.

Table 1 Number of students randomised to each teaching session per cohort

Cohort	Case-based discussion	Lecture	Total
1	8	7	15
2	4	3	7
3	11	8	19
4	7	6	13
Total	30	24	54

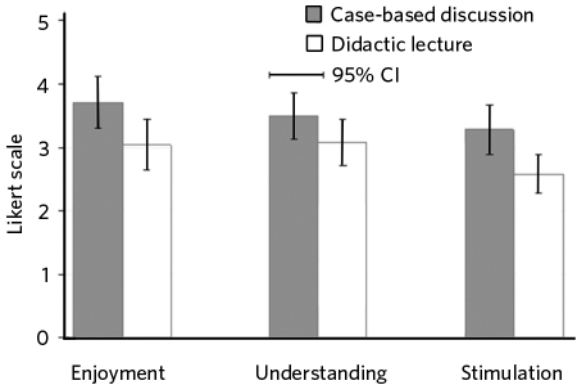

Fig 1 Comparison of medical student ratings of two teaching styles.

Discussion

Findings in context of the relevant literature

According to a review conducted by Kelly & Raphael,[8] psychiatrists as educators need to play an important role in the development and evaluation of education in the medical school undergraduate curriculum, which may involve comparing and assessing different teaching methods. This study contributes to a current evaluation of teaching methods in undergraduate psychiatry education in Cambridge. The results from this study provide evidence that undergraduate students prefer interactive case-based discussions to traditional didactic lectures in child and adolescent psychiatry. The findings of this study provide similar evidence to a number of other studies that have directly compared traditional didactic teaching with more interactive methods of teaching in obstetrics[2] and orthopaedics.[3]

The study does not provide evidence for superiority in academic exam results in traditional knowledge-focused examinations as a result of case-based discussions. This result is not entirely unexpected, as from a constructivist educational perspective, case-based teaching methods may produce better problem-solving skills rather than improved specific knowledge acquisition. This finding is in line with the Fischer *et al*[2] study on undergraduate teaching of obstetrics and the Bulstrode *et al*[9] study of teaching orthopaedics and trauma. However, another study of orthopaedics and trauma did show a weak association with improved exam results.[3] It is also noteworthy that exams in all of the above studies tested knowledge a month after the lectures, rather than whether knowledge was retained years later.

Table 2 Exam scores and student ratings of teaching for the two teaching styles[a]

	Mean (s.d.)		Difference between groups		
	Case-based discussion ($n = 30$)	Didactic lecture ($n = 24$)	β	*Z*	*P*
Exam scores, %	68.8 (3.04)	68.6 (2.78)	0.60	0.16	0.9
Enjoyment[b]	3.71 (1.04)	3.04 (0.93)	0.69	2.75	0.006
Understanding[b]	3.50 (0.96)	3.09 (0.85)	0.44	2.01	0.044
Wish to learn more[b]	3.29 (1.01)	2.59 (0.72)	0.71	3.00	0.003

a. High scores represent greater exam performance, enjoyment, etc.
b. Based on questionnaire with a 0- to 6-point Likert scale.

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There appears to be a paucity of current studies that directly compare the efficacy of teaching methods in producing enjoyment and stimulation of the subject. There are, however, a number of studies that compare the effects of teaching methods in stimulating attitudinal changes to psychiatry as a discipline. These studies are useful in highlighting the positive attitudinal effects of interactive teaching styles on learning. Walton found in his 1967 study that students taught by seminars showed many more positive attitudinal differences from students taught by lectures.[10] Spiegel[11] found that interactive learning techniques produced more positive attitudinal changes towards psychiatry than lectures. Singh *et al*[12] found that lectures and interactive teaching produced equal attitudinal changes towards mental health in Nottingham, even though the interactive learning attachment was shorter in duration than the traditional course.

Strengths and limitations

It is important to note that the teacher's individual teaching qualities play a crucial role in affecting the learning experience, as well as the teaching strategy they use. However, this study specifically attempts to address the effects of teaching strategy rather than individual teacher qualities, and this was achieved through a cross-over design with teachers delivering both teaching styles to separate cohorts. The results of this study demonstrate that modern interactive teaching methods such as case-based discussions can enhance the delivery of teaching across the board. Although some teachers were rated more highly than others, all of the teachers were rated more highly when using case-based discussions than lectures.

The design of the study minimised bias and confounding. Randomisation made it likely that there were no pre-teaching differences between groups in ability or interest in psychiatry. Rigorous masking of teachers and the examiner stopped exams and teaching being tailored to each other for one teaching style. Four teachers were used and each delivered both teaching methods, making it unlikely that results were due to a better teacher being used for one group but not the other. Further support for the superiority of case-based teaching for enjoyment and a wish to learn more was given by the fact that all cohorts rated these higher for the case-based teaching, no matter who was teaching. Our sample size was adequate according to pre-study power calculations, and statistically significant differences were found in all subjective measures of preferring case-based teaching. However, the relatively small sample size is a limitation of the study, and a larger sample size would improve the power of the results.

No statistically significant difference was found between teaching styles on knowledge acquisition; however, difference between groups was very small (0.6%, with a standardised mean difference of 0.21). A sample size of 730 would have been needed to detect such a small difference. It is likely that any effects on knowledge acquisition were minimal, and, as the case-based discussion group scored marginally higher in the assessment than the didactic group, we conclude that the greater enjoyment of the case-based teaching did not come at a cost of reduced knowledge acquisition.

A major limitation of the study was the fact that only two topics from the lecture course were chosen. Students may have realised that these topics were likely to come up in the exam and so revised those subjects hard, leading to ceiling effects, with high exam scores in both groups. However, average scores of only 69% make it less likely that there was such a ceiling effect. Generalisability to other topics is also reduced by the fact that only two topics were chosen, and volunteers who were keen to deliver case-based discussion were used. It may be that for a more varied lecture course, course organisers would be unable to recruit enough enthusiastic and skilled case-based discussion teachers, so the quality of such sessions would be reduced. The generalisability is also affected by the fact that all of the students were undergraduate medical students at Cambridge, a traditional research-based university that makes more use of didactic lectures than most UK medical schools. This may affect the way case-based discussions are perceived by Cambridge students.

A further concern was the number of non-attenders, especially in one of the cohorts. The characteristics of attenders and non-attenders was not examined in this study to compare whether non-attenders were more likely to be disaffected by lectures, which could potentially affect results in favour of case-based discussions. It is also possible that students who do not like case-based discussion chose not to take part in the study, biasing selection towards students who are more likely to enjoy case-based discussion. This would skew results in favour of case-based discussion. However, very few students attended teaching but did not consent to be in the study. Most non-attendance was because students had chosen not to attend a teaching session.

Another limitation of the study is that problem-solving skills were not measured in assessment methods. According to constructivist educational theory, assessment of problem-solving skills are more aligned to case-based discussions than knowledge-focused examinations, such as were used in this study. Thus, if teaching and assessment strategies were fully aligned, problem-solving skills should also have been tested. The reason for not including problem-solving skills as an additional learning outcome was that it is typically hard to reliably measure this after a limited number of specific teaching sessions; it is also a skill set that improves incrementally over a series of seminars. It would also have been difficult to form an accurate comparison with existing teaching and assessment strategies, which was the aim of the study.

It is also noteworthy that the resource and economic implications of the two teaching methods were not addressed in this study. Case-based discussions are more costly and resource intensive than didactic lectures as they can only be effectively delivered to small groups. However, case-based discussions are more aligned with modern educational theory as they promote active learning and problem-solving, rather than passive retention of knowledge. Miller's pyramid[13] illustrates this principle well, as 'knows' is the least effective way of demonstrating learning, whereas 'shows how' and 'does' are far superior. Thus, economic costs must be weighed up against acquisition of skills-based learning.

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Implications

This study confirmed our hypothesis that undergraduate medical students find interactive case discussions more enjoyable and educationally stimulating than didactic lectures. Teaching style had no effect on retention of knowledge for an exam one month later, suggesting that reduced enjoyment and stimulation is not delivered at the cost of reduced knowledge acquisition through a traditional exam. The implications of this study are that case-based discussions should be considered in teaching psychiatry in preference to traditional teaching strategies to make psychiatry more attractive and palatable to medical students across medical schools.

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About the authors

Dr Meinou Simmons is a Specialty Trainee Year 6 in Child and Adolescent Psychiatry at The Phoenix Centre, Ida Darwin Hospital, Cambridge. **Dr Paul Wilkinson** is a university lecturer in child and adolescent psychiatry at the University of Cambridge, UK.

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