A new model of paired clinical teaching of international and Danish medical students

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ABSTRACT

INTRODUCTION: Since 2006, one hospital has offered two clinical courses in obstetrics/gynaecology and paediatrics to international (I) students. However, as I-student enrolment increased, the hospital faced cut-backs. As from 2010, I-team course evaluations therefore dropped to unacceptable levels and more I- than Danish (DK) students failed exams. Therefore, in 2012 we started a three-year internationalisation project (I-project) at two hospitals. The primary intervention was to pair training for I- and DK-students at clinical contact, and to offer an exclusive daily lecturer for I-teams.

METHODS: We compared the course evaluations and exam grades of I-teams and DK teams for two years prior to (107 from I-teams – 211 participants from DK-teams) and during the I-project (245 participants from I-teams – 575 from DK-teams).

RESULTS: During the I-project, the I-teams' course evaluations increased to acceptable values and to levels comparable to the evaluation scores of DK-teams. Furthermore, I-students now considered that their communication with the patients was acceptable. Before the I-project, I-students had lower exam grades (median = 10 (range: 0-12)) than DK-students (10 (4-12)) (p = 0.03), but during the I-project, exam grades increased to the levels achieved by DK-students (10 (2-12) – 10 (0-12) (p = 0.22), and no more I- than DK-students failed exams (p = 0.51).

CONCLUSIONS: Pairing students for clinical training and allocating an exclusive lecturer for I-teams produced improved courses for internationalisation. Allocating an exclusive lecturer was associated with a cost of about 615 EUR per student per course when the team consisted of ten students.

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The University of Copenhagen's "Strategy 2016" includes promotion of education and creation of international collaboration and partnerships [1]. This can be achieved by offering international students (I-students) English-medium instruction and by using pedagogic methods that require close cooperation between Danish (DK-students) and I-students, thus providing DK-students "Internationalisation at home" [2]. At the School of Medical Sciences, exchange of students primarily takes place through the Erasmus and Nordplus programmes, which are based on bilateral agreements [3-5].

Since 2006, a limited number of I-students have participated in international clinical courses in obstetrics and gynaecology (Ob/Gyn) and paediatrics (Paed) at Hvidovre Hospital. The number of I-students increased from ten in 2009 to 12 in 2010 and to 14 in 2011. Simultaneously, the number of doctors at the departments decreased and the clinical work pressure increased due to general cut-backs. From 2010, the international courses received poor evaluations, e.g., the students gave *not acceptable* mean evaluations regarding some items, **Table 1**. In addition, from the autumn of 2010 to the spring of 2012, three I-students failed the exam in Ob/Gyn or Paed, while no DK-students failed.

The I-students attend the same Ob/Gyn and Paed courses as DK-students, so it was essential that they also had direct clinical contact to the patients. We therefore decided to implement training in pairs, consisting of one I- and one DK-student to allow I-students to work directly with the patients. When we planned the project in 2012, "training in pairs" had only been described to be efficient in simple tasks outside the medical community, but not in clinical medicine [6-9].

We conducted an internationalisation project (I-project) that included training students in pairs when having clinical contact with patients. These pairs were always supervised by a doctor who was responsible for the management of the patients. Moreover, we allocated a daily lecturer exclusively for the international team (I-team). This lecturer supervised a daily conference for the I-team and a student-chaired outpatient clinic where an I-student and a DK-student pair trained and met newly referred patients. In the clinic contact, the DK-students translated for the I-students and drafted the intended patient files in collaboration with the I-students.

The aim of this paper was to explore a model allowing I-students to achieve clinical contact with patients while DK students achieve "Internationalisation at home" while keeping exams grades and course evalu-

ORIGINAL ARTICLE

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TABLE 1

The student evaluations of the clinical courses in obstetrics/gynaecology and paediatrics[a]. Mean scores from the international and Danish teams, two years before (autumn 2010 to spring 2012) versus in the three-year internationalisation project period (autumn 2012 to spring 2015). Unfortunately, the international students had no evaluations in autumn 2010 and spring 2011.

	International teams		Danish teams	
	before	after	before	after
Response rate, % (n/N)b	75 (42/56)	73 (180/245)[c]	71% (163/230)	65% (375/575)[d]
How do you rate the department as a place for educating medical students?	5.3	6.3	5.9	6.1
To what extent have you trained as a physician, but still under supervision?	3.9/4.2[e]	4.8	5.0	5.4
How do you rate your communication with the patients?	3.1	5.2	–[f]	–[f]
How do you rate the efficiency of training in pairs?	–[f]	5.5	–[f]	–[f]
To international students: Do you think you have learned less, the same or more from attending the clinical course at the University of Copenhagen than you would expect to have done at your home university?[g]	3.5	4.9	–[f]	–[f]
To Danish students: How to you evaluate your benefit of being taught in English compared to being taught in Danish?	–[f]	5.4	–[f]	–[f]
To Danish students: How to you evaluate your interaction with the international students?	–[f]	5.6	–[f]	–[f]

a) The questions were evaluated on a 7-point Likert scale with scores: 1 = unacceptable, 4 = acceptable, 7 = excellent.
b) The number of courses, in general a student had both a course in obstetrics and gynaecology, and in paediatrics.
c) Prior to the internationalisation project the response rates were similar (p = 0.66).
d) During the internationalisation project the response rates were lower for the Danish teams than the international teams (p < 0.05).
e) Obstetrics and gynaecology, and paediatrics.
f) Not relevant.
g) Scores: 1 = much less, 4 = the same, 7 = much more.

TABLE 2

Template for feedback between the students followed by feedback between the lecturer and the students.

Between the students
The student who acted as a doctor says what went well
The supervising student says what went well, in addition to what the former said
The student with the doctor's role says what s/he would do differently next time
The supervising student suggests what could be done differently next time
Between the lecturer and the students
The students say what went well
The lecturer says what went well in addition to what the students said
The students say what they would do differently next time
The lecturer suggests what could be done differently next time

ations comparable to those of the DK-only student teams.

METHODS

Set-up for the I-project

Clinical courses in Ob/Gyn and Paed are given in the last (12th) semester of the medical curriculum. The control group counted students in the I-teams from the autumn of 2010 to the spring of 2012. The intervention group comprised students in the I-teams from the autumn of 2012 to the spring of 2015. In the I-project period, Hvidovre and Nordsjaellands Hospitals had 1-2 I-teams per semester. The I-teams consisted of ten students; five I-students and five DK-students (five pairs of students) at Hvidovre Hospital and of six students; three I-students and three DK-students (three pairs of students) at Nordsjællands Hospital. In total, 121 pairs of students were included in the project period. The clinical five-week-courses were conducted in English and comprised mandatory clinical residence four days a week including 20 hours of classroom-based tutorials. Moreover, two full days were allocated for case-based learning sessions for both I-teams in Hvidovre and Nordsjællands Hospitals. To complete the Ob/Gyn and Paed courses, the students neeeded to pass a 30-minute oral exam rated by an exam score.

The resource people in the I-project were the DK-students, who pair trained with the I-students, and a daily lecturer who taught the students exclusively. The students did not choose their partner themselves, and the pairing varied during the course. The student-chaired outpatient clinics were organised for 1-4 days per week at the four departments, depending on availability of nursing staff and exam rooms. In Paed, Nordsjællands Hospital, a trainee also functioned as a lecturer. Apart from training in the outpatient clinic, I-students were also trained by other staff members and doctors who translated for the I-student, e.g., in the operating theatre. The DK-students were rewarded for their participation through a diploma for "Internalisation at Home". Moreover they had closer contact to the lecturers and had the special outpatient clinics.

Pair training

Peer-assisted learning involves active and interactive mediation of learning through other learners who are not professional teachers. In reciprocal peer monitoring in pairs, one learner does the task while the other moni-

TABLE 3

Theme	Evaluation
About training in pairs	The outpatient clinic was great, especially for international students
	It was optimal when the families/patients were good at English
	It was difficult to remember to give feedback
	Doctors and nurses had to accept that they worked in pairs; sometimes they informed the students that they were not welcome as it would cause too many people in the room
	It was annoying when the patients did not show up to the outpatient clinic and when the patients did not accept to participate
	The latter happened sometimes in gynaecology as the medical topic was too sensitive and some patients did not want gynaecological exam by 2 students
About being an international student in the international teams	It was very good to meet patients without a diagnosis
	For most international students this could never happen at the countries they came from
	It was optimal when the families/patients were good at English; otherwise they were dependent on Danish students or Danish doctors
About being a Danish student in the international teams	It was interesting to be taught together with the international students
	It was tough to translate the consultation due to difficulties with medical English and with obstetrics/gynaecology or paediatrics at the same time
	It was tiring being the one who wrote the case reports
	It was nice to have special outpatient clinics and closer contact to the lecturers
	It would be optimal if this were the way all Danish students were taught in obstetrics/gynaecology and paediatrics

The student's evaluations of the clinical courses. The themes from the free text of the electronic questionnaires are shown from the international teams during the three-year internationalisation project period (autumn 2012 to spring 2015).

tors; then they give each other feedback when they shift roles [10]. The students were introduced to this method in a welcome letter and at the department. The lecturers were given a similar instruction. The feedback procedure is summarised in **Table 2**.

Student's evaluations and exam grades

Each course is evaluated via an electronic questionnaire comprised by a mix of closed and free text questions that are sent to all students by the Evaluation Unit of the Faculty of Health and Medical Sciences in the last week of the courses. The responses are anonymous and voluntary. The students could score the closed questions on a seven-point Likert scale where a score of 4 was acceptable and a score of 7 was excellent. Student evaluations from two years prior to and during the three-year I-project period were compared. Evaluation scores were given as mean values. We compared the mean scores for the I-teams (consisting of I- and DK-students) and the DK-teams. We calculated the mean evaluation scores for I- and for DK-teams from each department prior to and during the I-project, respectively. The scores for each semester were weighted equally. We also studied the exam grades of I- and DK-students at the exams in Ob/Gyn and Paed prior to and during the I-project period, respectively.

Statistics

The Mann-Whitney test, Fisher's exact test, and the Spearman-Rank test were used to compare numerical data, categorical data and data correlation, respectively. Two-sided tests were used and a significance level < 0.05 was considered statistically significant. IBM SPSS version 21 and the internet programme www.openepi were used.

Trial registration: not relevant.

RESULTS

Students' evaluations

During the I-project, I-teams scored "their communication with the patients" as acceptable. Likewise, other items were also evaluated at satisfactory levels and levels that were equivalent to those of the DK-teams, Table 2. Students' evaluation scores of "training as a physician under supervision" were directly related to the number (1-4 per week) of supervised student-chaired outpatient clinics that the department had provided during the course ($p < 0.05$).

Relevant free-text themes regarding pair training from the students' electronic evaluation questionnaires are listed in **Table 3**. In general, the students were pleased with the pair training and considered their clinical patient contact to be satisfactory. However, DK-students considered it a challenge to translate for I-students, and some nurses and doctors considered that "a pair of students" was too many people in the consultation room.

A pair of students in the Outpatient Clinic examine a boy who is at the hospital with his mother and sister. Photo: Dina Cortes, Hvidovre Hospital.

Students' grades

We studied 352 exam grades in Ob/Gyn or Paed from I-teams (168 from I-students) and 786 exam grades from DK-students in the DK-teams. There were 318 exam grades from exams prior to the I-project period (107 grades from I-teams) and 820 exam grades from the I-project period (245 from I-teams). Before the I-project, I-students had lower exam grades than DK-students ($p = 0.03$), but during the I-project the grades were equal ($p = 0.22$), **Table 4**. The DK-students on I-teams achieved the same exam grades as DK-students on DK-teams, both prior to ($p = 0.45$) and during the I-project ($p = 0.11$).

DISCUSSION

To our knowledge, this is the first study to describe a systematic model on how I-students can overcome linguistic barriers and benefit from short-term clinical university clerkships. The I-students obtained direct clinical contact with Danish patients, and the DK-students experienced "Internationalisation at home".

During the I-project, both evaluation scores and exam grades from the I-teams improved to levels comparable with the scores and grades achieved by the DK-teams. Furthermore, a survey of doctors working in the four departments in the spring of 2015 showed that more than 85% of the doctors involved in the I-project wished to continue the project, provided that one doctor every day would be allocated full time to I-teams on a routine basis and provided the students trained in pairs.

The students in I-teams considered that pair training was very efficient, and their evaluation of "to which level they worked as a physician" were similar to the evaluations from DK-teams. The students' highest mean score of "training as a physician under supervision" was observed at the department which offered four weekly outpatient clinics and in general required pair training. Our observations are in line with those of studies reported within the past years, reporting that medical clinical pair training was efficient for skill labs [11-15]. The students felt that pair practice improved their self-efficacy through social interactions with peers, provided useful insight through observation and contributed with a shared memory of what to do [16]. Theoretical assumptions regarding how and why collaborative learning works make reference to increased confidence, shared memory and cognitive partnership [11, 12, 14], concepts which are in accordance with interaction perspectives of the outcomes of collaborative learning of clinical skills [17]. It has been stated that pair training may not be applicable to clinical training involving real patients [14]. This is in contrast to our I-project. However, in our I-project, an attending doctor supervised the student-pair and was responsible for the patient. Thus, no patients were managed solely by the student-pair. We consider that under these conditions, clinical training in pairs is valuable. Recently, it was stated that in accordance with the cognitive perspective, collaborative learning of clinical skills is effective for learning complex tasks [17]. Obviously, clinical contact involving real patients is a complex task.

Recently, studies have also shown that pair training can give valuable knowledge about teambuilding and leadership development activities, which are important in medical training [14, 18]. However, pair training requires a cultural shift among doctors and nurses.

TABLE 4

The 352 exam grades of the international students and the Danish students at the international teams two years before the internationalisation project (autumn 2010 to spring 2012) versus during the three-year internationalisation project period (autumn 2012 to spring 2015).

	Before			During		
	international students	Danish students	p-value	international students	Danish students	p-value
Students with grades, n	47	60	121	124		
Grades, median (range)	10 (0-12)	10 (4-12)	0.034[a]	10 (2-12)	10 (0-12)	0.215[a]
Risk of not passing the exam, % (n/N)	6 (3/47)	0 (0/60)	0.047[b]	0 (0/121)	1.6 (2/124)	0.510[b]

a) Mann-Whitney test comparing international students with Danish students.
b) Fisher's exact test comparing international students with Danish students.

In our I-project, the students in a pair provided feedback to one another together with the lecturer since feedback is essential for the learning of complex skills [15, 16, 19, 20]. In the traditional medical curriculum in Denmark, it is uncommon to give feedback, and a survey of doctors working in the four departments in the spring of 2015 showed that only 38% of these doctors gave feedback to the students in the I-team.

The I-students' exam grades improved during the I-project. This may be owed to more intensive teaching. Even though translating for the international students was time-consuming for the DK-students, the I-teams achieved exam grades in line with those achieved by DK-students in DK-teams. The DK-students evaluate their benefit of being taught in English compared with being taught in Danish and their interaction with the I-students as good, at mean evaluation scores of 5.4 and 5.6, respectively. To our knowledge, this is the first study to consider these two questions.

Whenever possible, patients for I-teams were pre-identified to optimise the yield of the consultation, e.g., in Ob/Gyn at Nordsjællands Hospital, the student pairs had consultations with emergency patients who were not severely ill, and the waiting time for the patients was when shorter than expected. It was mandatory to select patients with referral diagnoses suited for pair training and to accept this when patients rejected pair training.

One of the limitations of our study is its relatively small size and the control population. The intervention group included 245 students who were recruited at four departments in two hospitals, and the control group included 107 students who were recruited from only two departments at one hospital. Furthermore, students for the intervention and the control groups were not randomly assigned, which may introduce bias. Moreover, in addition to the pair training and a daily lecturer, students received feedback, formalised supervision and special conferences. Consequently, it is difficult to address the isolated effect of the pair training. The principal disadvantage of the I-project model is the expenditure, which is estimated to be about 4,600 DKK (615 EUR) per student in Obs/ Gyn and Paed, respectively, when the team consist of ten students. However, at Paed, Nordsjællands Hospital, a trainee was responsible for the I-teams on a third of the days. By replacing a lecturer with a trainee doctor in one out of three days, the cost can be reduced to about 4,000 DKK (530 EUR) per student in one of the courses when the team consists of ten students.

CONCLUSIONS

We propose a new model for clinical training of I-students including pair training and association of a lecturer on a daily basis, including special student conferences and special students outpatient clinics. This model can be applied worldwide in other clinical settings for training of non-native speaking medical students. However, we need to explore whether costs can be reduced while maintaining equal evaluations and exam scores. We are planning to investigate to which extent a trainee doctor can replace the lectures by the doctor allocated for the I-teams on a daily basis as this would reduce the costs associated with this new training model.

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