

FACULTY/STAFF DEVELOPMENT

Residents as Teachers: Outcomes of a Brief Training Programme

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ABSTRACT Introduction: Residents (RMOs) teach medical students in hospital wards, yet little evidence of efficacy is available for this activity. This study undertook to test the effectiveness of RMO teaching, and to delineate the principal barriers encountered.

Methods: Medical students in their fourth year were assessed at baseline for clinical examination skills in ophthalmoscopy, neurological examination of the legs, and rheumatological examination of the hands. One group of RMOs (n=6) taught ophthalmoscopy to the students attached to their unit, while the second group of RMOs (n=6) taught leg examination to their students. The third examination skill was not taught, but was used as a control intervention. The students were evaluated in all three skills by an observed, structured clinical examination at the beginning and end of their six-week attachments.

Results: There was a significant improvement in the skill of ophthalmoscopy in the intervention group ($p < 0.02$), while the control group of students showed a decline in their abilities. The skill of examination of the legs improved after being taught, but not significantly. The RMOs universally reported that difficulty in finding time was a major barrier to their ability to teach medical students, and most set up additional teaching sessions rather than incorporate the teaching into their routine ward work.

Conclusions: RMO teaching of medical students is effective, particularly for a skill which is novel. The difficulties arise in finding a suitable time for these important clinical teachers to transfer their skills.

KEYWORDS Resident medical officers, teaching, medical students.

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Introduction

The primary role of junior medical staff or residents (RMOs) in teaching hospitals is patient care, yet teaching of medical students and junior residents has often been noted as an additional major responsibility (Sheets *et al.*, 1991; Bing-You & Tooker, 1993; Dunnington & Da Rosa, 1998). The majority of RMOs spend up to 20% of their time teaching, but do not receive training in the principles of adult learning or methods of instruction (Dunnington & Da Rosa, 1998). Even fewer receive evaluation of their teaching skills.

Residents' perception of the value of their teaching is ambivalent. RMOs indicate that they enjoy teaching, and view it as a critical aspect in their own education, and yet report that teaching medical students made their clinical responsibilities more difficult, and that they feel anxious about teaching (Sheets *et al.*, 1991). In one RMO survey, 71% responded that they see teaching as a primary responsibility, but that they feel unprepared for their teaching role and lack confidence (Brown, 1970; Wilkerson *et al.*, 1986). Training programmes are generally welcomed by residents, believing that developing their teaching skills deserves serious attention (Brown, 1970). Teaching Skills Improvement Programmes (TSIP) are yet to be defined accurately with respect to optimum programme length, facilitation and content, although RMO teaching skills do improve after some formal instruction (Bing-You & Tooker, 1993; Dunnington & Da Rosa, 1998). Due to the limited time residents have to spare during their ward work, instruction time is preferably brief. Bing-You and Tooker suggest that the optimal time for instruction of RMOs in teaching skills is 9 hours (Bing-You & Tooker, 1993), while other projects suggest that a minimum of 12 hours may be necessary in order to obtain effective results (Lawson & Harvill, 1980). Nevertheless, the preference towards short programmes is significant amongst many residents (Spickard *et al.*, 1996). Shorter programmes may be optimal due to high levels of participation and benefits within a short period of time (Sheets *et al.*, 1991), and these can produce significant observable improvements in teaching behaviour (Lawson & Harvill, 1980). Results from small group microskills training show significant improvement in RMO performance as measured by pre- and post-tests and in their change of attitude (Lawson & Harvill, 1980). It may be more important, however, for RMOs to acquire practical teaching skills than focus on modifying attitudes to teaching, as RMOs utilise the opportunities and material provided by their patient encounters as teaching material, and do not usually introduce structured topic teaching.

RMOs are well placed to transfer clinical skills to medical students during their clinical attachments. Medical students are on the wards seeing patients and attending the RMO ward rounds, and are therefore influenced to a greater extent by RMOs than faculty members, because of the greater time spent together (Sheets *et al.*, 1991). In support of this observation, it is reported that students are reported to obtain approximately one third of their knowledge

during clinical clerkships from RMOs (Sheets *et al.*, 1991; Bing-You & Tooker, 1993) and student feedback has been used to provide insights into the effectiveness of resident rotations (Prislin *et al.*, 1998). This proximity allows both formal and informal teaching, and therefore we wished to investigate whether student learning could be facilitated, and if it would be successful. Studies upon the process of cascading, that is, flowing of skills from experienced teacher to novice and then to student (White *et al.*, 1997), and peer teaching (Biernat *et al.*, 1998) have often focused on the learning benefit to the RMO teacher, and few studies have examined the learning outcome of medical students resulting from teaching skill interventions with RMOs. This study was designed to address this deficit and also sought to determine if there were specific difficulties whilst engaged in this exercise that could be identified. In addition, previous unpublished surveys of students at this institution had identified student-reported shortcomings in specific clinical skills, including ophthalmoscopy, and the study was designed to address ways of improving teaching in these areas.

Methods

Participants

Medical Students. All Year 4 Medical Students at UNSW attached to one teaching hospital were approached as a group and invited to participate. Year 4 Medicine is the first completely clinical year of a 6-year programme, although all students have been taught basic clinical history taking and examination techniques during Year 3. A group of Year 4 medical students was therefore studied using an assessment of their clinical skills by an observed, structured clinical examination (OSCE) before and after the RMO teaching period took place. The potential total numbered 60, and of these, 42 attended the initial OSCE assessment. Those who attended were invited to return for the second assessment 6 weeks later. The usual student clinical attachments of general medicine, general surgery and orthopaedics were retained for this study.

RMOs. A group of 12 RMOs in their first or second postgraduate year attached to the clinical teaching teams volunteered to participate. RMOs were recruited by personal approach from a colleague, and those who expressed interest were enrolled. RMOs from three student attachments did not volunteer and their students were used as controls. The volunteer RMOs were randomly allocated to one of two groups. Both groups took part in a brief tutorial outlining principles of teaching practical skills. They then separated for a demonstration, explanation and practice of one of the two physical examination skills by an expert in that field (ophthalmoscopy or neurological examination of the legs). During this training session RMOs rehearsed their

physical examination and teaching skills, but they did not have practice teaching with students. Conduct of a single teaching skills session with one "clinical expert" for each clinical skill was the single standardisation attempted in this brief intervention. Each RMO was asked to teach the skill in which they had received instruction to the students attached to their clinical team. These RMOs were given no further direction about when and how to incorporate this activity into their daily routine. Students were attached to their RMO for 6 weeks during this study.

Teaching

The teaching covered two main clinical areas. Skills of basic ophthalmoscopy and neurological examination of the legs were selected as examination tasks for this study. A control examination of basic rheumatological examination of the hands was included, which is taught in Year 3. Ophthalmoscopy was chosen as this is not usually taught in Years 3 and 4, and is generally perceived to be a poorly acquired skill. Neurological examination of the legs was chosen as this is taught in Year 3 and again in Year 4, and we wished to see whether additional teaching would enhance the performance of this skill.

Assessment

Each student was assessed in OSCE format in each skill at the start and end of their clinical attachment with the RMO. Performance of each skill was scored using a previously validated and structured assessment, with the exception of ophthalmoscopy which is not usually assessed at clinical examinations in this university. This latter assessment was constructed with an emphasis upon technique, rather than interpretation of findings. Each station was scored out of a possible 40 marks. The marking structures are available from the authors.

Study Design

The OSCE was performed at baseline, and within one week the RMOs were instructed in either ophthalmoscopy or how to perform neurological examination of the legs. The RMOs were then instructed to make contact with identified students who were attached to their clinical units, and to teach their particular skill to those students. Six weeks after the initial OSCE, the students were re-evaluated by the same OSCE and results collated. At the conclusion of the term RMOs were surveyed about their experience by questionnaire which addressed: whether and when teaching occurred, whether students were observed performing the skill and how often, the RMOs' perceived confidence in performing and teaching the skill, the effect on their workload, adaptations they made to teaching and to document any difficulties in teaching. RMO teaching skills were not assessed prior to the intervention.

Statistical Analysis

Data are expressed as mean (SD) or median (range), and those corresponding to the Normal distribution were analysed by *t*-test; non-parametric data were analysed by Wilcoxon signed-rank test.

Results

Students

Of the 42 students who attended the first OSCE, 41 attended for the second evaluation. This study followed the pre-existing student allocation system. Eleven of the 12 RMOs attempted to teach students, but these were not in equal sized groups, nor was the distribution of students equal between the two clinical skills that were taught. This was largely due to the distribution of students not matching the distribution of RMOs, and therefore some RMOs were assigned to teams that had many patients, but fewer students.

OSCE Results

These results are tabulated in Table 1. Students taught ophthalmoscopy demonstrated a significant improvement in their skills from a mean (SD) score of 16.0 (6.8, $n=11$) to 21.2 (10.9, $p < 0.02$, paired *t*-test). It is of interest that the

Table 1. OSCE results

Skill taught	Baseline mean (SD)	Post-teaching mean (SD)
<i>Ophthalmoscopy group</i>		
RMO ($n = 6$) Student ($n = 22$)		
Score for:		
1. Ophthalmoscopy	16.0 (10.6)	21.2 (10.9)**
2. Legs	25.8 (7.5)	22.1 (10.3)
3. Hands (control assessment)	21.9 (7.6)	23.8 (10.5)
<i>Neurological examination of the legs group</i>		
RMO ($n = 6$) Student ($n = 11$)		
Score for:		
1. Ophthalmoscopy	16.2 (9.2)	21.4 (7.6)
2. Legs	22.9 (9.9)	25.8 (6.8)
3. Hands (control assessment)	19.7 (6.6)	28.7 (5.9)***
<i>Control group</i>		
RMO ($n = 0$) Student ($n = 9$)		
Score for:		
1. Ophthalmoscopy	23.4 (7.7)	18.9 (10.1)
2. Legs	31.9 (6.7)	23.1 (3.8)*
3. Hands (control assessment)	26.6 (2.4)	28.3 (5.1)

OSCE results for all student groups taught either a skill or who acted as a control group. Each group was assessed in each of three skills (ophthalmoscopy, neurological examination of the legs of examination of the hands (control)). OSCE results are expressed as group mean (SD) before and after the training programme. * $p < 0.05$, ** $p < 0.02$, *** $p < 0.001$.

group which were taught examination of the legs also demonstrated an improvement in ophthalmoscopic skills from a mean score of 16.2 (9.2, $n=22$) to 21.4 (7.6, $p=0.057$, paired t -test).

Those taught examination of the legs showed an improvement in this skill from a mean score of 22.9 (9.9) to 25.8 (6.8), which was not significant ($p=0.55$, paired t -test). This group also demonstrated a significantly increased ability in examination of the hands from 19.7 (6.6) to 26.7 (5.9, $p<0.001$, paired t -test). The control group, which was taught neither skill, demonstrated no significant improvement in their scores for any of the three skills assessed, and in fact showed a decrease in scores in all three skills, reaching significance in examination of the legs.

RMOs

Three of the 11 RMOs did not teach the allocated skill, two because of insufficient time, and one because their only student was an optometrist prior to enrolling in medicine, and this RMO's allocated skill was ophthalmoscopy. None of the RMOs was able to incorporate this clinical skill teaching into their routine ward rounds. All eight who taught scheduled additional teaching time outside their working day for this activity. All but one RMO subsequently observed their students performing the allocated skill, usually more than twice per student. All eight RMOs who taught a skill reported increased confidence in performing that skill, as well as teaching the skill. The additional teaching was not reported to impact adversely on their other ward teaching, but two reported an impact on patient care duties. Time was the major factor limiting the RMOs teaching.

Conclusions

This study chose relatively common physical examination tasks, and these simple but important clinical skills had been identified in previous UNSW medical student surveys as areas of student uncertainty (unpublished data). These tasks allowed straightforward assessment by direct observation and rating using an OSCE format, and the results indicate an improvement in student performance in physical examination, after specific interventions.

This study demonstrated that significant clinical skill transfer can take place in a vertical manner from RMOs to medical students, with minimal instructional intervention. It was most noticeable, and significant, in ophthalmoscopic skills which had not been taught previously. The group taught examination of the legs, in contrast, showed an improvement in ability, but this failed to reach significance even though the number of students studied was larger ($n=22$ versus $n=11$). It is of interest that the group taught examination of the legs also showed an improvement in examination of the hands, which was the control intervention. One possible explanation may be that many students

were attached to an orthopaedic term, and may have acquired skills related to hand examination at this time, although these are not formally taught until the students attend a rheumatology attachment. It is also possible that the RMOs assigned the examination of the legs were less skilful teachers than their colleagues, but random allocation of RMOs to each skill was intended to limit this potential bias. The control group of students, although small, showed a decline in clinical skills in all three areas, with a significant decrease in neurological examination of the legs, suggesting that the improvement in the other groups was associated with the intervention. This also suggests that the pre-test OSCE did not induce improvement across the study groups. Selection of interested RMOs should not have biased the student performance, as the results did not demonstrate a global increase.

All RMOs reported difficulty in finding time during the working day to teach the students and for this reason two of the 11 were unable to fulfil these teaching commitments at all. Incorporating teaching into the daily work proved difficult and most RMOs provided additional teaching sessions at the end of the day. This also indicates that RMOs felt most comfortable organising a formal period when they were less likely to be interrupted, but it in turn means that more time is required. Practical instruction on how to teach examination skills whilst on routine ward rounds may be a useful method to reduce the burden on junior staff (Wilkerson *et al.*, 1986; Irby, 1995). Thus, RMOs found it very difficult to integrate structured teaching into their daily ward routine, because of their existing workload. The paradox is that it is this workload and accessibility of junior medical staff that makes them important practical teachers of "the curriculum presented by the patient". In conclusion, RMO teaching of medical students is effective, but requires further investigation in its delivery so as not to create an additional burden upon junior medical staff.

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