

▶ Medical students represent a valuable resource in facilitating telehealth for the under-served

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Summary

Over a two-year period, eight medical students from four U21 universities spent their electives at hospitals in Pakistan, Papua New Guinea and Sri Lanka. They made a total of 49 e-referrals which resulted in 67 queries in a wide range of specialties. The median response time was 20 h (interquartile range 5–85). Follow-up data were obtained in 14 of the 30 cases from one hospital (47%). The major categories of the 67 queries were internal medicine, paediatrics and surgery, and in very similar proportions to the 785 queries managed by the Swinfen Charitable Trust over the same period. The presence of a medical student facilitated e-referrals by relieving the pressure on the local doctor to undertake the necessary clerical and technical work. The students reported a rewarding elective experience which appears to have the potential to increase the ease with which heavily burdened medical staff in developing countries can make use of e-referrals.

Introduction

Since 1999, the Swinfen Charitable Trust (SCT) has operated a low-cost telemedicine network to support doctors working in hospitals in the developing world.¹ Email and, more recently, Web messaging are used to facilitate communication between doctors. In principle, telemedicine in the developing world might be facilitated by the presence of medical students. However, there has been little previous experience with medical student telemedicine in developing countries – the SCT was involved, briefly, with Emory University in 2001 and a medical student initiated some referrals from the Solomon Islands.²

In 2005 the Health Science Group of the Universitas 21 consortium of universities (U21) began a pilot project that involved U21 universities providing support to an under-served health facility in a developing country.³ The initial aim was to provide support to local doctors via information and communications technology – telemedicine – and to involve U21 medical students on elective placements. As well as establishing low-cost telemedicine networks in developing countries, a long-term aim was to gather data about their effectiveness.

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Aims of the elective

Like the electives of the State University of New York,⁴ the general aims of the U21 e-health electives are:

- (1) academic (to widen students' understanding of how health care is delivered in disadvantaged countries and to increase their clinical experience);
- (2) service (to contribute to local service delivery);
- (3) cultural (to better understand cultures other than the students' own).

The specific aims of the electives are to facilitate a telemedicine service and to obtain follow-up data on patients previously managed through telemedicine.

Telemedicine referrals

Students are responsible for operating a telemedicine support service on behalf of the local hospital doctors. This means that students need to attend the ward rounds and offer the local doctor the possibility of obtaining a second opinion in appropriate cases. The local doctor has the role of supervisor and preceptor in relation to the student, and ultimately it is the local doctor who chooses cases for telemedicine referral.

Once an appropriate case has been identified, the student is in charge of collating all appropriate evidence (history, examination results, photographs) and transmitting the details to the U21 Coordinating Centre. Specialist advice is provided by consultant staff from the U21 universities and the SCT. When the reply is received (usually after a day or two) the student provides the information to the local doctor concerned and looks after any further electronic dialogue between the parties.

Follow-up

A crucial part of the project is to obtain follow-up data on patients previously managed by telemedicine. The U21 Coordinating Centre provides each student with a patient list at regular intervals and they then try and follow-up the patients. There is a form for collecting follow-up information in a standardized manner (Appendix 1).

Students

In order for effective student participation in the project, there are various practical and logistical matters that need to be addressed prior to student departure. The practicalities of accommodation, travel and visas need to be dealt with. In addition, students are provided with basic pre-trip briefing documentation, camera training and training on the Web-based e-referral system.

After the trip students are requested to participate in a standardized post-trip interview and/or provide a report or 'blog'. The post-trip interview has a number of purposes, which include providing students with the opportunity to formally debrief, to identify any emerging problems that need to be addressed prior to the next student placement and to gain information to help evaluate the project.

Results

The project began in mid-2005. In the first two years, a total of eight medical students from four U21 universities spent their electives at hospitals in Pakistan, Papua New Guinea and Sri Lanka. Most electives lasted about four weeks. Most of the students were in their final year.

Referrals

A total of 49 cases were referred either directly by the students, or indirectly by the medical staff that they worked with, i.e. after the students had left (Table 1).

Case-mix

The 49 cases resulted in a total of 67 queries. These were answered by specialists from the panel of the SCT and by specialists from the U21 health faculties. The median

Table 1 Referrals

Hospital	Referrer	Cases
Ragama, Sri Lanka	HKU (2 students)	5
	UBC	4
	Total	9
Tabubil, Papua New Guinea	LMS	5
	NUS	3
	UQ	7
	UQ	2
	LMS	6
	HKU	4
	LMS	2
	LMS	1
Total	30	
Rawalpindi, Pakistan	UQ	5
	LMS	2
	Total	7
Islamabad, Pakistan	LMS	3
	Total	3
	Grand total	49

HKU: Hong Kong University student, on behalf of the LMS; LMS: local medical staff; NUS: National University of Singapore student, on behalf of the LMS; UBC: University of British Columbia student, on behalf of the LMS; UQ: University of Queensland student, on behalf of the LMS

response time was 20 h (interquartile range 5–85 h). There was a broad range of query types (Figure 1).

Follow-up

Follow-up data were obtained for 14 of the 30 cases referred from the Tabubil Hospital in Papua New Guinea (47%).

Student experience

The students who participated had a range of motivations for participating. A common factor identified by all students surveyed was the opportunity to gain experience in a different culture and health system from their country of study. For one student the opportunity to undertake an elective in a low-resource site was a particular motivator: 'I thought that if the placement was in an area where there were less staff, I may be able to get more hands-on experience, rather than being on the end of a long queue of people on ward rounds'.

The students' level of previous involvement and use of telemedicine systems varied, as did their previous experience of travelling and working (paid or as a volunteer) in developing countries. For example, one student had previous volunteer experience in two other developing countries and extensive personal travel, while others had never left the boundaries of their home country.

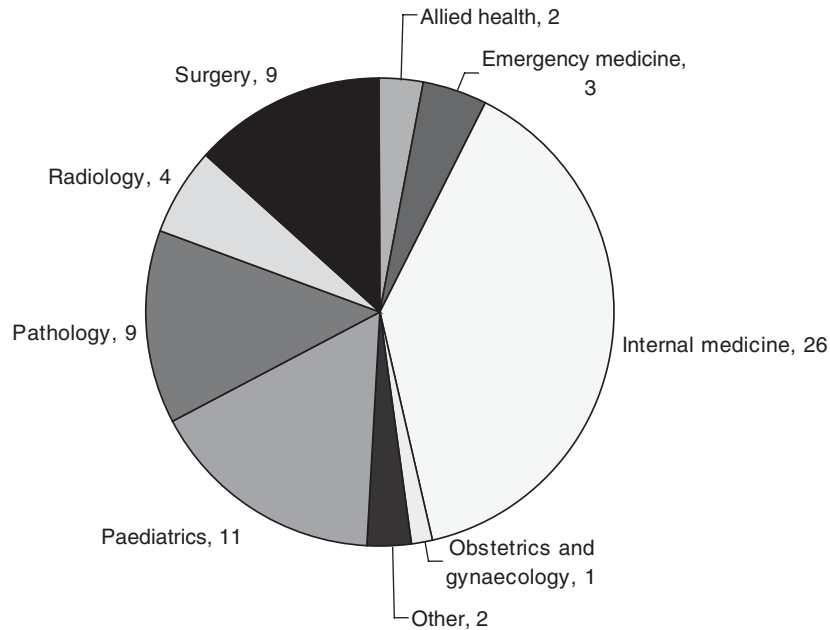


Figure 1 Main categories of U21 queries, June 2005–May 2007 (n=67)

Linking the elective experience with a clear role also provided students with a definite activity, with students reporting that the U21 project gave a purpose to the placement. As one student expressed it, *'often students don't always have a "role" other than to sometimes feel as though you are hanging around as the silent observer. This way you could feel as though you were contributing'*.

Students also experienced a number of challenges. There was the obvious and relatively easily rectified technology breakdown; the slightly more complex processes of advocating with local health practitioners who in some instances did not initially see the value of telemedicine referrals (*'it's a slow process to keep banging the drum and encourage referrals'*); and the continuing challenge of cultural and language barriers.

Overall for students, the three principal objectives of the project in the areas of academic, service and cultural experience were met with a high degree of success.

Referring doctor experience

Feedback was obtained from one of the referring doctors at the Tabubil Hospital who had acted as mentor for one of the medical students. She reported that the student had been a great help in facilitating e-referrals (e.g. by writing formal case histories), taking photographs and scanning electrocardiograms) and that the responses had been useful both in supporting her decision-making and in providing new information about particular cases. She felt that final-year medical students were an excellent resource.

Discussion

The present study suggests that barriers to the success of telemedicine projects in developing countries include the time and resource constraints experienced by local medical staff which inhibit them from undertaking the documentation and referral process to request the information. The linking of elective opportunities for medical students with a telemedicine project not only provides a clear purpose to the elective experience for the student but also mitigates this barrier to telemedicine. We have previously noted that the quality of photographs taken by local medical staff for telemedicine purposes is often unsatisfactory.⁵ It was pleasing to observe that the clinical photographs taken by the medical students were of generally higher calibre.

The student placement process also allowed follow-up data to be collected on patients. At the time of writing this has only occurred in a small number of referrals (n=14). Nonetheless, to our knowledge this is the first time that such data have been collected. The follow-up data provide a unique opportunity to assess the longer term value that e-consulting provided to the patient and the local medical staff. In one case the referring doctor reported that *'By providing a clear diagnosis, money was saved on trialling a variety of other treatment regimens and also preventing an unnecessary referral [i.e. patient transfer] to a specialist in Australia. This referral was very useful in both diagnostic and management sense but also in an educational sense. Diagnosis was made clear and the variety of treatment options and possible complications canvassed'*.

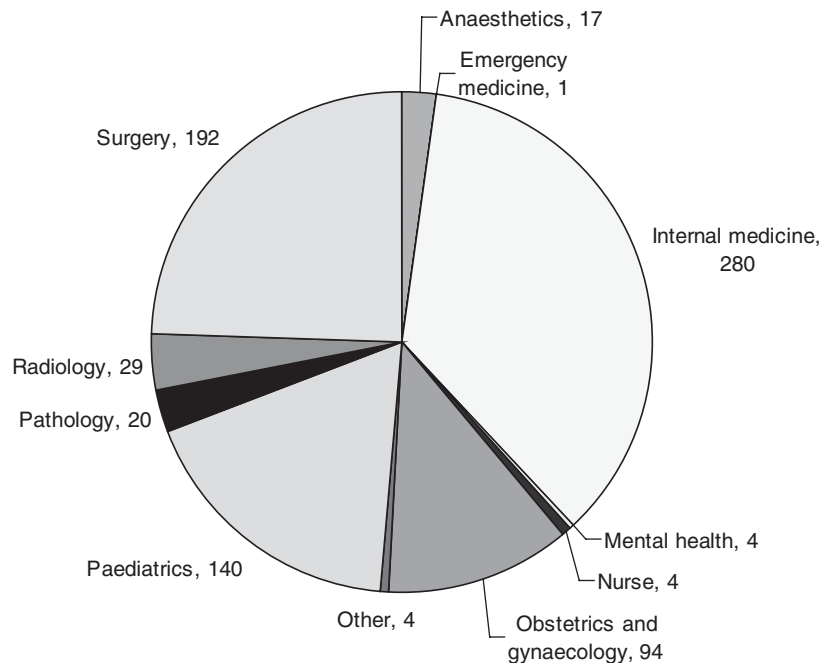


Figure 2 Non-U21 queries, June 2005–May 2007 ($n = 785$)

The case-mix of the e-referrals in the project was broadly similar to that of the e-referrals received by the SCT during the same two-year period (Figure 2). The major categories in each case were internal medicine, paediatrics and surgery, and in very similar proportions in the two cohorts. However, the U21 referrals were relatively more frequent in pathology and radiology, and relatively less frequent in obstetrics and gynaecology and surgery.

Regardless of the individual's level of previous overseas experience or number of years of study, all students required a level of pre-departure support to facilitate a successful placement process. As Imperato⁴ has pointed out, students require support in at least four areas: health preparations and precautions; travel and lodging; host country health-care system and assignment site; host country culture. Willingness by students to take a risk and be self-reliant and resourceful has been essential to successful placements to date. In the longer term however, the establishment of a sustainable support framework for students before, during and after placement will be critical for the success of the project.

As with any project there are always unforeseen and unintended consequences. At one site, the local doctor had been reluctant to become engaged in the e-referral process; however, following the departure of the student, she commenced using the system on her own and found it very valuable. Two students have indicated that as a result of their positive experience, they would like to return to a developing country to work once they have completed studies and gain more practical experience.

Although these encouraging results prove nothing more than the feasibility of the medical student elective model in facilitating the use of telemedicine in under-served locations – and certainly suggest nothing about its sustainability – a useful start has been made and the potential has been demonstrated to a wider audience than the U21 group of universities.

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Appendix 1 Follow-up form

Patient Feedback Form, to be completed by student:

0. Patient name and case no [no]
1. Date of follow-up: ... / ... / ...
2. Is the patient still alive? Yes No
If no, go to question 9.
3. Has the patient been seen by any other doctor(s) since the teleconsultation? Yes No
If yes, has a different diagnosis been made? Yes No
4. Since leaving hospital, the patient's condition is: (please circle as appropriate)
better worse about the same
5. Did the treating doctor expect the patient to improve after discharge? Yes No
6. Has the patient complied with the treatment advised in hospital? Yes No
7. What would have happened if e-health had not been available? (Treating doctor's opinion)
.....
.....
8. In the treating doctor's opinion, did the use of e-health provide: (*please briefly explain each response*)
- a. functional benefit? Yes No
Comment:.....
.....
- b. symptomatic benefit? Yes No
Comment:.....
.....

c. clarification of diagnosis? Yes No

Comment:
.....

d. clarification of management? Yes No

Comment:.....
.....

e. overall benefit to the patient? Yes No

Comment:.....
.....

f. any other benefits? (e.g. to the medical team) Yes No

.....
.....

g. cost savings? Yes No

Comment:.....
.....

9. Please provide any known details in relation to the date and cause of death:
.....
.....