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► Prospective case review of a global e-health system for doctors in developing countries

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Summary

The Swinfen Charitable Trust has managed email consultations for doctors in developing countries since 1999. The process was handled manually for the first three years and then subsequently using an automatic message-handling system. We conducted a prospective review of email consultations between referring doctors and consulting specialists during six months of automatic operation (December 2003 to May 2004). During the study period 125 consultations took place. These concerned a wide range of specialties (e.g. orthopaedics 17%, dermatology 16%, obstetrics and gynaecology 11%, radiology 10%). Of these referrals, 33% (41) were for paediatric cases. Consulting specialists, who were based in five countries, were volunteers. Referring doctors were from 24 hospitals in 12 developing countries. The median time from referral to definitive reply was 1.5 days (interquartile range 0.6–4.9). There was an 85% response rate ($n=106$) to a survey concerning the value of the consultation to the referring doctor. All the referring doctors who responded made positive comments about the service and half said that it improved their management of the case. The second-opinion consultation system operated by the Swinfen Charitable Trust represents an example of a global e-health system operated for altruistic, rather than commercial, reasons.

Introduction

The Swinfen Charitable Trust (SCT) is one of several organizations using email to provide second opinions to

doctors in developing countries. The charity, which has been growing steadily over the past five years, uses a panel of specialists who volunteer their time and expertise to assist colleagues in the developing world. Email provides a practicable and reasonably reliable method of performing low-cost telemedicine.

In reviews conducted in 2000 and 2002, the service provided by the SCT was found to be valuable to the referring doctors^{1,2}. In 2002, an automatic message-handling system was brought

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into operation owing to the increasing case-load and the associated work of handling the email messages manually. The manual handling of messages also made undertaking reviews a very laborious task, and an added benefit of the automatic system was that message traffic is archived and readily available for subsequent analysis³. A retrospective review of the usefulness of the service was conducted in 2003, although there was a poor response rate from the doctors surveyed (38%)⁴.

We have conducted a prospective review in order to obtain better survey data. There were two main objectives. First, we wished to determine whether the management of patients in developing countries changes (improves) following the provision of email advice and whether the referring doctors find the service useful. Second, we examined the feasibility of a global email telemedicine system for developing countries, to determine, for example, how long it takes to resolve a query in practice.

Methods

User survey

We surveyed the doctors who had referred cases through the automatic message-handling system during the period December 2003–May 2004 inclusive. A short survey was sent by email, asking the following questions about each new case:

- (1) Did you use the advice given?
- (2) Did you find the advice helpful?
- (3) Did the advice received change the management of this patient?
- (4) What are your opinions of the service?
- (5) Would you be happy to use the service again?

The survey message was sent approximately 10 days after the response from the specialist(s), to allow time for the referring doctor to consider the advice provided and to implement it if appropriate.

System performance

Data were taken from the message database to quantify aspects of the system's performance. Statistics were calculated on the time to resolution of cases, that is, the interval between the original referral being received by the SCT and the first response from a specialist being sent to the referring doctor.

Results

User survey

There were 125 cases sent to the SCT during the six-month survey period. Thus 125 surveys were sent to referring doctors. There were 106 responses, a response rate of 85%. The results indicated that the advice provided was used by 93% (99) of the respondents. Seventy-nine per cent (84) found it helpful; for a

Table 1 Results of the prospective review ($n=106$)

	Number of responses	Proportion of respondents (%)
<i>Was the advice provided helpful?</i>		
No	7	7
Yes	99	93
<i>Did you use the advice given? (If not, why not?)</i>		
No (patient died)	1	1
No (patient did not return)	8	8
No	13	12
Yes	84	79
<i>Did the advice received change the management of this patient?</i>		
Confirmed diagnosis or management	13	12
No	37	35
Yes	56	53
<i>What are your opinions of the service?</i>		
Positive	106	100
<i>Would you be happy to use the service again?</i>		
Yes	106	100

further 8% (8) the advice was not helpful because the patient did not return for follow-up. In one case the patient died before the doctor received the advice. Over half (53%) of all respondents indicated that the advice provided changed the management of the patient and a further 12% indicated that the advice confirmed their diagnosis or management. All respondents had positive opinions about the service and said they would use the service again (Table 1).

Paediatric cases accounted for 33% of the referrals received. The whole case series involved approximately 30 different specialty areas, the most common being orthopaedics (17%), dermatology (16%), obstetrics and gynaecology (11%), radiology (10%) and neurology (6%). The cases came from 24 different hospitals in 12 countries. The countries sending the most referrals were Nepal (34%), the Solomon Islands (18%), Bangladesh (16%) and Iraq (10%).

System performance

The 125 referrals generated 161 queries, an average of 1.3 queries per case. A *referral* refers to a second opinion being sought about a unique patient case. When a referral is sent to a specialist it represents a *query* and since one case may be sent to several specialists before a definitive reply is received, there may be multiple queries for each case. These cases involved 416 email messages being sent between referrer and specialist, an average of 3.3 per case. The median time between the SCT receiving an email referral and the referring doctor receiving a reply from a specialist was 1.5 days (interquartile range 0.6–4.9). Half the cases were responded to within 2 days and 90% had been responded to within 12 days.

Discussion

The growth of the SCT over its five years of operation is encouraging. As the survey responses showed, the referring

doctors found the service very useful and therefore were happy to use the service again in the future. The median time from the original referral being sent and a definitive reply being received is also excellent (less than two days), especially considering that all specialists provide their advice on a volunteer basis and are located all over the world.

The results of the user survey show that the advice provided through the SCT service is helpful and appreciated; it also changes the management of patients in a high proportion of cases. The response rate for the prospective review (85%) was substantially higher than that of the previous, retrospective review (38%). The results of both reviews, however, indicated that the users of the service found it helpful and appreciated the ability to access specialist advice. Over half the respondents had changed their management plan as a result of the advice provided.

The response rate for the prospective review was very good considering that hospitals in the developing world have high staff turnover—commonly overseas-trained doctors spend only short periods of time there and then return to their home country. Patient follow-up is also difficult as the patients may not return to the hospital after the initial treatment, and hospital record systems may be lacking.

The SCT is a charitable organization that depends on the willingness of consultant staff to respond to their colleagues, using spare moments during the working day, or often in the evenings. There is a parallel here with grid computing⁵, where unused processing cycles on computers connected to a network are used for solving problems too intensive for any

single machine—in the SCT operation, consultant resources around the world are brought to bear on specific questions via the Internet.

The SCT network represents an example of a sustainable global e-health system, which is operated for altruistic, rather than commercial, reasons.

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