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Adoption of Telemedicine in Scottish Remote and Rural General Practices: A Qualitative Study

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1. Introduction

In the past decade there has been increasing use of information technology in Scottish primary care. The majority of general practitioners (GPs) now accept that computing is part of their everyday practice.[1] Some GPs in Scotland have used telemedicine for the referral of patients for specialist opinion or for access to educational resources. However, although the potential benefits of telemedicine to primary care are arguably greatest in the remote and rural context, the few existing studies suggest that uptake is slow and piecemeal.[2] There have been a number of studies of the knowledge, experience and attitudes of health-care professionals to telemedicine.[3-5] These have indicated that although there is general satisfaction with the experience of using telemedicine, health professionals have concerns about the negative effect on the consultation, establishing the infrastructure and adopting telemedicine systems into existing organizational systems.

There have been relatively few detailed studies of the complex issues such as individual attitudes to telemedicine and the organizational readiness for telemedicine. However, May[6] has developed a model for assessing the conditions necessary to introduce complex interventions like telemedicine. As well as a lack of information about individual attitudes, there is a particular dearth of information about nurses' knowledge of computers or telemedicine compared with the growing literature about doctors' knowledge.

The present study examined the attitudes of primary care practitioners, both nurses and doctors, to the adoption of telemedicine. The study comprised two elements: a postal survey and an interview study. The quantitative data have already been published.[7] This paper reports the qualitative results.

2. Methods

The response rate for the postal survey was 87% (n=193). Of these respondents, 30 were identified for the interview sample. Purposive sampling was carried out to include professionals with varying levels of telemedicine experience, as established by the survey. Three groups were identified: those with no experience (never used telemedicine); those with some experience (who had used two applications; and those with extensive experience (who had used more than two

applications). We then randomly selected equal numbers of respondents from each category. For the purposes of the sampling, telemedicine was defined as the transmission of laboratory results, X-rays or electrocardiograms, and audioconferencing or videoconferencing for education or clinical purposes. More GPs than nurses were interviewed because there were more GPs in the sampling frame and because the survey had demonstrated that GPs were more involved in telemedicine initiatives than nurses. The final sample included people from island and mainland practices across Scotland (Figure 1).

Figure 1: Location of interview subjects.

Interviews were carried out with staff working in 26 of Scotland's most remote practices and five of the seven most rural health boards. These practices were characterized by smaller than average patient list sizes, with 17 of them having fewer than 1000 patients registered and no practices with more than 3000 patients. The smallest practice had just 150 patients spread over three small islands. The mean for Scotland is 5200 patients per practice.[7] Some of the practices had populations dispersed over very wide areas, or distributed among a number of islands, making travel within the practice area time consuming.

The term 'telemedicine' in its broadest sense means any method of delivering health care at a distance.[8] According to that definition, 'telemedicine' includes the transmission of laboratory results, the use of email, as well as videoconferencing and audioconferencing for education and clinical purposes. However, it became clear in the interviews that for most respondents, 'telemedicine' specifically meant videoconferencing. To avoid confusion, we specify each application of telemedicine as it is discussed.

Face-to-face interviews lasting approximately 1 h were carried out in the practices. The design of the topic guide was informed by the results of the survey and by themes identified from the literature. The topic guide focused on communication between primary and secondary care staff; the effects of telemedicine on the clinical consultation; the therapeutic relationship between the patient and professionals; the impact of telemedicine on professional isolation; and the potential for telemedicine to improve education and training. The interviews also asked about the challenges of working in remote and rural areas. All of the interviews were recorded and transcribed verbatim. Ethics approval was provided by the appropriate committee. Although all of the interviewees agreed to be interviewed, only 29 interviews were completed in 2003, the final one being cancelled due to ill health.

2.1 Analysis

Data analysis was carried out using a five-stage process: the development of the coding schedule; the coding of the data; description of the main themes; linking the themes; and developing explanations of the relationships between themes. The codes were entered into a qualitative data analysis program 'Nonnumerical Unstructured Data Indexing Searching and Theorizing' (NU☐DIST). Once the codes were applied, the data were grouped into categories and thematic analysis was performed looking for similar and divergent perspectives. Two researchers analysed the data independently to develop the coding schedule and to check for consistency in applying the codes. The data were anonymized to protect the identity of those interviewed.

3. Results

A total of 19 GPs and 10 nurses were interviewed (Table 1). Fourteen GPs were from practices on the mainland and five were from practices on islands. Eleven of the practices were single-handed. The largest practice had five partners. Three of the GPs were younger than 39 years, eight were 40-49 years and eight were over 50 years. Their tenure ranged from 1 to 19 years.

Seven of the nurses interviewed were in mainland practices and three were on islands. Some of the nurses were practice nurses, some were district nurses and others combined the duties of nurse, midwife and health visitor. Seven of the nurses were aged 50-59 years, two were 40-49 years and one was 30-39 years.

	n
Age (years)	
20-29	1
30-39	3
40-49	10
50-59	15
Gender	
Men	10
Women	19
Discipline	
GPs	19
Nurses	10
Practice	
Island	8
Mainland	21

Table 1: Characteristics of those interviewed (n=29).

3.1 Remote and Rural Context

The organization of the practices differed in some important respects from the organization of typical urban practices. First, many of them did not operate an appointment system. The reasons given for this were: the seasonal variation in the workload; the need for summer visitors to be seen quickly; the need to accommodate unavoidable lateness of patients in bad weather; and the lack of reception staff to administer the appointment system. Second, most of the practices dispensed their own medication (rather than issuing prescriptions for a pharmacy). Third, the roles of our respondents were more flexible than those of professionals in urban areas. Nurses often combined the duties of community nurse, practice nurse, health visitor and midwife; and there were examples of receptionists doubling as dispensers and practice managers. In one practice, the nurse shared the on-call duty with the GP, and in another, a GP explained that he

had acquired training in leg ulcer management because of the lack of adequate nursing cover.

3.2 Professionals' Attitudes Towards Computers and Telemedicine

In the survey which preceded the interview study we identified that the professionals' attitudes to telemedicine depended on their professional discipline, age, previous experience of information technology, whether they worked on an island or not, how easy the equipment was to use and whether telemedicine was for clinical or educational application.[7] The interview study also found that GPs were more positive about the use of computers and telemedicine than nurses. However, typically GPs found computers useful and time saving whereas nurses were more likely to find them intimidating and time consuming. GPs were able to avoid the use of computers if they chose to do so, while nurses, as employees of the practices, had little choice but to use the information technology systems. The lack of choice for nurses might explain why they were more likely to describe feeling intimidated by the technology.

Practitioners of all ages believed that the adoption of information technology was easier for younger professionals. Those with experience of using telemedicine were typically more positive than those who had no experience. There was more interest and enthusiasm from island practitioners than those working on the mainland. Practitioners wanted equipment which was easy to use, and both GPs and nurses were more positive about videoconferencing for education rather than clinical consultation.

3.3 Effect of Telemedicine on the Clinical Encounter

Physical proximity to the patient was identified as important to these professionals for clinical assessment and psychosocial support. The doctors in the study were concerned about being unable to carry out simple tasks such as palpation if they were seeing patients virtually. They also reported that using senses as well as touch was important in the clinical assessment of their patients. For example, it was important to be able to smell the alcohol on a patient's breath, or the smell associated with an infected wound. The nurses were concerned about being unable to carry out practical tasks as well, such as checking the extent of a patient's ankle oedema. As well as being important clinically, respondents believed that videoconferencing could undermine the psychosocial support function of the consultation. Doctors and nurses spoke about the importance of touch for reassurance and comfort for their patients.

3.4 Telemedicine to Access Educational Resources

Respondents acknowledged that using videoconferencing for education could save the expense of travelling to educational events. They also reported that there

were times when they were not able to get away to go to conferences, so that being able to link up to a conference would be their only option.

The perceived potential usefulness of audio/ videoconferencing for education was dependent on the remoteness of the practices. Those who were more remote were more likely to see the advantages of virtual conferences. Despite the opportunities identified for telemedicine to support access to education, it was also extremely important for professionals to continue to go to conferences and meet their peers.

3.5 Adopting Telemedicine Into Primary Care

Introducing telemedicine equipment, teaching staff how to use it and providing adequate technical support were identified as critical to the successful adoption of telemedicine in Scottish remote and rural primary care. At the time of the study unused videoconferencing equipment from previous government telemedicine initiatives continued to lie in cupboards. This was the case in four of the practices, although there were other examples of equipment out of cupboards but not being used.

Lack of technical support was reported to be a significant problem for remote and rural practices. Respondents commented that there appeared to be plenty of resources for providing hardware, but very little money for the kind of support these practices needed to integrate and maintain the hardware or train the staff.

4. Discussion

Although there was wide variation between the practices in the extent to which information technology had been routinely adopted, most of our respondents used computers for some of their administrative and clinical activities. The picture with regard to telemedicine was more variable. While the transmission of simple data, such as obtaining laboratory results had become routine for some, most respondents had very little experience of more sophisticated telemedicine applications such as videoconferencing.

Generally those interviewed were positive about the use of technology. However, there was widespread scepticism about the potential clinical applications of telemedicine. Telemedicine was perceived to have greater potential in reducing professional isolation by facilitating access to educational resources. These results support what is said in the literature about communication and telemedicine: that the professionals were generally positive about the experience of using telemedicine except when it came to non-verbal communication and the use of senses that needed physical proximity.[9] Those with experience of using telemedicine were more likely to be positive about its use.

This study highlights possible reasons why telemedicine has not become routinely adopted in remote and rural primary care. These include: concerns that

videoconferencing could diminish communication in educational and clinical settings (by reducing the need for face-to-face meetings and by changing the dynamics of communication); concerns about the adequacy of training and technical support; and a fear that telemedicine would not fit in easily with the organizational routines of the practices and the links with secondary care.

It follows that if telemedicine is to be implemented successfully, practical changes will be needed to the organization of remote and rural practice. It will be necessary for some premises to be modified to ensure that there is adequate room for telemedicine equipment. It may be necessary for professionals to re-organize their work so that their routines are more compatible with secondary care. Many of the professionals will need further training to make the best use of telemedicine applications. As well as instruction on how to use the equipment, it will be important to consider the need for training in communication skills specific for telephone and video consulting.

Finance and policy drive alone are unlikely to increase the uptake of telemedicine in primary care in remote and rural Scotland. It is important to ensure compatibility with existing organizational routines, to improve the quality and reliability of external links, to improve training and technical support, to be explicit about the existing evidence base for the technologies and to address concerns about the negative effect on interpersonal communication. Not only does this general approach make sense from a theoretical perspective, but it also corresponds with evidence from our own study and the wider literature, which suggest that the adoption of telemedicine is best driven by clinical need and not by the technology itself.[10]

Policy-makers should recognize that remote and rural primary care is a health-care context in which the experts are the health professionals themselves. To maximize any benefits of telemedicine, policy-makers need to strive to understand the special contextual features, and individual and organizational challenges. We suggest, like others, that new initiatives are first introduced into practices where there is some understanding of and enthusiasm for telemedicine.[11] Successful sites can then become examples for others.

In our study, there was more interest and more positive views expressed about videoconferencing for education than videoconferencing for clinical purposes. However, professionals' perceptions that videoconferencing will diminish the enjoyment of education should be taken into account when planning educational programmes. Tele-education should be in addition to, and not instead of, traditional educational meetings

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