Refereed papers

Patient and health care professional views and experiences of computer agent-supported health care

Ron G Neville MD FRCP FRCGP DRCOG MBChB
Westgate Health Centre, Dundee, UK

Alexandra C Greene PhD BA
Senior Research Fellow

Sue Lewis PhD BA
Research Fellow

Department of Social Anthropology, University of St Andrews, Fife, UK

ABSTRACT

Objectives To explore patient and health care professional (HCP) views towards the use of multi-agent computer systems in their GP practice.

Design Qualitative analysis of in-depth interviews and analysis of transcriptions.

Setting Urban health centre in Dundee, Scotland.

Participants Five representative healthcare professionals and 11 patients.

Main outcome measures Emergent themes from interviews revealed participants' attitudes and beliefs, which were coded and indexed.

Results Patients and HCPs had similar beliefs, attitudes and views towards the implementation of multi-agent systems (MAS). Both felt modern communication methods were useful to supplement, not supplant, face-to-face consultations between doctors and patients. This was based on the immense trust these patients placed in their doctors in this practice, which extended to trust in their choice of communication technology and security. Rapid access to medical information increased patients' sense of shared partnership and self-efficacy. Patients and HCPs expressed respect for each other's time and were keen to embrace technology that made interactions more efficient, including for the altruistic benefit of others less technically competent.

Conclusions Patients and HCPs welcomed the introduction of agent technology to the delivery of health care. Widespread use will depend more on the trust patients place in their own GP than on technological issues.

Keywords: agents, email, health care, texting

Introduction

Electronic communication media are now accepted methods of communication in business, leisure and education. Their use in health care has lagged behind, principally because of perceived concerns from patients and professionals about privacy, security and loss of face-to-face contact. Work in the United States of America (USA) has shown that health professionals appreciate the asynchronous nature of email communication and find it a useful way to communicate with their patients, so long as certain safeguards are met, including concerns about billing and unfettered demand.[1] In the United Kingdom (UK), debate has centred on concerns over safety and confidentiality, but the major barrier to more widespread use may be attitudinal rather than logistic.[2–4]

Mobile phone text message communication is now an integral part of the way people interact with each other, access information and engage in lifestyle choice. Small-scale medical trials of text messaging have delivered promising results and show great potential

to assist patients with lifestyle choice and medication compliance reminders.[5] Patients, particularly young adults, are willing to use text messages if it can help them to make their condition and its treatment comply with their lifestyle. This is in contrast with the traditional medical model of making the patient comply with prescribed treatment, not the other way around.[6]

Multi-agent system computing offers a way to integrate these technologies by allowing each user to have an interface of their choosing (PC, mobile phone or interactive TV) and for communications traffic to be managed by computer agents representing each user or institution. An agent is a piece of computer software that is persistent, autonomous, communicative and programmed to obey a set of instructions. In the commercial world, internet auction sites such as eBay use multi-agent systems (MAS).[7] The 'fish market' is an example of a complex set of agents programmed to buy and sell while co-operating on a societal level to maintain market stability.[8] Each individual or institution in the real world has an agent represent them in the virtual world. Agents communicate with each other to reach agreement and execute a pre-defined task. To date, medical applications of MAS have focused on areas where matching supply to demand is paramount; for example, renal transplantation and planning bed usage in intensive care units. There is great scope to use agent technology for more mundane health encounters, including booking appointments, prescription ordering, obtaining test results and processing simple clinical enquiries.

Healthcare professionals (HCPs) can feel compromised when using modern communication media, because it lacks the familiarity of face-to-face contact, with all its inherent visual clues and opportunities for physical examination. Paradoxically, restricted opportunity for the HCP to take control of the consultation may be of appeal to some young patients. Some young people might deliberately choose to seek health advice using email or text messaging because of its perceived impersonal or casual nature.[9]

Asynchronous electronic communication using email or text messaging does not readily fit the definition of a consultation as being a face-to-face encounter between someone who is ill or thinks they are ill with a qualified practitioner whom they know and trust.[10] Perhaps the concept of a 'health encounter' between client and professional is more relevant to modern communication media. The dynamics of the consultation are further changed now that HCPs and patients use the same source of primary information on health care: the internet. Medical knowledge, once the exclusive preserve of medical graduates, is now a disparate and freely available commodity. Some patients now choose to 'consult' the internet, exchange emails with their doctor, and then decide whether or not to proceed to a face-to-face encounter.[11]

We wished to explore the views, attitudes and experiences of patients and healthcare staff in relation to the use of new technologies, particularly MAS, in health care. Our aim was to give patients and professionals an opportunity to express their views through an experienced interviewer.

Methods

Design

We convened a multidisciplinary professional/patient group with expertise in computing, health care and the patient experience. We debated various methods for eliciting patient and professionals' views and concluded that an in-depth interview technique was most appropriate. We presented an outline interview schedule to the Patient Advisory Group of the study practice and further refined the interview schedule.

Recruitment and sampling

The study practice had a list size of 7000 and was predominantly urban. It had a broad cross-section of socio-economic mix, as it served areas of multiple deprivation but also areas close to a large hospital and university. The practice was founded in 1920 on a traditional family practice model but had subsequently embraced a full range of modern communication methods, including pioneering the use of email and text message access to appointment booking, repeat prescription ordering and a clinical advice service. One of the general practitioner (GP) partners (RN) had recently introduced, with technical support (www. CalicoJack.co.uk), a MAS to support access to clinical services.

Following approval from Tayside Medical Ethics Committee, we purposively recruited five HCPs (comprising a GP, manager, receptionist, pharmacist and practice nurse). We tried to encompass a mix of gender, experience, length of service and technical ability.[12] A patient selection matrix was constructed consisting of: user/non-user of healthcare technology services, male/female and ages under 35, 35–64 and 65 and above. Selection of individuals to receive an invitation was done by applying a random numbers sequence to practice patients within each cell of the sample matrix. Invitations for interview were issued until at least one representative from each cell had completed an interview. The invitations for interview were issued by the researcher (SL) and receptionist by telephone and confirmed by postal invitation. The matrix and sample size were chosen so the sample would be large enough

to generate an adequate range of themes and perspectives, without creating a dataset that was too large to analyse in depth.[12]

Data collection

Key areas were explored with HCPs and patients: experience and perception of the integration of modern technology into service provision, effects on consultations, adjustment, accessibility, safety and confidentiality. To ensure interviews were consistent, we devised an interview schedule to provide a loose structure to the questions being asked but without inhibiting participants' own views and priorities. The interview schedule, lasting up to one hour, was similar for professionals and patients, and was conducted at the study health centre.

Analysis

The study was informed by grounded theory, which allows concurrent data collection and analysis, and the opportunity to check and refine developing categories of data while the project is progressing.[13,14] Team members systematically reviewed all data and all participants' transcripts were repeatedly read through and cross-compared. Regular meetings were held to ensure agreement on recurrent themes and findings. INVIVO, a qualitative data-indexing package, was used to facilitate data coding and retrieval.[15]

Results

Views about technology impinging on the consultation

Patients and HCPs expressed similar views and attitudes about the benefit of MAS. Important for all was the belief that modern technology should never be allowed to replace face-to-face contact between HCPs and patients. In addition to allowing for physical examination and thus diagnosis, it was perceived as essential to build up and maintain relationships of trust between patients and HCPs. Technological intervention was seen as a complementary facility that added to and strengthened rather than replaced face-to-face contact. Patients and professionals both perceived the shared challenge of working with new technology as a way of developing closer working and shared understanding of each other's needs.

> R11: I like the computer system to the point of being able to access my own private knowledge that I want to obtain,

and yes obviously I can discuss it with other people, but what worries me about the computer system is that I would lose that contact with a doctor, just so that I had the one-to-one reassurance from her, not from a screen. You need the personal.

Trust and risk

All believed that the successful implementation of MAS in the practice was the result of patients' trust in the practice and their own GP. Clinical trust in their own GPs allowed patients to trust and thus support the introduction of novel methods of communication into the practice. Although patients believed use of email and text messaging posed a threat to confidentiality, they all trusted their GP to manage this risk in the context of managing many other risks associated with healthcare decisions. Those patients with experience of online purchasing were most comfortable with balancing the ease and accessibility of novel communication methods with the inherent security risk.

> [Interviewer: Why do you trust this surgery?]
>
> R9: Because they don't screw up. I have a good relationship with the doctor, and I trust him, and he has looked after me. A lot of it is personal trust with the doctor.
>
> R7: To me it's not any more insecure than [paper] files all sitting there.
>
> R6: I know that if I ever needed to actually speak to him in person he would always be there. So you've got two sides, you've got the easy side where I can just do it through my fingers, but if I needed someone, even someone just to come and speak to, I know that there'll always be someone here.

Another theme to emerge was the respect HCPs and patients had for each other's time. Each group supported the use of agent-based technology if it helped others to save time. There was a clear statement of altruism from patients not wishing to take up appointments unnecessarily, thus allowing other patients to be able to see the GP more quickly. Healthcare professionals were keen to work with technology if it helped save patients' time, regardless of whether they themselves would benefit. There was an acceptance of unwritten ground rules to the effect that the practice was trying to introduce novel methods to help them. Underpinning this idea was the strong belief that, despite an interest in technology, staff in the practice remained committed to the basic principles of providing personal medical care.

Almost all the participants believed that the style, tone and content of the technological communications were a natural extension of the consulting style in the practice. They were confident that professional

standards of communication would not be compromised. Staff and patients appeared comfortable integrating limited email jargon and text messaging abbreviations into non-face-to-face consultations. Once again, trust in the GP seemed to translate into trust in the communication style chosen for novel methods of consulting.

Accessibility

While most interviewees saw computers as an effective way to access information and contact HCPs, they felt more confident in the reliability of the medical information if it originated from their own practice.

> R9: It is always useful to know more, and you don't want to pester the doctor too much. But I think the amount of knowledge you can get fishing around is limited, and some of it is liable to be suspect, because it isn't in the wider context of who you are. You would get that direction from your GP.

Limiting time wasting

Important for all participants was the opportunity for agent-based technology to save time. From the patients' point of view, the use of MAS allowed them to feel that they were not wasting the doctor's time, which gave many the sense that they were not taking time away from more important cases. Healthcare professionals appeared equally altruistic.

> R6: I mean, last Christmas I got a footbath thing from my husband but when I read it, it said if you're diabetic consult your doctor. And I thought, I'm going to have to make an appointment to see the doctor for a stupid thing like that. And then I thought, no, I can email. So I did that, and then they can answer you in their own time.

> R7: [Who is it for?] I think it has to be for both, but I think ultimately it would be for the patients because I don't see it will save the doctors an awful lot of time. But it's certainly going to save the patients', particularly folk that maybe are not so mobile or are working.

Criticisms

There were no direct criticisms of the practice for introducing modern methods to facilitate communication. Long-standing health service access problems, including appointment availability, car parking spaces and hospital waiting times, were perceived as being the fault of the National Health Service (NHS), not the individual GPs.

Discussion

Patients' trust in the doctors appears to extend to trust in their doctors' decision to introduce and offer novel technological methods of consulting. This study showed that in an environment where rapport and trust between HCPs and their patients are well-established, then new technology can be introduced and accepted readily by patients. Patients might be less willing to accept technological change if there is a lack of personal trust between provider and recipient. It is ironic that perhaps the more mature, staid, older and traditionally-inclined GPs might have an easier task coping with novel technologies than young computer-savvy enthusiasts. The trust of one's patients may be a greater asset than technological skill. The rate determinant of successful implementation of technology in the NHS could well be the trust patients place in their GP rather than any technical factor.

Both users and non-users stand to benefit from the introduction of new technologies because of less pressure and demand on traditional means of contacting GPs: telephone and face-to-face contact. In-depth interviews with HCPs showed clear themes of reciprocity and altruism.

The study is open to criticism for being in a single centre and restricted to a small number of interviews. One could argue that employees and patients of a practice are likely to say complimentary things about that practice and in turn its use of technology. For this reason the research was undertaken by an outside interviewer (SL), the interviews were confidential, and we deliberately recruited as many non-users of technology services as users. The study might provide a benchmark for others seeking to explore the views of staff and patients in the emergent age of new communication technology. The patients interviewed in this study did not seek elaborate explanation or demonstration of new technologies, but were more interested in maintaining trust with the people behind the innovation. They were prepared to accept that if their own GP had chosen and selected a new communications system they could trust it. As one patient indelicately put it: 'they haven't screwed up yet'.

The key message for HCPs who wish to implement novel communication technologies is to build on existing relationships and trust rather than trying to impress with technical wizardry. This means keeping the face-to-face consultation as the core of health care, while using novel communication technology as an adjunct, not a replacement, for solving the problems for which patients of all ages and backgrounds turn to their GP for help.

REFERENCES

1 Borowitz SM and Wyatt JC. The origin, content and workload of email consultations. *Journal of the American Medical Association* 1998;280:1321–4.

2 Car J and Sheikh A. Email consultations in health care: 1 – scope and effectiveness. *British Medical Journal* 2004; 329:435–8.

3 Car J and Sheikh A. Email consultations in health care: 2 – acceptability and safe application. *British Medical Journal* 2004;329:439–42.

4 Neville RG, Marsden W, McCowan C, Pagliari HC, Mullen H and Fannin A. Email consultations in general practice. *Informatics in Primary Care* 2004;12:207–14.

5 Franklin VL, Waller A, Pagliari HC and Green S. Sweet talk: text messaging support for intensive insulin therapy for young people with diabetes. *Journal of Diabetes Technology and Therapeutics* 2003;5:991–6.

6 Neville RG, Greene A, McLeod J, Tracy A and Surie J. Mobile phone text messaging can help young people manage asthma. *British Medical Journal* 2002;325:600.

7 www.ebay.co.uk

8 Rodriguez J. FM 96.5: a Java-based electronic marketplace. In: *Proceedings of the 2nd International Conference on the Practical Application of Intelligent Agents and Multi-Agent Technology (PAAM-97)*, London, 1997: 207–24.

9 Pinnock H, Neville RG, Hoskins G and Sheikh A. Choice, triage and modern consultations. *British Journal of General Practice* 2005;55:910–11.

10 Royal College of General Practitioners. *The Future GP*. Occasional paper. London: Royal College of General Practitioners, 1972.

11 Eysenbach G and Diepgen TL. Towards quality management of medical information on the internet: evaluation, labelling, and filtering of information. *British Medical Journal* 1998;317:1496–502.

12 Pope C and May N. Qualitative research. Reaching the parts other methods cannot reach: an introduction to qualitative methods in health and health services research. *British Medical Journal* 1995;311:42–5.

13 Strauss A and Corbin J. *Basics of Qualitative Research: grounded theory procedures and techniques.* London: Sage, 1990.

14 Glaser B and Strauss A. *The Discovery of Grounded Theory.* Chicago: Aldine Publishing Company, 1967.

15 Boyatzis RE. *Transforming Qualitative Information: thematic analysis and code development.* Thousand Oaks, CA: Sage, 1998.

CONFLICTS OF INTEREST

None.

ADDRESS FOR CORRESPONDENCE

Dr Ron G Neville
Westgate Health Centre
Charleston Drive
Dundee DD2 4AD
UK
Email: ron.neville@blueyonder.co.uk