

Chapter 1 : Research context and relevant literature

In this chapter, we provide an overview of the National Institute for Health Research (NIHR) brief and how our research contributes to it, describe the NHS landscape as our research context and summarise the evidence base, generally in relation to alternatives to face-to-face consultations (e.g. e-mail and telephone consultations) and, specifically, on the use of virtual consultations.

There is a significant push from national-level decision-makers for the NHS to make better use of digital technologies, including virtual consultations. However, the current evidence on the development and use of virtual consultations is sparse. The few studies conducted to date have shown great potential for the use of virtual media, such as Skype™ (Microsoft Corporation, Redmond, WA, USA) and FaceTime (Apple Inc., Cupertino, CA, USA) for online communication between patients and clinicians. However, much of the literature uses experimental methods and classifies service models primarily by the nature of the technology and secondarily by the task supported by that technology. Although there are lessons to be learned about the potential of virtual consultations from this literature, we conclude that further work is needed to understand how and why individuals, teams and organisations do (and do not) adopt virtual consultations.

Introduction to the research

Health services face rising costs as a result of increasing disease prevalence, high ‘did not attend’ (DNA) rates and poor patient engagement, resulting in poor health outcomes and greater use of emergency care.^{1,2} Most outpatient models fail to reliably provide responsive care when patients need intervention. Reducing hospital follow-up appointments is a priority in the NHS. Unless new ways of delivering care are found, chronic disease management will be unaffordable and undeliverable. Current policy places considerable faith in digital technologies and their potential to deliver more efficient, effective, patient-centric care in the community.³⁻⁶ The UK’s National Information Board (see the glossary in [Appendix 1](#) for a description of national organisations and initiatives) has argued that, in order to respond effectively to these demographic and epidemiological trends, we need a different kind of health service, in which the traditional outpatient consultation, for example, will become increasingly obsolete.⁵ Technology-supported consulting is viewed as at least a partial solution to the current challenges of delivering health care.

Digital technology plays a significant (although varied) role in local plans across the NHS to reconfigure hospital services and transform the delivery of health services.⁷ Attending regular clinics can be expensive, physically challenging and inconvenient for patients. Virtual consultations (using Skype or similar media) have the potential to fundamentally change the way in which patients interact with clinicians.

Following proof of concept work with NHS Choices, we were funded by the Health Foundation^{8,9} to explore the scope and feasibility of video outpatient consultations in the diabetes clinic in Newham. The Diabetes Appointments via Webcam in Newham (DAWN) project documented 62% acceptance rates across all ages, a reduction in DNA (from 40% to 23% at the end of year 1) and small efficiency savings of £63K.^{8,9} Our subsequent project on Diabetes Review, Education And Management via Skype (DREAMS) was also funded by the Health Foundation (2012–14), and explored Skype-supported video consultations in ‘hard-to-reach’ patients with diabetes mellitus.¹⁰ As well as improved clinical outcomes, DREAMS showed improved engagement and better self-management among regular users.¹¹

The online environment is known to produce subtle alterations in the dynamics of human interaction, with a potential risk that clinical clues will be missed or the clinician–patient dynamic will be altered adversely.¹² As a new service model, it also brings operational and cultural challenges, including training and supporting staff, as well as patients, in using digital technologies. For this reason, we sought to undertake further in-depth research.

Aims and objectives

As set out in our protocol published previously,¹³ the VOCAL (Virtual Online Consultations – Advantages and Limitations) study aimed to define good practice and inform its implementation in relation to clinician–patient consultations via Skype and similar media, addressing three key objectives:

1. at the macro level, to build relationships with key stakeholders nationally and identify from their perspective how to overcome policy and legal barriers to the introduction of remote consultations as a regular service option
2. at the meso level, to illuminate and explore the sociotechnical microsystem that supports the remote consultation, thereby identifying how organisations can best support the introduction and sustainability of this service model in areas where it proves to be acceptable and effective
3. at the micro level, to study the clinician–patient interaction in a maximum variety sample of 30–45 remote outpatient consultations in two clinical areas; in particular, to highlight examples of good communicative practice, to identify and characterise examples of suboptimal communicative practice and to propose approaches for minimising the latter.

The study addressed the following research questions:

1. At the macro level: what is the national-level context for the introduction of virtual consultations in NHS organisations and what measures might incentivise and make these easier?
2. At the meso level: how is a successful virtual consultation achieved in an organisation in which the processes and systems are mostly oriented to more traditional consultations?

3. At the micro level: what defines ‘quality’ in a virtual consultation and what are the barriers to achieving this?

In the following sections, we outline how our research contributes to the NIHR brief and describe the current evidence base relating to virtual consultations. The VOCAL study was designed as a multilevel study capturing macro-level barriers and incentives to, and facilitators of, supporting virtual consultations (objective 1), meso-level administrative and clinical processes that need to change to embed online consultations (objective 2) and micro-level details of the interactions in consultations (objective 3). As this included a significant research component focused on the national-level context, we set out the detail of the wider landscape in which virtual consultations are evolving in [Chapter 3](#).

The National Institute for Health Research Health Services and Delivery Research commissioning brief

The VOCAL study was funded in response to a call from the NIHR Health Services and Delivery Research (HSDR) programme for ‘assessing alternatives to face-to-face contact with patients’ (HSDR call number 13/59). The call emphasised the rapid increase in new forms of interaction between patients and health professionals, including consultations by Skype, e-mail and webcam, and the potential that these new forms of contact hold for improving the quality and experience of patient care and securing cost-savings. The two themes were:

1. primary research evaluating the cost-effectiveness of non-face-to-face contact with health professionals
2. qualitative research on the impact of new forms on the clinician–patient dynamic, and appropriateness for hard-to-reach groups.

Our study responds directly to the second theme, which offered a unique opportunity to build on our previous work in setting up Skype consultations for the diabetes clinic at Newham.⁸⁻
¹¹ Guided by the brief, we sought to examine in depth any changes in the dynamics of the clinician–patient interaction and communication in virtual consultations in three clinics spread across two clinical areas (the Adult/Young Adult Diabetes and antenatal Diabetes clinics in the Diabetes service, and the Hepatobiliary And Pancreatic Cancer Surgery clinic in Cancer Surgery, enabling comparison across different conditions, clinics and teams), the appropriateness and satisfaction of staff and different patient groups using virtual consultations (including young adults, older people and those from ethnic minority groups) and the ways in which wider organisational- and national-level environments shape virtual consultation services.

In the following sections, we review the current evidence generally on alternatives to face-to-face consultations, and specifically on virtual consultations, and provide an overview of the strengths and weaknesses of different methodological approaches.

The development of alternatives to face-to-face consultations

New technologies that support alternatives to face-to-face consulting are often seen by decision-makers as potentially providing more flexible and convenient ways for patients to interact with health professionals, while at the same time improving financial efficiency and the clinical effectiveness of services.^{2,14,15} However, the use of alternatives to face-to-face contact with patients is a relatively new area of activity in health care, with limited evidence currently available to inform decisions about how best to develop and use a range of technologies. As well as video, these technologies include telephone, text messaging, e-mail consultations, online portals, telemedicine and telehealth. We summarise the evidence on each of these below.

Telephone

Telephone contact is used variably for assessment and triage of acute problems;¹⁶⁻³³ general practice consultations;³⁴⁻⁴⁰ to offer health education;^{41,42} and to offer support for those with chronic illness^{43,44} or those in need of palliative care.⁴⁵ The literature on telephone consultations consists largely of small and heterogeneous primary studies, most of which had practical challenges or methodological flaws. Systematic reviews have tended to conclude that, although telephone contact may allow minor problems to be dealt with without a face-to-face visit (and sometimes with apparent cost-savings), it may miss rare but serious conditions and/or lead to higher rates of face-to-face visits in the days following. This is particularly the case when those responding to calls have limited training and are working largely to an algorithm, as, for instance, with NHS 111.²¹ Telephone consulting, it seems, requires skill and judgement, perhaps because of the lack of visual cues. Detailed analyses of the clinician–patient interaction using conversation analysis have found that, compared with traditional face-to-face consulting, telephone consultations have a more linear format and tend to focus on a narrow range of preplanned themes, with fewer opportunities for the patient to raise ad hoc issues.^{34,35} One study combined telephone consulting with video consultation to support patients receiving palliative care and reported that the combination offered both practical support and reassurance.⁴⁵

Text messaging and e-mail

There is a significant body of literature on text messaging as a means of, for instance, supporting people with chronic illness;⁴⁶⁻⁴⁸ facilitating adherence and/or attendance;⁴⁹⁻⁵² conveying results of tests;⁵³ or sending health promotion messages.⁵⁴⁻⁵⁷ Systematic reviews have indicated that text messaging can be effective in facilitating short-term behaviour and medication adherence in particular.⁵¹ However, the quality of studies is often poor, with research frequently conducted with population samples that may not be representative, and with limited understanding of long-term effectiveness and patient satisfaction.^{52,58,59} Findings generally show that the text-messaging medium is popular with varied groups of patients, who use it both to send questions and to receive messages sent by health professionals and administrators. Similarly, systematic reviews of a large number of primary studies (mostly of weak methodological quality) have confirmed that it is technically possible to consult via e-mail, and that some patient groups value such contact.^{60,61} Other studies have raised the possibility of increased inequality of access⁶²⁻⁶⁴ and professional uncertainty about safety, workload and remuneration, and about the ‘rules of engagement’ for online interaction.^{64,65}

Online portals

Studies of online portals (e.g. facilitating prescription ordering,⁶⁶ appointment booking^{67,68} and patients' access to their online record⁶⁹) have demonstrated proof of concept.⁷⁰⁻⁷² However, such portals are often not widely used by patients beyond the research setting.

Telemedicine

Telemedicine involves the use of technology to deliver clinical care at a distance (including, potentially, video-based consultation), typically with one part of the health service, usually in primary care, linking remotely to another, usually in secondary care (e.g. teledermatology). There are many proof-of-concept studies⁷³⁻⁷⁷ and examples of up-and-running services, largely in remote regions (e.g. in rural Wales, UK⁷⁸). However, the adoption, spread and sustainability of telemedicine tends to be disappointing, because of issues of cost, patient preferences and subtle but vital impacts on professional roles, interactions and work routines.^{73,79,80}

Telehealth

Telehealth (involving the exchange of data between a patient at home and their clinician, often via a remote monitoring centre, to inform diagnosis and monitoring) and telecare (involving the use of technologies, installed at home or attached to the person's body, to allow remote monitoring of position or environment) are both the subject of considerable debate. Proof of concept (that the technology 'works') has been shown for many telehealth⁸¹⁻⁸⁴ and telecare^{81,82,85-87} technologies, and some randomised trials have demonstrated improved outcomes, such as reduced hospital admission and mortality rates.⁸³ However, many trials have been criticised as being small, unrepresentative and methodologically flawed. To date, the largest trial achieved improvements in outcomes, but only at a significant cost that is out of reach within the NHS.⁸³

Combinations of different technologies

Combinations of different technologies (e.g. home-based and telemedicine services,⁸⁴ or telephone and video consultation⁴⁵) show that the efficacy, acceptability and costs of such services vary considerably.

Summary

In summary, studies examining the potential of new technologies to support alternatives to face-to-face consultations suggest that many of the mediums set out above (text messaging, e-mail consultations and so on) offer potential for patients, clinicians and the wider health system. However, many studies are of poor methodological quality and questions remain unanswered about the relative cost and effectiveness of individual technologies and their combinations. Overall, the literature suggests that different technologies (particularly telephone and text messaging) offer potential as alternatives to face-to-face consultations for different patients in different clinical settings. For the VOCAL study, this raised questions about the potential and appropriateness of video-based consultations, as well as the adoption and spread of technology-mediated services in health care. For instance, qualitative findings on telephone consultations raised questions about whether and how the addition of a visual medium would mirror the ethos and interaction of the face-to-face environment. Findings from studies of other technologies

raised the possibility of increased inequality of access, a need to review the ‘rules of engagement’ for online interactions between clinicians and patients, and changes to work routines required to embed technologies in the everyday work of health care.

Evidence relating to the use of virtual consultations

The evidence base on virtual consultations (using Skype or similar technology) has been steadily accumulating.⁸⁸⁻⁹⁸ A number of published studies focus broadly on video or remote consulting (e.g. exploring issues of usability and acceptability).^{45,99-113} Many focus specifically on the clinical use of Skype,^{91,114-123} either on its own or in combination with other technologies [e.g. WhatsApp (WhatsApp Inc., Mountain View, CA, USA) messaging¹²⁴ or FaceTime^{125,126}]. A handful of papers examine the perceived ethical, legal or technical issues relating to virtual consultations.^{127,128} Studies generally report positive benefits, particularly in terms of patient satisfaction and increased accessibility. However, most are brief descriptions of small, pilot-stage projects (some with as few as five patients), or randomised controlled trials (RCTs) offering one or more virtual consultations compared with traditional face-to-face contact, often with limited follow-up.

Below, we extend the literature review that we conducted at the start of the VOCAL study,¹³ by reviewing the higher-quality primary studies from a 2015 review⁸⁸ of 27 published studies of the use of Skype, which reported largely positive benefits. We focus on studies from the review that are most relevant to the VOCAL study, along with some additional studies published since 2015. In doing so, we have adapted and extended the literature review that was previously published in our study protocol in *BMJ Open*.¹³

A number of studies have focused on the use of virtual consultations for the treatment of chronic diseases. A study of family based behavioural support for adolescents with poorly controlled type 1 diabetes focused on the ‘working alliance’ (the strength of the relationships between patients, caregivers and health-care professionals).¹²⁹ Findings showed that 10 sessions via Skype were as effective at preserving the working alliance as 10 face-to-face sessions.¹¹⁴ Adherence to treatment and glycaemic control were also similar.⁹¹ However, losses to follow-up were high: of the 47 (out of 92) participants randomised to Skype sessions, follow-up data were available for only 32.

In our work in Newham, we introduced virtual consultations for Diabetes in 2011, with 480 remote consultations documented in 104 patients between 2011 and 2014.^{10,11} Findings showed that virtual consultations were popular with both patients (especially young adults) and staff. In patients who chose to use the remote service, it appeared to be associated with increased engagement (overall DNA rates were 13% in patients accepting the Skype option and 28% in those who chose not to use this option, although denominator populations for these figures were self-selecting and hence not strictly comparable), improved glycaemic control (the average glycated haemoglobin level pre and post introduction of remote consulting was 70 mmol/l and 65 mmol/l, respectively, for those who used the service) and fewer accident and emergency (A&E) attendances than those not using the remote service (raw data on this were statistically significant, although numbers were small). These figures were encouraging; however, patients

were not randomised and there were multiple potential confounders, and 45 patients who initially signed up to the remote service subsequently withdrew from it.

A recently published RCT¹³⁰ showed similarly positive results for patients with type 2 diabetes who were not responding to usual care. A total of 102 participants ($n = 165$) were randomised to either monthly video conferences with a nurse via tablet computer over 32 weeks or usual clinic-based care. Allocation to the trial group required participants to regularly self-monitor blood glucose, blood pressure and weight, and to upload results so that these were available to both the nurse and patient during video consultations. Authors reported a significant improvement in glycaemic control in the virtual consultation arm compared with those receiving clinic-based care. However, these differences were no longer significant at 6 months, and authors were unable to tease out whether it was the video conference per se, the effect of immediate response to increased measurements, increased personal contact or a combination that led to the initial improvement.

In a study of the management of depression in older housebound adults, participants were randomised to receive in-person problem-solving therapy, Skype-delivered problem-solving therapy or a weekly telephone call with no therapeutic content.⁹² Both the in-person and Skype-delivered therapy were effective at reducing depression scores and disability outcomes. However, at the 36-week follow-up, the participants in the Skype arm experienced significantly better outcomes than those receiving in-person therapy. The authors ventured that the more focused nature of the Skype sessions may be responsible for sustained benefits.

A number of studies have examined the use of virtual consultations for clinical follow-up, either as an alternative to or an addition to face-to-face consultations. A 2014 study reported on the use of Skype for orthopaedic follow-up.⁹⁴ The Skype service was offered to 78 patients, following total joint arthroplasty. Participants were invited to consult with their surgeon via Skype in addition to scheduled follow-up appointments at 1, 3, 4, 6 and 9 weeks. Just under half of the participants ($n = 34$) underwent at least one Skype consultation. The remainder ($n = 44$) did not have appropriate electronic devices or internet connection to use the Skype service. There was no significant difference in clinical outcomes for the users and non-users of this service (however, the study was probably underpowered). However, those participants followed up using the Skype service had fewer unscheduled in-clinic visits. Those using the Skype service rated their postoperative satisfaction as higher than those who were not using it. A key finding in a follow-on paper with 228 participants was that time spent on the consultation, and patient-borne costs, were lower in the Skype group.⁹⁶ A linked economic evaluation showed that service costs were also significantly lower in the Skype group.⁹⁵ Although no issues were missed in patients in the trial, a subsequent commentary queried whether or not remote assessment might be less safe.⁹⁷

Skype was used to deliver follow-up training for 'pursed lips breathing' (a technique used to manage breathlessness in chronic obstructive pulmonary disease). An initial study with 16 participants reported that those who received the follow-up sessions had better breathlessness management than those with basic training alone.¹¹⁵ A subsequent small-scale trial confirmed these findings.¹¹⁶

A small trial ($n = 55$) comparing remote 'video visits' during follow-up after prostate cancer surgery with usual care found video visits to be 'equivalent in efficiency' to conventional outpatient visits, as measured by the amount of time spent face to face, patient wait time and

total time devoted to care.⁹⁹ There were no significant differences in patient perception of visit confidentiality, efficiency, education quality or overall satisfaction. Video visits incurred lower patient-borne costs and were associated with similar levels of urologist satisfaction to conventional outpatient visits. Other studies have shown similar levels of patient satisfaction, particularly in terms of time saved (as a result of not needing to travel to clinics) and costs saved.^{101,104,107}

In a randomised trial of Skype sessions versus standard home care in supporting families with premature infants, the nine families randomised to Skype sessions reported very positive experiences. All found the technology easy to use, noting that virtual consultations were better than telephone calls.¹³¹ Tellingly, the authors commented that ‘The families readily embraced the use of ICT [information, communication and technology], whereas motivating some of the nurses to accept and use ICT was a major challenge’,¹³¹ raising questions about the ways in which virtual media might be embedded in clinical work.

Virtual clinics via Skype have also been used for counselling and mental health consultations. Skype proved to be an effective medium for supporting independence and self-confidence among those aged 12–18 years with spina bifida.⁹⁸ In a 15-minute consultation once per week, the nurse supported patients with continence care and self-care. Participants reported that they felt more confident talking about personal issues via Skype than face to face. They also valued the privacy that consultations via Skype allowed (e.g. enabling young people to speak about their care from a private space at home rather than in a face-to-face consultation with a parent or carer), and increased the accessibility of the service (particularly for those patients with complex physical needs).

Issues surrounding privacy, security and reimbursement for virtual consultation services are the topic of significant public and professional debate. Despite this, and often being mentioned in passing in discussion sections of studies,¹⁰⁸ such issues have rarely been systematically explored.¹²⁷ Technical difficulties are also typically mentioned in passing, but are rarely explored in any depth. Studies beyond the medical literature have shown that Skype is often ‘laggy’ (e.g. audio and video data can become unsynchronised). However, in one study that looked at the effect of collaborative song-writing as therapy, some participants reported that this lag could be helpful, making them select words with care and focusing them more on the interaction.¹¹⁷ There are times when Skype compresses the video, so that facial expressions are hard to interpret.¹¹⁷ It may be that the quality of hardware or bandwidth is critical to some (although perhaps not all) kinds of clinical consultation.^{103,128}

In summary, the research literature on virtual consultations remains sparse. The contribution of virtual media to consultations in health care has been studied mainly by using experimental methods (especially RCTs), but with no adequately powered randomised trials and only a handful of controlled before-and-after studies conducted to date. These studies have generally focused on evaluating the outcomes of the technology. To date, there have been no rigorous and theoretically grounded qualitative or mixed-methods studies of the kind undertaken in the VOCAL study.

Overall, the literature suggests that there is great potential for the use of virtual media tools, such as Skype, for virtual communication between patients and clinicians. Although the studies reviewed are broadly positive, the small sample sizes, select nature of samples and high losses to

follow-up call into question any unqualified conclusion that the technology is ‘effective’, and the lack of negative studies raises questions about potential publication bias. For the VOCAL study, current evidence raises questions about the relevance of video-based consultations for different clinical conditions and patients, the accessibility and acceptability of Skype and other virtual media to both patients and (clinical and non-clinical) staff, the ways in which practical and technical issues (e.g. the availability of smart technology, delays in data transfer) shape virtual consultations and how ethical, legal, regulatory and payment issues shape the adoption of virtual media. In addition, none of the studies reviewed examined the detail of interaction and what gets either added in or left out of consultations when they take place virtually, raising the question for the VOCAL study about what a good-quality interaction means in the context of a virtual consultation.

Although the RCT is widely viewed as a gold-standard design for testing the efficacy of an intervention experimentally, the trials that have been undertaken on remote consultations have provided few or no data on the organisational complexities of implementing a radically new technology-based service, and they cannot address the question of how video consultation services emerge and become embedded in a real-world setting (i.e. outside the specific confines of a randomised trial and with a view to long-term sustainability). To fill this gap in the literature, studies are needed to explore the emergence of video consultation services naturalistically (i.e. by capturing real-world quantitative and qualitative data on the emerging services and documenting the challenges faced).

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