

Webcam consultations for diabetes: findings from four years of experience in Newham

Joanne Morris¹

PhD, MSc, BEng

Desiree Campbell-Richards¹

RGN, BSc (Hons), MSc

Joseph Wherton²

PhD, BSc

Rita Sudra³

RGN, BSc

Shanti Vijayaraghavan¹

FRCP

Trisha Greenhalgh²

MD

Anna Collard¹

PhD, BA

Emma Byrne⁴

MSc, MRes, PhD

Teresa O'Shea³

RGN, BSc (Hons)

¹Barts Health NHS Trust, London, UK

²Nuffield Department of Primary Care Health Sciences, University of Oxford, Oxford, UK

³East London NHS Foundation Trust, UK

⁴Centre for Primary Care and Public Health, Queen Mary University of London, London, UK

Correspondence to:

Dr Joanne Morris, Research & Development Office, Education Centre, Newham University Hospital, Glen Road, Plaistow, London E13 8SL, UK; email: joanne.morris@bartshealth.nhs.uk

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Abstract

Newham diabetes service supports an ethnically diverse population in a deprived urban area and exemplifies challenges faced throughout the NHS with rising demand, high outpatient 'did not attend' (DNA) rates (33–50% depending on age) and poor health outcomes.

With funding from the Health Foundation, we aimed to provide more accessible and cost-effective care by replacing selected follow-up outpatient appointments with webcam consultations. This paper reports a mixed methods evaluation comprising attendance and biomarker data, and patient and staff interviews.

Consultations were offered to clinically suitable adults aged over 18 and supported using everyday technology available in most people's homes (computer or smartphone, Wi-Fi connection).

From 2011–2014, 480 online appointments were scheduled by one consultant and one diabetes specialist nurse. Overall, the DNA rate was 13% (compared to 28% for all outpatient appointments for the same patients). There were an additional 152 'patient-initiated' webcam appointments (in which patients made contact for a Skype consultation in between their scheduled appointments).

Quantitative data were inconclusive, although an improvement in HbA_{1c} levels (though not statistically significant) was evident for those using the webcam service. A&E attendance data showed greater uncertainty, partly due to the relatively small number of A&E events.

Qualitative data indicated that patients found the service convenient, empowering and dependent on a pre-existing relationship with their clinician, and delivering as good a quality of care as face to face. Patients and staff felt that webcam appointments were not appropriate for all encounters, but could be interspersed with traditional clinic visits. No critical incidents occurred.

Modest efficiency savings were identified, through a decrease in DNAs and increased productivity – with clear savings for patients. Further work is ongoing to understand system-wide changes required to embed this intervention longer term. Copyright © 2017 John Wiley & Sons.

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Key words

webcam; online; outpatients; consultations; diabetes; 'DNA'; efficiency; convenience; urban

Background and introduction

Local problem

This project was based in Newham, an ethnically diverse borough in East London with high rates of deprivation and poor health outcomes.

Newham exemplifies challenges faced elsewhere in the NHS, with a high and rising prevalence of type 2 diabetes, currently approximately 9.4% (twice the UK average), placing increasing demands on busy services. The diabetes service has a particularly high 'did not attend' (DNA) rate (33–50% depending on age) reflecting the complex lives and access challenges of many local patients, who are largely from minority ethnic groups. Newham Primary Care Trust commissioned an in-depth qualitative study, by Ipsos MORI, in 2009 to better

understand the complex issue of non-compliance; findings revealed that perceived lack of control, poor engagement with services and lack of flexibility of services contributed to poor patient self-management.¹

(Figure 1 shows the location of Newham in London.)

Alternatives to face-to-face consultations: video solution

There is strong policy pressure to reduce unnecessary outpatient attendance, especially for the routine monitoring of chronic conditions (for which such a model is both expensive and inconvenient for patients). As part of a much wider policy push to harness the potential of new technologies to improve efficiency and take care 'closer to home', alternatives to

the traditional face-to-face diabetes review are being introduced and piloted.

Video consulting via webcam has been used for a diverse range of conditions, including the management of chronic diseases, such as diabetes, and supporting patients with complex health needs and their families.²⁻⁴ However, typically, video has been an 'add on' to more complex telemedicine systems; there is limited evidence on the use of webcam consultations in isolation.

Verhoeven *et al.*⁵ reviewed the findings of 17 studies of video-conferencing to connect diabetes patients with health care professionals, in some cases with the patient at home and some with the patient in a local or regional facility. Studies were small and inconclusive but overall suggested that video could be a practical, cost-effective and reliable way of delivering the service. None of these studies was conducted in the UK.

A qualitative study by Pols⁶ of webcam consultations in a COPD rehab clinic in the Netherlands focused on changes in the dynamics of consultations; she concluded that for webcam consultations to 'work well', there should be a pre-existing 'personal and supportive relationship' between patient and clinician.

Greenhalgh *et al.*⁷ summarised wider literature relevant to this study, including a review of 27 studies looking at the use of Skype in clinical care.⁸ Relevant studies appear sparse but broadly positive; however, 'the small sample sizes and high losses to follow-up in many studies call into question any unqualified conclusion that the technology is "effective" and the lack of negative studies raises the issue of publication bias'.⁷ There remain important questions about changes in the clinician-patient dynamics,⁶ patient empowerment⁹ and cost-effectiveness.^{10,11}

No previous studies identified have specifically addressed the socio-economically disadvantaged areas of major cities. Indeed, many studies of webcam services have been in rural or remote areas. However, there is known to be considerable appetite for webcam services even when the patient is located relatively close to the clinic.⁴



Figure 1. Map of Greater London showing the location of Newham

A webcam video solution was thought particularly timely given the changes in lifestyle of patients and the ever-increasing access to broadband now in people's homes, enabling a cost-effective solution. A 2013 household panel survey (1019 residents aged 16+), conducted by the London Borough of Newham, revealed that 79% of households had access to broadband, an increase from 70% in 2010.¹²

Aims/intended improvement

This project aimed to explore how, to what extent and in what circumstances webcam video consultations can provide accessible, cost-effective and person-centred care, while maintaining clinical quality, using readily available video-conferencing technology. We sought to replace routine follow-up outpatient appointments with web-based consultations where clinically appropriate (e.g. when the patient did not require physical examination).

We anticipated that if the service proved feasible and acceptable, it could improve efficiency of the outpatient process, improve continuity of care and enhance patient self-management skills with an impact on health outcomes.

Methods

Implementation

Suitable patients attending routine follow-up diabetes appointments with one consultant physician and one diabetes specialist nurse (DSN) were offered webcam consultations, using readily available video-conferencing software, where the patient was considered clinically suitable and in particular where a physical

examination was not anticipated. In the consultant clinic, webcam consultations were interspersed with face-to-face appointments within the existing clinic structure; patients therefore had the option to change their appointment back to a face-to-face one at any point. As the service was taken up, patients began to initiate their own appointments with the DSN (for example when the nurse had invited the patient to contact her to report if a change in management had led to further problems they wished to discuss).

Data collection and analysis

Quantitative outcome data included recruitment figures and before and after measures of: DNA rates, duration of appointments, HbA_{1c} levels and A&E attendance. Twenty-eight online questionnaires were also completed with a mixture of quantitative and qualitative responses.

Qualitative data included 43 semi-structured patient interviews (19 of which were conducted over the phone), three semi-structured staff interviews, four patient focus groups, and one staff focus group.

Questionnaire and interview respondents were broadly representative of patients taking up the webcam service in terms of age, ethnicity and gender.

Data collection tools were developed with input from a service user and the clinical team. Data were analysed by two researchers independently and results compared.

Formal statistical analysis of A&E attendance data was performed using a Normal-Poisson mixture model by an independent statistician.

Results

Quantitative findings

In all, 104 patients were recruited to webcam appointments over the four years, with a total of 480 scheduled and 152 'patient-initiated' webcam appointments. On average, approximately one-third of appointments became webcam appointments for these patients.

Recruitment was quickest in the first year, with 89 patients enrolled; an acceptance rate of 62%. (See Table 1.) Approximately 80% of the patients considered for webcam appointments were deemed suitable

for this service. Reasons for classifying a patient as 'unsuitable' included: complex comorbidity, the need for a physical examination or lack of familiarity with the patient. This was a clinical decision taken by the clinician.

Table 1 shows the uptake of the webcam service by age, during the first year. Uptake was very high in those under 60 but much lower in the over 70s. The main reasons given for declining the offer of a webcam appointment were: no access to the internet at home (52%), just 'prefer face to face' (18.5%), not confident with the internet/computer (9%).

The DNA rates for scheduled webcam appointments was 13% and for patient-initiated webcam appointments it was nil (all appointments initiated by patients were kept). This compares with a DNA rate of 28% for all outpatient appointments for the same patients (during the same time period, 2011–2014).

The DNA rates appeared to be influenced by the reliability of the technology. We initially used a more sophisticated commercial package (rather than Skype) but we experienced frequent technical problems as the bandwidth requirements were too demanding for most home computers. Since using Skype, the technical problems have mostly been resolved and DNA rates have dramatically improved.

The duration of appointments is shown in Table 2. While appointments were significantly shorter in webcam consultations, clinical case mix was different due to the exclusion of patients who needed a physical examination. Overall, however, there was increased productivity in the clinics as measured by the fact that the consultant found she could book one to two additional patients per clinic.

Before and after measures of HbA_{1c} levels and A&E attends were inconclusive. This pilot study was not sufficiently powered or controlled to look at these variables with any certainty. However, there were some promising results: mean HbA_{1c} pre-webcam appointments was 70mmol/mol and post-webcam appointments 65mmol/mol. Complex modelling of raw data suggested that

Age category (years)	Patients asked (no.)	Patients agreed (no.)	% acceptance
<20	23	18	78%
20–49	68	57	84%
50–59	11	7	64%
60–69	14	4	29%
70–79	19	2	11%
80–89	6	0	0%
90–99	2	1	50%
Total	143	89	62%

Table 1. Uptake of the webcam service by patient age

Appointment type	Mean duration
Consultant – face to face	25 mins
Consultant – webcam	9 mins
Nurse specialist – face to face	30 mins
Nurse specialist – webcam	9 mins

Table 2. Mean duration of appointments

diabetes-related A&E events were lower for patients using webcam appointments (approximately one-third, depending on how the model was constructed). However, these findings need to be treated with extreme caution; numerous confounders could have accounted for the difference so, in the absence of a control group and randomisation, we cannot be confident that this is a real finding.

The questionnaire response rate was 51%, which compares favourably with surveys carried out in black and minority ethnic groups, and with young people.¹³ Questions relating to cost revealed that, while using webcam appointments, the majority of patients saved money from travel and parking costs and a quarter of patients saved income by not having to take so much time off work.

Qualitative findings

Almost all patients commented that webcam appointments saved them time and greatly enhanced flexibility so they could fit consultations around their everyday lives, e.g. in between lectures for students, lunch breaks or while at home. Patients said they could keep appointments

even when on holiday or travelling, hence missed appointments were fewer. Several patients who forgot their appointment also attended at the last minute after being sent a remote reminder, and a patient who was feeling unwell on the day attended when they would otherwise have cancelled.

Patients perceived shorter waiting times and, if they had to wait, the advantage was they could use the waiting time more effectively (for example getting on with their work).

Some patients said that they felt more connected to the service and that the consultation felt more equal:

'You are in the comfort of your own home. Sometimes in hospital I've felt like the doctor was in control and you don't want to waste their time... You feel liberated in your own home, it's on your terms.'

Because it was easy to request a call-back appointment with the specialist nurse via a 'Skype' message, they were more likely to seek guidance or clarify issues between appointments:

'The other advantage of Skype is when I have an issue I might have a tendency to put it off a bit but

if I see her, it's easy to send her a quick message.'

'I think with diabetes particularly immediate is important; generally when you want to know something you want to know it now, or in a couple of hours.'

Even when patients were not actively using the webcam appointments service, the fact that it was an option provided reassurance:

'There's a big safety net because you know if I've got a problem I can just look online and see oh she's on and quickly either give a call or Skype in.'

Questionnaire respondents reported saving money (18 out of 24 respondents), mostly from travel costs and some parking costs. For six respondents, taking time off work to attend appointments had impacted on their pay; others had to ask for sick leave or holiday. This was particularly significant for one older patient whose daughters reported having to take a half-day's leave to accompany the patient to each appointment.

When asked about quality of care, patients were consistently positive, though they felt webcam would not be appropriate for every consultation:

'The same. Completely happy... I couldn't feel any different whether I was sitting next to her or not.'

One daughter speaking about her elderly mother said: 'Better. The quality of care for her to be in her own environment is much better.'

Patients highlighted how video (unlike the phone) can support dialogue about their condition through visual and non-verbal cues, both explicit (e.g. showing them physical marks/symptoms on the body) as well as more implicit indicators of their wellbeing (e.g. mood, tiredness, skin complexion, weight).

'If you are not well and you are Skyping they can see you are not well, if you are looking a bit rough or whatever.'

The clinicians also felt that the quality of consultations online was, overall, as good as face to face when used 'appropriately' and when the technology was working effectively. On 11 occasions (out of a total of 127) clinicians reported that the technology was ineffective to support the consultation and most of

these occurred in an early pre-pilot phase when a commercial package was used instead of Skype.

There were mixed views about how 'comfortable' patients felt when using the webcam. Some patients felt that an element of 'reality' in the face-to-face consultation was missing – or at least heavily compromised – by the use of webcam. They commented that physical presence was important for meaningful emotional support. Initial unfamiliarity with webcams contributed to this in some cases (one patient reported that it felt 'a bit strange' at first but 'by the third one it was fine'). Some patients still felt a lack of 'presence' even after repeated webcam appointments, and others felt there was no issue about 'presence'. Indeed, one patient talked about how she felt more relaxed in her own home than when she was 'in the doctor's office'.

Participants attributed the quality of the conversation via webcam to the quality of their existing relationship with their clinician. Hence, webcam was not considered suitable for someone newly diagnosed or if the doctor or nurse changed.

'I'd be uncomfortable, only because I don't know this person, it's the first time I'm meeting him and it's just awkward.'

Patients' confidence in using webcam seemed to stem from their trust in the clinician to pick up any concerns and act in their interests. For example, they trusted that the clinician would maintain the same level of privacy during a Skype consultation:

'She always lets you know and when someone does come in [to the room] she kind of stops and says I'm in a consultation right now and they usually go away.'

Patients who had a prior relationship with their clinician appeared happy for aspects of their home to be apparent over the webcam. Indeed, the DSN described how several young people had 'shown her around their bedroom' using their webcam, which added a personal element to the interaction. An older patient happily had a consultation with the doctor from her bed:

'She sat in bed and talked to Dr V-. They waved goodbye to each other at the end.'

In contrast, one of the nurses (a young Asian woman) reported feeling uncomfortable seeing patients at home if she hardly knew them, especially men from a different social or ethnic background.

Despite some patients feeling less 'comfortable' with the technology, many patients talked about an improvement in the level of engagement they perceived from their clinician. In particular, they felt that the clinician spent a greater proportion of the consultation looking at them and focusing on what they were saying. Patients compared this to a face-to-face encounter, in which the clinician would need to look down or away from them to view relevant medical records, or a phone consultation in which they felt they had even less attention and the clinician might even be doing other things.

As well as physical examination, patients felt that face-to-face appointments were sometimes needed when they wanted hands-on practical assistance (e.g. how to operate an insulin pump) or problem-solving that required the sharing of numerical or visual information:

'If I was to come to show her my pump she'll get some readings and put it up on a graph on the computer, so with Skype I don't think I'll feel more comfortable... it makes it so much easier if I'm there in person.'

Some patients signed up for the webcam service but abandoned it after one or two consultations. Several of these found the process of using Skype intimidating (meaning they had difficulties in operating the technology), or simply far too removed from their usual patterns of technology use.

Discussion

This pilot of webcam consultations for adults with diabetes has shown high uptake (except for the elderly). Patients perceived the service as convenient and accessible, and perceived the clinician as more 'focused', which they enjoyed. Appointments were shorter and DNA rates fell significantly. Importantly, in nearly 600 webcam consultations there were no critical events and the service

interfaced well with the existing outpatient clinic, with staff being able to recommend (or patients request) a face-to-face appointment when needed.

Others have shown that for patients with busy and often complex lives, or for patients with mobility issues, convenience is a significant factor in improving access.¹⁴ Not surprisingly, uptake was high in the 20–60 year-old group; these patients often have the most significant competing demands (e.g. family, work etc), and particularly value convenience. Younger patients are typically the most IT literate, with the highest DNA rates, and they often live more transient lives (travelling, studying away from home) where maintaining contact remotely with a trusted clinician may be important. Relationship and continuity of care is something patients value but don't always receive.

Our findings emphasise the importance of a prior relationship and resonate with those of Pols⁶ who stated that the webcam experience 'magnified the existing characteristics of the social relationship between the webcam users, i.e. a stranger became even more strange, a friend or trusted carer became even closer.' Maintaining this relationship over webcam is also needed and is one reason for an appropriate mix of webcam and face-to-face appointments. Some patients felt that at times they needed to see their clinician in person for 'meaningful emotional support'. Face-to-face appointments also continue to be important for an annual review, when a physical examination is required and for hands-on practical assistance. On average we found that about one-third of face-to-face appointments were converted to webcam for webcam patients.

Similar findings from other authors have also found webcam consultations to be more focused¹⁵ or intense, with a greater percentage of time gazing at the screen (92%) compared to eye gaze in direct face-to-face conversation (50%);¹⁶ and overall providing increased patient satisfaction.¹⁷

The increase in 'focus' over webcam may, in part, explain why consultations were shorter. However,

Key points

- Webcam consultations were successfully introduced in a busy diabetes service; nearly 600 consultations were undertaken by webcam in 104 patients over a four-year period
- In participating patients, there was no significant deterioration (and a non-significant improvement) in HbA_{1c} levels; the impact on diabetes-related A&E attendances was inconclusive
- Duration of webcam consultations was considerably shorter than face-to-face consultations (9 minutes vs 25 minutes for a consultant appointment)
- Successful webcam consultations appear to depend on a pre-existing relationship and patients should continue with an appropriate mix of webcam and face-to-face appointments
- Shorter (more focused) webcam appointments, with a reduction in DNA rates, have improved efficiencies and productivity, enabling services to meet increasing demand at no extra cost

various other factors must also be considered: change in clinical case mix, lack of physical examination, differences in patient attitude and control (over webcam, patients have reported that it feels like 'their time' is being used rather than the 'doctor's time'). Such changes in dynamic are being further studied as part of the VOCAL study.⁷

An unanticipated effect of introducing the webcam service was the high, and increasing, proportion of patient-initiated appointments with the specialist nurse, which were particularly valued and always kept. The immediacy of these appointments allows patients to address problems as they arise and gain reassurance at what may be a frightening time, in a way that is not possible over the phone. Some patients would initiate a large number of appointments when experiencing a crisis and then be out of touch for long periods of time. Such appointments could be particularly significant for engaging 'hard to reach' patients. Although the overall number of contacts for the nurse may have increased, the pattern and duration of appointments changed and there was no impact on overall workload.

Savings for patients are easier to identify than savings to the health service.¹⁸ The impact on pay reported by patients could have significant consequences for individuals and their families, particularly where patients rely on casual work or are self-employed. There are also significant savings for employers, with staff taking less time off to attend appointments.

Initial savings for the health service appear to be modest, and relate to increased efficiencies and productivity. Previous authors have reported health care savings mainly where staff have saved travel time, such as from a reduction in the number of home visits,^{19,20} or visits to remote clinics.²¹ However, it is anticipated that improved access to services will, in time, lead to fewer diabetes complications and a related reduction in avoidable A&E admissions. Such a reduction in A&E admissions, especially those for diabetic ketoacidosis, would massively impact on the economic argument for webcam appointments. It has been suggested that about half of diabetic ketoacidosis hospitalisations could be avoided with better outpatient and self-delivery of care.^{22,23}

Our experience with the software demonstrates that reliability of the technology is vital and sometimes a simple solution is best.

Conclusion

This project has demonstrated that in this busy inner city environment, video-mediated communication tools can provide more accessible, efficient and person-centred care, while maintaining quality and improving patient experience. We hope that, in time, associated health benefits will follow with knock-on benefits for services, such as A&E.

Further work is ongoing, as part of the VOCAL study,⁷ to understand the changes in dynamics within the webcam consultation itself, the potential to positively impact on

self-management behaviour as well as local and system-wide changes required to embed this intervention longer term.

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Declaration of interests

There are no conflicts of interest declared.

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POEMs



Metformin appears to be at least as effective as insulin for treatment of GDM

Reference

Butalia S, *et al.* Short- and long-term outcomes of metformin compared with insulin alone in pregnancy: A systematic review and meta-analysis. *Diabet Med* 2017;34(1):27–36.

Synopsis

These investigators searched multiple databases including MEDLINE, EMBASE, BIOSIS, and the Cochrane Database, as well as bibliographies of pertinent publications. Eligible studies included English language-only randomised trials that compared metformin with insulin during pregnancy in women with gestational diabetes mellitus (GDM) or type 2 diabetes. Sixteen trials met eligibility requirements and quantitative data were available from 14 of them – 11 included women with GDM (n=2062) and three included women with type 2 diabetes (n=103). The overall quality of the studies was moderate; a lack of masking of the assessors was the most common

flaw. Overall, there was no difference between metformin and insulin in the rate of preterm delivery or perinatal mortality, but metformin did significantly lower the risks of neonatal hypoglycaemia, large-for-gestational-age babies, and neonatal intensive care unit admission. Compared with insulin, metformin also significantly reduced the risk of pregnancy-induced hypertension, but had no effect on the rate of pre-eclampsia. There were no significant group differences in the rate of congenital malformations, shoulder dystocia, clavicular fracture, hyperbilirubinaemia, respiratory distress syndrome, APGAR scores, glycaemic control, or Caesarean delivery. Total maternal weight gain during pregnancy was significantly lower in women who received metformin compared with women who received insulin. Finally, one study of long-term infant outcomes showed no differences in motor, social or linguistic development at 18 months of age.