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P Wallace,[1*] J Barber,[1,2] W Clayton,[1] R Currell,[3] K Fleming,[4] P Garner,[5] A Haines,[6] R Harrison,[1] P Jacklin,[6] C Jarrett,[3] R Jayasuriya,[1] L Lewis,[3] S Parker,[1] J Roberts,[6] S Thompson[7] and P Wainwright[3]

[1] Department of Primary Care and Population Sciences, Royal Free and University College Medical School, London, UK
[2] University College Hospitals Research and Development Directorate, London, UK
[3] Centre for Health Informatics, School of Health Science, University of Wales, Swansea, UK
[4] Royal Free Hampstead NHS Trust, London, UK
[5] British Telecom, UK
[6] London School of Hygiene and Tropical Medicine, UK
[7] MRC Biostatistics Unit, Cambridge, UK

* Corresponding author

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Abstract

Virtual outreach: a randomised controlled trial and economic evaluation of joint teleconferenced medical consultations

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[1] Department of Primary Care and Population Sciences, Royal Free and University College Medical School, London, UK
[2] University College Hospitals Research and Development Directorate, London, UK
[3] Centre for Health Informatics, School of Health Science, University of Wales, Swansea, UK
[4] Royal Free Hampstead NHS Trust, London, UK
[5] British Telecom, UK
[6] London School of Hygiene and Tropical Medicine, UK
[7] MRC Biostatistics Unit, Cambridge, UK
* Corresponding author

Objectives: To test the hypotheses that virtual outreach would reduce offers of hospital follow-up appointments and reduce numbers of medical interventions and investigations, reduce numbers of contacts with the health care system, have a positive impact on patient satisfaction and enablement, and lead to improvements in patient health status. To perform an economic evaluation of virtual outreach.
Design: A randomised controlled trial comparing joint teleconsultations between GPs, specialists and patients with standard outpatient referral. It was accompanied by an economic evaluation.
Setting: The trial was centred on the Royal Free Hampstead NHS Trust, London, and the Royal Shrewsbury Hospital Trust in Shropshire. The project teams recruited and trained a total of 134 GPs from 29 practices and 20 consultant specialists.
Participants: In total, 3170 patients were referred, of whom 2094 consented to participate in the study and were eligible for inclusion. In all, 1051 patients were randomised to the virtual outreach group and 1043 to standard outpatient appointments. The patients were followed 6 months after their index consultation.
Interventions: Patients randomised to virtual outreach underwent a joint teleconsultation, in which they attended the general practice surgery where they and their GP consulted with a hospital specialist via a videolink between the hospital and the practice.
Main outcome measures: Outcome measures included offers of follow-up outpatient appointments, numbers of tests, investigations, procedures, treatments and contacts with primary and secondary care, patient satisfaction (Ware Specific Visit Questionnaire), enablement (Patient Enablement Instrument) and quality of life (Short Form-12 and Child Health Questionnaire). An economic evaluation of the costs and consequences of the intervention was undertaken. Sensitivity analysis was used to test the robustness of the results.
Results: Patients in the virtual outreach group were more likely to be offered a follow-up appointment. Significant differences in effects were observed between the two sites and across different specialities. Virtual outreach increased the offers of follow-up appointments more in Shrewsbury than in London, and more in ENT and orthopaedics than in the other specialities. Fewer tests and investigations were ordered in the virtual outreach group, by an average of 0.79 per patient. In the 6-month period following the index consultation, there were no significant differences overall in number of contacts with general practice, outpatient visits, accident and emergency contacts, inpatient stays, day surgery and inpatient procedures or prescriptions between the randomised groups. Tests of interaction indicated that virtual outreach decreased the number of tests and investigations, particularly in

patients referred to gastroenterology, and increased the number of outpatient visits, particularly in those referred to orthopaedics. Patient satisfaction was greater after a virtual outreach consultation than after a standard outpatient consultation, with no heterogeneity between specialities or sites. However, patient enablement after the index consultation, and the physical and psychological scores of the Short Form-12 for adults and the scores on the Child Health Questionnaire for children under 16, did not differ between the randomised groups at 6 months' follow-up. NHS costs over 6 months were greater for the virtual outreach consultations than for conventional outpatients, £724 and £625 per patient, respectively. The index consultation accounted for this excess. Cost and time savings to patients were found. Estimated productivity losses were also less in the virtual outreach group.

Conclusions: Virtual outreach consultations result in significantly higher levels of patient satisfaction than standard outpatient appointments and lead to substantial reductions in numbers of tests and investigations, but they are variably associated with increased rates of offer of follow-up according to speciality and site. Changes in costs and technological advances may improve the relative position of virtual consultations in future. The extent to which virtual outreach is implemented will probably be dependent on factors such as patient demand, costs, and the attitudes of staff working in general practice and hospital settings. Further research could involve long-term follow-up of patients in the virtual outreach trial to determine downstream outcomes and costs; further study into the effectiveness and costs of virtual outreach used for follow-up appointments, rather than first-time referrals; and whether the costs of virtual outreach could be substantially reduced without adversely affecting the quality of the consultation if nurses or other members of the primary care team were to undertake the hosting of the joint teleconsultations in place of the GP. Qualitative work into the attitudes of the patients, GPs and hospital specialists would also be valuable.

Contents

List of abbreviations

CHQ	Child Health Questionnaire
CI	confidence interval
DUSOI	Duke Severity of Illness
IT	information technology
ITT	intention to treat
PC	personal computer
PEI	Patient Enablement Instrument
QALY	quality-adjusted life-year
RCT	randomised controlled trial
SF-12	Short Form-12
STAI	Spielberger State Trait Anxiety Inventory
SVQ	Ware Specific Visit Questionnaire
WTE	whole-time equivalent
WTP	willingness to pay

All abbreviations that have been used in this report are listed here unless the abbreviation is well known (e.g. NHS), or it has been used only once, or it is a non-standard abbreviation used only in figures/tables/appendices in which case the abbreviation is defined in the figure legend or at the end of the table.

Executive summary

Objectives

Main trial: to test the hypotheses that virtual outreach would:

- reduce offers of hospital follow-up appointments
- reduce numbers of medical interventions and investigations
- reduce numbers of contacts with the health care system
- have a positive impact on patient satisfaction and enablement
- lead to improvements in patient health status.

Economic evaluation: to test the hypotheses that virtual outreach would:

- incur no increased costs to the NHS
- reduce the costs incurred by patients attending outpatient appointments
- reduce the time taken off work
- be more cost-effective than physical outreach clinics.

Methods

Design

The study was principally a randomised controlled trial comparing joint teleconsultations between GPs, specialists and patients with standard outpatient referral. It was accompanied by an economic evaluation.

Setting

The trial was centred on the Royal Free Hampstead NHS Trust, which serves GPs in inner city and urban settings in London, and the Royal Shrewsbury Hospital Trust in Shropshire, which serves GPs and patients in small market towns and rural settings. The project teams recruited and trained a total of 134 GPs from 29 practices, 15 in London and 14 in Shrewsbury, and 20 consultant specialists. Of the latter, nine were in medical specialities (gastroenterology 3, endocrinology 1, neurology 1, general medicine 2 and rheumatology 2), and 11 in surgical specialities (ENT surgery 4, orthopaedics 2 and urology 5).

Subjects

All patients referred by the participating GPs to specialists participating in the trial were included, with the exception of patients requiring urgent assessment, private patients and those with significant difficulty communicating in English. In total, 3170 patients were referred, of whom 2094 consented to participate in the study and were eligible for inclusion, 862 in Shrewsbury and 1232 in London. In all, 1051 patients were randomised to the virtual outreach group and 1043 to standard outpatient appointments. The patients were followed for 6 months after their index consultation.

Intervention

Virtual outreach services were established in the Royal Free Hampstead NHS Trust in inner London and the Royal Shrewsbury Hospital Trust in Shropshire. Patients randomised to virtual outreach underwent a joint teleconsultation, in which they attended the general practice surgery where they and their GP consulted with a hospital specialist via a videolink between the hospital and the practice.

Main outcome measures

Outcome measures included offers of follow-up outpatient appointments, numbers of tests, investigations, procedures, treatments and contacts with primary and secondary care, patient satisfaction (Ware Specific Visit Questionnaire), enablement (Patient Enablement Instrument) and quality of life (Short Form-12 and Child Health Questionnaire). An economic evaluation of the costs and consequences of the intervention was undertaken. Sensitivity analysis was used to test the robustness of the results.

Results

Patients in the virtual outreach group were more likely to be offered a follow-up appointment (odds ratio 1.52, 95% confidence interval (CI) 1.27 to 1.82, $p < 0.001$). Significant differences in effects were observed between the two sites ($p = 0.009$) and across different specialities ($p < 0.001$). Virtual outreach increased the offers of follow-up

appointments more in Shrewsbury than in London, and more in ENT and orthopaedics than in the other specialities. Fewer tests and investigations were ordered in the virtual outreach group, by an average of 0.79 per patient (95% CI 0.37 to 1.21 per patient, $p < 0.001$). In the 6-month period following the index consultation, there were no significant differences overall in number of contacts with general practice, outpatient visits, accident and emergency contacts, inpatient stays, day surgery and inpatient procedures or prescriptions between the randomised groups. Tests of interaction showed evidence of differences in effects by speciality for number of tests and investigations ($p = 0.01$) and outpatient visits ($p = 0.007$). They indicated that virtual outreach decreased the number of tests and investigations, particularly in patients referred to gastroenterology, and increased the number of outpatient visits, particularly in those referred to orthopaedics. Patient satisfaction was greater after a virtual outreach consultation than after a standard outpatient consultation (mean difference 0.33 scale points, 95% CI 0.23 to 0.43, $p < 0.001$), with no heterogeneity between specialities or sites. However, patient enablement after the index consultation, and the physical and psychological scores of the Short Form-12 for adults and the scores on the Child Health Questionnaire for children under 16, did not differ between the randomised groups at 6 months' follow-up.

Overall, NHS costs over 6 months were greater for the virtual outreach consultations than for conventional outpatients, £724 and £625 per patient, respectively (difference in means £99, 95% CI £10 to £187, $p = 0.03$). The index consultation accounted for this excess. Cost and time savings to patients were found (difference in mean total patient cost £8, 95% CI £5 to £10, $p < 0.0001$). Estimated productivity losses were also less (difference in mean cost £11, 95% CI £10 to £12, $p < 0.0001$) in the virtual outreach group. Comparison with physical outreach clinics was not carried out as the required data were not available.

Conclusions

This trial demonstrated that virtual outreach consultations result in significantly higher levels of patient satisfaction than standard outpatient appointments and lead to substantial reductions in numbers of tests and investigations, but that they are variably associated with increased rates of offer of follow-up according to speciality and site. The main hypothesis that virtual outreach would be cost neutral is not supported, but the hypotheses that patient costs and productivity losses would be less were supported. Changes in costs and technological advances may improve the relative position of virtual consultations in future.

Implications for healthcare

These findings have important implications for the design and implementation of virtual outreach services within healthcare systems, and suggest that appropriate patient selection, significant service reorganisation, and provision of logistical support for arranging and conducting consultations will be required to enable such services to operate efficiently. The extent to which virtual outreach is implemented will probably be dependent on factors such as patient demand, costs, and the attitudes of staff working in general practice and hospital settings.

Recommendations for research

The trial has answered many important questions, but a number of additional issues of significant importance would justify investment in further research:

- The health service usage of patients in the 6-month period following their index consultation was assessed, but it is possible that further benefits would have accrued over a longer period. Further research could involve long-term follow-up of patients in the virtual outreach trial to determine downstream outcomes and costs.
- Although virtual outreach appears to be of limited effectiveness for unselected first-time referrals, there is a real possibility that its effectiveness would be significantly greater if it were used predominantly for follow-up appointments of patients. Further study into the effectiveness and costs of virtual outreach used for follow-up appointments, rather than first-time referrals, is therefore recommended.
- The costs of joint teleconsultations in the trial were high for a variety of reasons, but the principal cost component was the initial consultation, involving not only the consultant and the patient but also the GP. Further study is recommended into whether the costs of virtual outreach could be substantially reduced without adversely affecting the quality of the consultation if nurses or other members of the primary care team were to undertake the hosting of the joint teleconsultations in place of the GP.

- There is a strong suggestion from the trial findings that the attitudes to the joint teleconsultation of the patients, GPs and hospital specialists all played a very important part in determining outcomes, particularly in relation to the offer of follow-up and patient satisfaction. There is an important case for undertaking qualitative work in this area.

Chapter 1
Background

General background

Within the NHS, the GP is essentially the gatekeeper between the patient and secondary care. Between 6 and 10% of patient episodes in primary care result in a referral for a specialist opinion, and as consultations in general practice continue to rise, so referrals to secondary care in England rose by more than 40% between 1987 and 1998.[1] This rising trend may be attributed to factors including an ageing population, developments in medical technology and therapeutics, increasing medical specialisation and growing patient expectations, but it brings many problems in its wake. There are particular difficulties in communication between primary and secondary care, patient satisfaction with the consultation and referral process, and the ability of health services to meet ever increasing demand.[2–4] One response is to attempt to provide as much care as possible in the primary care sector,[5,6] which raises further issues of continuing professional education and appropriate skill mix amongst healthcare workers. The relationship between practitioners in primary and secondary care is pivotal in all of this.

One approach to this problem has been to investigate the 'appropriateness' of referrals from primary to secondary care,[7–10] but this has proved to be an elusive and immeasurable concept.

The reasons why GPs refer to secondary care have been categorised by Coulter and colleagues[11] as:

- to establish diagnosis
- for specific investigations
- for treatment or operation
- for advice on management
- to take over management
- to reassure the GP or the patient.

Poor communication at referral may impair the quality of care provided, resulting in overuse of healthcare resources, such as the unnecessary ordering of tests or duplication of treatment, and can contribute to the risk of iatrogenic damage. It may also lead to lack of information, an underuse of tests and delays in treatment, and patients may suffer as a result. Despite the importance of this topic, there is a dearth of reliable data available about the influence of the quality of communication between GPs and other primary care professionals. In a Cochrane systematic review by Zwarenstein and Bryant, no studies in primary care were found.[12] A number of observational studies on written correspondence found that communication of relevant patient data was frequently inadequate, if not absent. Westerman and colleagues, for example, found that referral letters by GPs were prompt, but more than half contained insufficient information.[13] Discharge information by specialists, although usually comprehensive and complete, often arrived too late or not at all.[14] In one Spanish study, GPs received a discharge letter in only one-quarter of cases.[15] In another, specific questions raised in referral letters to orthopaedic surgeons were answered in only 44% of cases.[16] In his study, Jenkins found a clear relation between the quality of the information provided and the appropriateness of the referral, with the percentage of inappropriate referrals being highest in referral letters with the least information.[17] Improved communication has been demonstrated in a hospital setting to have a clear effect on several process outcomes, such as the length of stay after hospital admission. Although these data came from hospital care, the findings may be relevant to primary care as an example of what can be achieved when the level and quality of communication are improved.

Improving communication at the primary–secondary care interface

There have been many attempts to improve communication. Some of these were designed to improve the quality and comprehensiveness of the information provided at the time of patient referral. Others were meant to provide innovative alternatives to the current standard forms of consultation.

Standardised referral letters

Various attempts have been made to improve the quality of paper-based communication by organising and structuring the content of letters.

In several countries, structured referral letters were developed, including recommendations about what a good referral letter should contain. One example is the standard referral letter developed by the Dutch College of General Practitioners.[18] It is likely that communication will benefit from referrals containing such data. However, despite the general consensus about the contents of a good referral letter, evidence about the effects on the quality of communication is absent. As lack of time is likely to be the principal reason preventing doctors from providing information at the appropriate level of detail to a colleague, more effective implementation strategies are needed to stimulate the use of standard referral letters.

A prototype referral letter should contain as a minimum:[18]

- personal information about the patient
- doctor identification
- signs and symptoms of the patient
- the reason for referral.

In case of referral to a non-surgical speciality, information should be added:

- data such as test results
- drug use
- family history.

Patient-held records

Where the exchange of information between one healthcare professional and another is problematic, it is conceivable that more efficient data exchange can be achieved when the data accompany the patient. A good example is the patient-held medical record. The patient-held record has been tried out extensively for many years and several benefits are described in the literature, varying from indirect positive effects on the health of patients (e.g. through better adherence to preventive care) to time-savings.[19,20] It seems especially valuable in cases where multiple institutions or healthcare workers are needed, such as in antenatal care, oncology and palliative care.[21,22] Clear-cut effects of the patient-held record on the quality of communication have so far not been found, owing, at least in part, to the absence of sufficient randomised trials focusing on this subject.[23]

Educational initiatives and the use of guidelines

Ensuring that GPs are kept up to date with best practice in the whole range of medical specialisms is an almost impossible task. Thomson O'Brien and colleagues[24] reviewed the effectiveness of continuing education meetings and concluded that whereas teaching sessions alone are unlikely to make professionals change their practice, interactive workshops could have an effect. In a similar review of printed educational materials, Freemantle and colleagues[25] found small and uncertain effects, and Thomson O'Brien and colleagues,[26] reviewing audit and feedback as an educational method, concluded that this could have a small effect, but should not be relied on alone. The effectiveness of local opinion leaders was also found to be unclear.[27] Clinical guidelines have been used in many specialities with the object of improving practice and the appropriateness of referrals to secondary care. Davis and colleagues[28] concluded that clinical guidelines could be effective in changing professional practice, but suggested that how they were developed and implemented affected their effectiveness. Woolf and colleagues[29] draw attention to the limitations of guidelines and to the potential for harm, and studies of guidelines in specific areas show not only that they may be ineffective at reducing inappropriate referrals (e.g. O'Brien and colleagues[30]) but also that they may not be adhered to even on the secondary care side of the interface.[31] Clinical guidelines are designed for a particular patient group on a population basis, and can thus be difficult for general practitioners who deal with individual patients.

Outreach clinics

One way of providing expert advice to the GP for an individual patient is through specialist outreach clinics and domiciliary visits. Outreach clinics held in GP surgeries or in community hospitals have advantages for patients by usually being closer to home with less time and expense spent on travelling, and being in more familiar surroundings, in an environment and with staff that they already know.[32] It is important to distinguish between outreach clinics in which specialist and primary care physician consult jointly (either in the presence of the patient or not) and peripheral clinics in which only primary care premises are used and the GP is not present. Benefits for clinicians cannot be expected in this case. Reviews of outreach clinics in primary care in the UK[33,34] have shown that patients preferred outreach appointments to hospital appointments, and that their costs were less, while costs to the NHS were increased, as specialists tended to see fewer patients than in hospital clinics and spent time travelling. The research does not show

consistent differences in health outcomes, and although it is believed that there is an educational element for GPs, this has not been consistently demonstrated in studies of conventional outreach clinics, partly because it is not clear how actively GPs participate in these sessions in reality.

Joint consultation

The joint consultation was developed as an alternative to standard outpatient referral for a specialist opinion. In joint consultations, the GP can include cases where there is doubt in both directions, as whether to diagnose and treat the patient him or herself or whether to refer the patient. A joint consultation may also be desired in cases where the GP would require the advice of the specialist owing to a relative lack of expertise, skills or knowledge. Real-time joint medical consultations were shown in The Netherlands to result in major reductions in unnecessary investigations and treatments, and to reduce substantially the need for hospital outpatient follow-up. Joint consultations were developed as an alternative to standard outpatient referral for a specialist opinion, especially for cases where there is doubt about whether diagnosis and treatment can effectively be carried out in general practice. In The Netherlands, a series of studies was carried out on joint consultations between GPs and a variety of different specialists.[35,36] In the Maastricht studies series, the joint consultations were organised as a monthly meeting between a group of four or five GPs with one specialist in the practice of one of the GPs. During the monthly 1.5-hour sessions, each GP could bring in one or two patients. These patients were reassessed in the practice, together with the other GPs and the consulting specialist. Such consultations were organised with orthopaedic surgeons, cardiologists, dermatologists and rheumatologists. Overall, the acceptance of the joint consultations was high, and they appeared to have a direct effect on the management of the patient and communication. First of all, as a result of a learning effect and a higher level of skills, the joint consultations were shown to reduce the number of patients referred to specialist care. After joint consultations between GPs and orthopaedic surgeons the number of patients referred was halved. In a study of joint consultations between GPs and cardiologists, the reduction was only 10%. Apart from these findings, there are communication and educational aspects of joint consultations. On the basis of questionnaires about communication it seems as if GPs and specialists sometimes appear to talk a different language. Data as yet unpublished show that there were clear differences in the interpretation of the reason for referral. In cases of routine referral to outpatient clinics, GPs had a significantly different reason for referral to that perceived by the specialists. This may have been caused by lack of information or by differences in interpretation. Joint consultations may be useful in tackling this communication problem, for after a joint consultation, the interpretation of the reason for referral, or more specifically, the difference between the GP's reason for referral and that perceived by the specialist, clearly diminished.

'Real-time' videoconferencing

The transmission of images through electronic networks can be achieved either as real-time transmission of moving pictures, or through 'store and forward' transmission of fixed images. These may be X-rays and other radiological investigations, or actual digital photographs, preferably of high resolution. Usually, there is a physical distance between primary and secondary care, and it is the patient who is expected to cross it. Dissatisfaction with travelling long distances for long waits and brief consultations in hospital outpatient clinics is well documented. Videoconferencing technologies allow virtual meetings between patients and practitioners, and several studies have investigated such joint teleconsultations in a range of clinical areas including dermatology, orthopaedics, cardiology and psychiatry.[37] The introduction of videoconferencing technologies and their application to healthcare has provided a means of overcoming distance, and created possibilities for new solutions to long-standing problems in the provision of health services. Videoconferencing has been in use in medicine since the late 1960s. Dwyer (1973),[38] for example, described the use of "interactive TV" for consultations with psychiatric patients, reporting that he had been "delightfully surprised" that the skills he used in a psychiatric interview were not diminished or lost. He also commented that some patients found the experience easier than a routine face-to-face encounter with a psychiatrist. Studies of telemedicine have since progressed from such early feasibility studies to studies of diagnostic accuracy,[39–41] and then to very many reports of case series around the globe (e.g. Harno[42]). Studies have reported high levels of patient satisfaction, although the validity of these findings has been questioned.[43] More recently, several reviews of the telemedicine literature have been undertaken[44–46] and they have all highlighted the dearth of rigorous experimental studies examining

the clinical effectiveness of telemedicine in general and teleconsultation in particular, and the lack of comprehensive economic evaluations. It is not clear why telemedicine has not yet been subjected to the same detailed assessment that is now expected of all other forms of health technology. There are several possible reasons. Telemedicine has historically been introduced by a few enthusiasts in a region or a discipline, and projects have withered as funding has run out or the innovator has moved on. There has now been a telemedicine project somewhere in the world in just about every medical speciality, which means that early experience has been spread very thinly and this has possibly made it difficult to put together clinical trials with sufficient numbers of participants. The organisational complexities of telemedicine have been reported,[47] particularly the difficulties of scheduling two doctors and the patient to be available at the same time. The technology used in telemedicine applications has changed dramatically over the years, so that now the necessary equipment can be contained in a desktop computer with an inexpensive web camera. This has presented the classic problem in health technology assessment, of when to assess fast-moving technologies. Communication technologies are only enabling technologies, and are not interventions or treatments in themselves, and comparisons with the telephone may have led some to believe that rigorous assessment was not necessary. However, telemedicine applications do have the potential to alter radically the ways in which healthcare services are organised and the experience of healthcare for both patients and professionals.

The Virtual Outreach Project offered the potential to make use of the most effective of the existing methods of supporting primary–secondary care referral, through the medium of the latest information and communications technology, and to test its effectiveness. The virtual consultation brings the local expert and GP face to face, provides the opportunity for immediate feedback on the current (and also previous) referrals and allows interactive teaching. Whether or not a structured or electronic referral letter has been used, the virtual consultation enables the immediate exchange of clinical data that may be held by either the primary or secondary care physician. Where guidelines or protocols are being followed, these can be explained and demonstrated on a case-by-case basis. The three-way consultations in the Virtual Outreach Project also put the patient at the centre of the episode, with demonstrable continuity of care across the interface, and the potential use of an advocate in either the GP or the specialist. The literature on all these topics makes it clear that the research base for all the interventions designed to improve care at the primary–secondary care interface (in addition to the telemedicine research base) is limited. Morrison and colleagues[31] stated that: "Relatively few studies of interventions to improve referrals exist. Further studies are needed, especially to explore methods of engaging both primary and secondary care." The Virtual Outreach Project aimed to address some of these issues.

Development of the project: pilot cluster randomised controlled trial

In 1997/98, a pilot study was carried out in preparation for a full-scale randomised controlled trial (RCT).[48] Four inner-city practices with registered populations ranging from 7800 to 10,300 were recruited into the trial. Nine GPs within the practices participated, but as several only worked on a part-time basis, this amounted to 5.5 whole-time equivalents (WTE). At the Royal Free Hospital the specialities included in the trial were orthopaedics, ENT, gastroenterology, urology, paediatrics and endocrinology, with one consultant from each speciality participating for the duration of the study. After discussion with the participating practices it was agreed that all of the patients whom they referred, within the specialities on offer and for the duration of study period, should be subject to randomisation. The administrative arrangements to facilitate the process were as follows. For the duration of the study all the referral letters from the participating GPs to the outpatient department at the Royal Free Hospital were redirected initially to the Teleclinic office. This design obviated any temptation on the part of the GP to allocate (or withhold) patients from the experimental service selectively, leaving the choice to the patients themselves. Referrals not included in the trial, because they did not relate to consultants in the study, were immediately redirected to the routine outpatient service. Eligible referrals were then screened by a research clinician to ensure that they met the entry criteria. The entry criteria were:

- a routine referral primarily for diagnosis
- a referral primarily for advice about management where decisions could be made on the basis of history and tests

- a referral for tests to which the GP does not have direct access (e.g. a magnetic resonance imaging scan or an endoscopic examination)
- not an emergency referral where any time delay was critical (it is unlikely in any case that urgent referrals would be made by letter).

The videoconferencing was accomplished using ISDN2 lines together with off-the-shelf videoconferencing equipment, namely the British Telecom VC8000 using Olivetti communications software. This kit was fitted into a standard desktop personal computer (PC). The standard equipment was enhanced by the use of a call port, making it unnecessary to use the telephone handset. The experience of joint teleconferenced consultations could be expected to have a cumulative educational impact on the participating GPs and therefore a potential influence on their clinical performance, leading to possible changes in the management of patients in the control group. It was therefore decided to randomise at the level of the GP rather than the patient. The two main choices were to randomise by GP practice or by individual GPs. Randomising by GPs ran the risk of contamination from GPs sharing information within the practice. Randomising by practice would have incurred a much heavier penalty by way of sample inflation, as the cluster effect would have been greater for practices than for individual GPs. There would also have been little incentive for practices to take part if they were not to receive the new service. It was decided therefore to randomise GPs. This was achieved through a system of balanced randomisation. Balanced randomisation was chosen because it provided for an even allocation of practitioners to each speciality. Each GP was assigned by means of a random number table to one line in the matrix. Thus, the GP was involved in virtual outreach in half of the trial specialities, while in the other half, his or her patients were seen in conventional outpatient clinics. Balanced randomisation was achieved by assigning each GP a number. Eligible patients were then assigned to control or intervention group according to the allocation given to the referring GP in a balanced randomisation process. Thus, consenting patients were allocated into a control group, which received a conventional current best practice outpatient service, or an intervention group, which consulted the hospital specialist together with their GP by means of a real-time videoconference at the GP's surgery. This was referred to as virtual outreach clinic, with joint teleconferenced medical consultations. All the patients in the control group attended the Royal Free Hospital. The patients in the control group saw the specialist alone unless accompanied by a carer or relative. Carers and relatives may have been present in addition to the GP during the course of teleconsultation at the GP's surgery. Following assignment to control and intervention groups consent was sought from patients. Only those who were assigned to the teleconsulting group (intervention group) were sent an explanation of teleconsulting, using a method described by Zelen.[49] Patients in the control group were asked only if they would participate in a research project that would involve completing some questionnaires and allowing the research team access to their medical records.

The following instruments were used in the pilot study:

- a demographic and personal details questionnaire for patients
- the Short Form-12 (SF-12), a generic measure of well-being
- the Ware Specific Visit Questionnaire (SVQ), to measure patient satisfaction
- the Spielberger State Trait Anxiety Inventory (STAI)
- a cost questionnaire for patients
- the Duke Severity of Illness (DUSOI) questionnaire, to measure the co-morbidity or burden of illness
- a protocol specifically designed to extract data from hospital and GP records.

The instruments chosen to measure the key non-economic variables had all been validated in previous studies. Other data collection instruments used to gather more immediate information, such as economic data and health service usage, were adapted from measures used by other health service researchers, or developed specifically for the virtual outreach study and piloted during the previous year.

On entry into the trial, and concurrent with gaining the patient's consent, the initial questionnaire covering demographic information and containing the SF-12 was dispatched. The DUSOI was sent to the patient's GP. Immediately after the patient's consultation a second questionnaire was dispatched. The second questionnaire contained the Ware (SVQ), the Spielberger (STAI) and the economic questions. After 3 months (the longest period permitted in the pilot study) the SF-12 was sent again. To maximise response rates all questionnaires were subject to up to three reminders plus a personal telephone call, when the referral letters provided

the telephone number. Tracking patients through the data collection process was accomplished by means of a specifically designed management database system using Microsoft Access.

It was decided to select a reduction in outpatient follow-up appointments as the principal trial outcome on which to calculate the sample size. The study of Vierhout and colleagues[35] indicated a reduction in the number of patients receiving follow-up appointments from 60% for routine outpatients to 40% for joint consultations. Assuming that virtual outreach would lead to a reduction of the same magnitude, and ignoring initially the implications of cluster sampling resulting from the trial design, it was calculated that for each speciality, 130 patients would need to be included in the intervention group and 130 in the control group to give the trial a 90% power to detect a change of this size with a result significant at the 5% level.[50] To take account of the cluster effect, an approximation of sample size inflation of $n(rn+1)$ was used, where r is the intraclass correlation and n is the number of subjects per cluster. Previous studies indicate that the intraclass correlation is unlikely to be greater than 0.05. Assuming recruitment of 45 GPs , each GP would have to recruit some six referrals per speciality to achieve 130 control and 130 intervention patients. For each speciality in the main trial, the cluster inflation factor would be $6 \times (6 \times 0.05 + 1) = 7.8$. This meant that the main trial would need to include $(45 \times 7.8) = 351$ referrals per speciality. Assuming that each GP would on average make one referral per month per speciality, it was calculated that a period of 8 months would be required to complete recruitment of an adequate sample ($45 \times 8 = 360$).

A small amount of data was collected, but with a total achieved sample size of 101 (49 interventions and 52 controls), from six specialities, the sample was insufficient for statistical outcome with any acceptable power. The pilot study produced a referral rate of 1.1, rather than the anticipated 1.5. Following some teething troubles, largely due to misunderstanding within the practices about what documents were to be sent, the administration system worked well. In particular, the practices were able to redirect all of the referral letters to the Teleclinic research office without problems. The letters were processed by the research team within 24 hours, with subsequent allocation to routine outpatient attendance or teleconsultation. A figure of 1.1 eligible referrals per week per WTE GP was achieved. In total, 439 referrals were received over the trial period of 5 months from 5.5 WTE GPs. Of the 439 referrals, 297 were not eligible to enter the trial because they did not fall within the specialities or consultants included in the trial. Of the remaining 142 referrals, four cases were excluded before scrutiny by the research team because:

- the consultant was ill and the GP opted to have the patient seen by junior staff
- the patient was admitted to hospital via accident and emergency
- the patient was classified as urgent by their GP
- the patient was a paediatric case for whom the GP requested a conventional outpatient appointment.

Two cases excluded after scrutiny by the research team were:

- an infant with clicking hips and a previous missed diagnosis in the family
- an elderly women who was both blind and deaf.

A further four patients were lost to the trial because they went for a private consultation or declined consultation because they had recovered or had occupational demands. Of the 132 referrals entering the trial, 62 were for the intervention group and 70 for the control group. Consent to participate in the experimental arm of the trial was obtained for all but 13 patients assigned to the intervention group and 18 assigned to the control group. A number of patients were lost to the trial owing to incorrect addresses on referral letters. Cancellation of appointments created a considerable amount of extra work, particularly in the case of the teleconsultations which required three-way participation of GP, consultant and patient.

Response rates to the various questionnaires ranged from 100 to 73%. The overall response rate was misleading, however, as the item non-response, that is patients not answering particular items or questions within a particular questionnaire, was higher. For two of the questionnaires any item non-response meant that the whole questionnaire was void. The STAI was not fully completed by 12% ($n = 16$) of respondents. The non-completion rate was slightly higher among the intervention group than among controls. Non-response tended to be among the older patients (65 years plus) or for young children. Two per cent ($n = 3$) of respondents did not fully complete the SF-12, rendering their total score void. The DUSOI was completed by the GPs

after patients had been entered into the trial. A completion rate of 90% was achieved for the DUSOI. Non-response seemed to occur because some GPs allowed backlogs to build up.

The pilot study demonstrated the effective operation of a methodology designed to ensure the non-selective recruitment of adequate numbers of appropriate subjects to an innovative health service, namely a teleconferenced medical consultation. The allocation of patients directly from routine referral letters written by the participating GPs, resulted in the successful recruitment of adequate numbers of non-selected patients to the trial, and the balanced randomisation achieved a reasonable distribution between the experimental and control arms of the study. A slight imbalance between the intervention and control groups may have resulted from an asymmetry in the referral rates from one or two GPs. GP referral rates are known to vary quite considerably,[51] and this type of imbalance would be less likely with a larger group of GPs. The slightly lower referral rate of patients to the specialities included in the trial of 1.1, rather than the expected 1.5 per week WTE GP, probably resulted from having to use GPs in the pilot who did not exclusively use the Royal Free Hospital. Thus, many of their referrals were not eligible for inclusion in the study. An additional factor was that not all of the consultants in the study specialities were participants in the trial. As might have been expected, referral rates across specialities were not even. All but six (5%) of the referrals came from gastroenterology, ENT, orthopaedics and urology. With around 45–50 GPs in a trial, these four specialities were deemed to be capable of furnishing an adequate sample within a manageable time scale of 8 months to 1 year. The efficiency of sample recruitment could be increased further. A number of patients, around 10% in each group, had an incorrect address on their referral letter. This could have been improved by tactful advice to general practices in the initial training. Indeed, there were important service implications as an incorrect address must have been responsible for a significant proportion of non-attendance at NHS outpatient clinics. It was recognised, however, that patients may deliberately withhold their correct address in order to appear to remain with a practice catchment area. All the research instruments functioned well, apart from the STAI. There was a high level of item non-response, that is, only partial completion of the questionnaire. In total, 12% of the returned questionnaires were either not completed or only partially completed, rendering them void. Some of the non-response group were children. A substantial proportion of the remainder were elderly (65 years plus). The particular Spielberger inventory used was also designed to be completed very soon after the event to which the level of anxiety measured may have related. As the questionnaires that were completed were frequently only returned after reminders were dispatched, this was clearly not the case. The score therefore may have been quite arbitrary. In light of these shortcomings it was decided not to use the STAI in the main trial.

The methodology had some limitations. As with any trial of a new health technology incorporated into the treatment process, it was not possible to blind GPs to the patients' allocation. It was therefore possible in theory for the GPs to manipulate the referrals by referring to another hospital or withholding their referral letter from the batch sent via the Teleclinic. Scrutiny of the referral letters in the practices suggested that this did not happen to any noticeable degree. The method of sample recruitment also meant a loss of control for GPs. They did, however, at all times have the right to override the research office allocation. Trials of health service innovations cannot mirror actual practice and by their very nature there is always forced choice in experimental design. In practice, the participating GPs managed to live with the arrangements quite well, and only on two occasions asked for patients to be withdrawn from the trial. In one case the patient was an emergency and did not meet the entry criteria, in any case. Overall, the pilot study demonstrated the effective operation of the trial methodology designed to ensure the non-selective recruitment of adequate numbers of appropriate subjects to an innovative health service.

Chapter 2
Methods

General methods

An RCT was designed to assess the effectiveness of joint teleconsultations (virtual outreach) compared with standard outpatient consultations, across a variety of specialities and in both urban and rural settings. Ethical approval was granted by the relevant local research ethics committees.

The hypotheses to be tested were derived from exploratory work carried out before the trial, and from the studies published elsewhere, notably the trial of joint consultation clinics carried out in Maastricht. Although the Maastricht study had demonstrated that the participating GPs had improved their knowledge and skills of orthopaedics, and apparently changed their referral behaviour, it was decided not to evaluate the impact of involvement in virtual outreach on the clinical skills of the participating doctors, for a number of reasons. This was because the GPs involved in the study, particularly those in Shropshire, did not want a cluster design because they wished to develop overall experience of the virtual outreach referrals in all the specialities that were included in the trial. The steering group discussed this proposal at length, given that a decision to abandon the cluster design implication would mean that it would no longer be possible systematically to assess the impact of virtual outreach on the clinical skills and referral behaviour of the participating GPs. In the end it was decided that it was essential to keep their cooperation, and that the change in design would not threaten the integrity of the research, as it was unlikely that there would be contamination of the control group in view of the limited number of patients in each speciality per individual GP. Thus, it was relatively unlikely that GPs would learn so much about the management of specific cases from a virtual outreach consultation that the knowledge would influence the management of similar cases randomised to the control group. In addition, the individual randomisation had the advantage that it increased the statistical power compared with a cluster design.

The proposal to change the study design was fully discussed with the HTA programme directors, who gave their agreement to this change in the study design.

Very little has been published on the cost-effectiveness of teleconsultation, that is, real-time consultations, where doctors and patients are separated geographically but communicate through the use of videoconferencing or some other communication technology.[52] An RCT comparing conventional hospital consultations for dermatology with real-time teledermatology suggested that, subject to certain caveats about travel distances and prices, conventional hospital dermatological care remained the more cost-effective option.[53] A recent report of a systematic review commented on the poor quality of studies on the economic effectiveness of telemedicine and found that there was no evidence that telemedicine was cost-effective.[54] The economic evaluation of the Virtual Outreach Project was therefore a potentially important addition to this literature. The economic evaluation was undertaken to assess the key costs and consequences of joint teleconsultation.

The current mode of referral and specialist consultation may not be economically efficient as there is considerable duplication of investigations, unnecessary hospital follow-up, and concomitant dissatisfaction among patients and clinicians.[55,56] Although a joint teleconsultation, involving two clinicians instead of one, is likely to be more expensive than its conventional outpatient counterpart, improved patient management may potentially lead to net downstream savings to the NHS. However, the case for joint teleconsultation does not rest solely on such a narrow cost minimisation approach.

From a broader societal perspective, the joint teleconsultation has the potential to reduce the costs to patients of a specialist appointment (a 'shadow cost' of using an NHS 'free at the point of delivery'), with concomitant increases in economic productivity. Furthermore, new healthcare technology is often cost-increasing, but can still be considered cost-effective providing the additional benefits outweigh the additional costs.

Selection of the principal sites

The Virtual Outreach Project was established around two referral centres, one at the Royal Free Hospital NHS Trust, a teaching hospital in London, and the other in the Royal Shrewsbury Hospital, a district general hospital in the market town of Shrewsbury, serving a largely rural and semirural community. The rationale for choosing such different settings was to enable the assessment of any systematic differences in the impact of virtual outreach in rural settings, where patients had to travel greater distances, and in the urban context, where the separation between home and hospital was smaller.

General practitioners

The doctors who participated in the trial are summarised in *Table 1*. The project teams in both London and Shrewsbury had already established good links with local GPs and consultants through their previous involvement with telemedicine projects. However, the trial required a different level of involvement and larger numbers of GPs than had previously been used. Letters were therefore sent to GPs who were located within the catchment area of the hospitals. The sample was selected on the basis of evidence of substantial levels of referral, whether or not they were group practice allowing equipment to be shared, and whether or not the practice had the space to house videoconferencing equipment. GPs who elected to participate in the trial had to agree that all their referrals, not just those within the specialities included in the trial, were routed via the Virtual Outreach Office. The project teams recruited and trained a total of 134 GPs from 29 practices, 15 in London and 14 in Shrewsbury. A subsequent study demonstrated that the participating GPs were representative of their peers in their use of information technology (IT).[57]

Consultants

In total, 20 consultant specialists were recruited across the two sites. Of the latter, nine were in medical specialities (gastroenterology 3, endocrinology 1, neurology 1, general medicine 2 and rheumatology 2), and 11 in surgical specialities (ENT surgery 4, orthopaedics 2 and urology 5).

Training

A training programme was designed for both the GPs and the hospital specialists. In the first place, a manual was produced (Appendix 1) to illustrate how the equipment should be used, together with a 10-minute videotape showing the complete set of processes involved in the joint teleconsultation. Two training weekends were held, one in Birmingham (primarily for the Shrewsbury participants) and one in London for those working in the Royal Free project. Here, the participants had the opportunity not only to try out the equipment and to see how it felt to have a joint consultation, but also to share fears, expectations and general views with fellow GPs and consultants alike. Shortly before the start of recruitment phase of the trial, the research nurses in both the Royal Free and Royal Shrewsbury centres visited each of the participating practices, to provide them with the materials and show them exactly how the equipment could be used. They were also present to help with the first few teleconsultations undertaken by each GP and hospital specialist, and a technical helpline was established at each site to provide support to the participating clinicians. There were varying degrees of self-sufficiency among the participants, and these were particularly marked in the hospital specialists; some were 'self-catering', while others required a 'waiter service'.

TABLE 1 *Participating GPs and hospital clinicians*

	London	Shrewsbury	Total
Number of GPs	74	60	134
Number of practices	15	14	29
Number of consultants by speciality	12	8	20
Endocrinology	1	0	1
ENT	2	2	4
Gastroenterology	1	2	3
General medicine	0	2	2
Neurology	0	1	1
Orthopaedics	2	0	2
Rheumatology	2	0	2
Urology	4	1	5

Establishment of virtual outreach service

Virtual outreach services were established at the Royal Free Hampstead NHS Trust, which serves GPs in inner city and urban settings in London, and at the Royal Shrewsbury Hospital Trust in Shropshire, which serves GPs and patients in small market towns and rural settings. To ensure comparability, waiting times of no more than 8 weeks were established for patients in both arms of the trial. In most cases, the specialists were unable to provide dedicated virtual outreach

clinics, but generally offered appointments at the beginning or end of their routine outpatient clinics. Virtual outreach used PC-based technology (Intel Business Video Conferencing version 5) and ISDN2 links. No special fibre-optic or other instrumentation ('peripherals') was available at any site during the course of the trial.

Hypotheses

After due consideration, the following hypotheses were selected for the trial. Compared with standard outpatients, virtual outreach will:

- reduce offers of hospital follow-up appointments
- reduce numbers of medical interventions and investigations
- reduce numbers of contacts with the healthcare system
- have a positive impact on patient satisfaction and enablement
- have a positive impact on patient health status.

Measuring main outcomes

The following questionnaires were used, which had been tested in the pilot study (see Appendices 3–6).

The Short Form-12 (SF-12) and Child Health Questionnaire (CHQ)[58,59]

The SF-12 is a short form of the SF-36, which was itself a short form of a lengthier questionnaire to measure patient health status or well-being. The SF-36 questionnaire was developed by the Rand Corporation and validated originally in 1980. Further work on the internal consistency of the SF-36 was conducted in the UK on a randomly selected sample of 13,042 subjects aged between 18 and 64 years. The internal consistency of the different dimensions of the questionnaire was found to be high. Normative data broken down by age, gender and socio-economic status were consistent with those of previous studies. Further work was conducted to reduce the SF-36 to the SF-12. The study found that the scores calculated from the two questionnaires were virtually identical and indicated the same magnitude of ill-health and change over time.

The CHQ was developed in 1990 because of the absence of any health outcomes for children and adolescents other than mortality and morbidity statistics. The CHQ has been subjected to rigorous testing for consistency and internal reliability both in samples of representative US children in the general population and in clinical populations. Little difference was found in sample subgroups (child age, gender, parent gender, ethnicity, education and work status). Similar results were found in clinical samples, including subjects with asthma, cystic fibrosis, epilepsy, juvenile rheumatoid arthritis, and attention deficit and hyperactivity disorder.

The Duke Severity of Illness (DUSOI)[60]

The DUSOI is a measure of co-morbidity or the burden of illness during a specified week. It has been validated both as an instrument that can be used by a clinician at the time and for use immediately after a patient encounter by retrospective audit. The questionnaire is fairly simple to complete. All medical diagnoses for conditions in a specified week are listed. For any condition listed, the doctor completing the form is asked to give a score on a five-point scale for symptoms, complications, prognosis and treatment. A measure of co-morbidity was necessary to control the case-mix in the control and intervention groups.

The Ware Specific Visit Questionnaire (SVQ)[61]

The SVQ was first developed in 1988 by the Rand Corporation as part of a large-scale exercise for evaluating patient satisfaction and medical outcomes of medical services. The SVQ is a 14-item questionnaire rating various aspects of a specific visit to a medical practitioner. The items cover the convenience of location, communication in making an appointment waiting areas and time taken to get an appointment or sitting in the waiting room, together with a rating of the doctor–patient interaction and overall satisfaction. Each item is ranked on a five-point Likert-type scale ranging from excellent to poor. It has been widely validated and used in a large number of studies

The Patient Enablement Instrument (PEI)[62]

The PEI was developed because it was felt that there was a need to measure the degree to which patients were empowered or better able to cope with their illness following a visit to a medical practitioner. This is in contrast to measures of satisfaction that essentially measure whether or not particular patient agendas are met. The developers of the instrument have demonstrated that the PEI can identify patients with different types and levels of need in a way that has a strong face validity. In addition, they showed that the measures of consultation length (that had

previously be found to be a proxy measure of quality on a number of defined grounds) seem interchangeable as a process measure.

The measure is based on six postconsultation questions with good internal consistency and good construct validity, and has been developed in such a way that it can be scored in five ways that measure different elements of the concept of enablement as an outcome measure. Six questions are involved:

"As a result of your visit to the doctor today do you feel you are:

- able to cope with life?
- able to understand your illness?
- able to cope with your illness?
- able to keep yourself healthy?
- confident about your health?
- able to help yourself?"

The first four questions are given the choices 'Much better', 'Better', 'Same or less' or 'Not applicable'. The last two questions have the choices 'Much more', 'More' or 'Not applicable'.

Randomisation

GPs were encouraged to seek consent from their patients when the decision was made to refer. As referral letters were received, the project staff identified all patients eligible for the trial, and those for whom a consent form had not been completed were sent a patient information leaflet and consent form. The trial was deliberately kept as inclusive as possible, but patients requiring urgent assessment, private patients and those with significant difficulty communicating in English were excluded. Patients with difficulty in English were excluded not for clinical reasons (they may even have derived additional benefit), but because they would not have been able to complete the questionnaires. All other patients referred by the participating GPs to specialists taking part were eligible for recruitment. Shortly after the start of the trial, the exclusion criteria were extended to patients referred for a specific investigation (such as a hearing test), but the small number of such patients who had already been recruited was retained in the final analysis. Those not eligible to enter the trial were immediately placed into the hospital administration. Eligible patients were then sent a pack containing explanatory letters and consent letters. Patients for whom consent was obtained were randomly allocated to either the virtual outreach or the standard outpatient consultation arm of the trial. Computerised randomisation in permuted blocks of sizes four and six (arranged unpredictably) was stratified by centre, practice and speciality. Because the allocation had to be undertaken by research staff, there was no opportunity for clinical staff to influence the allocation procedure.

Data collection

Baseline measures consisting of demographic variables and a quality of life measure (SF-12 for adults and CHQ for subjects aged under 16 years) were collected on a questionnaire sent with the appointment letter. The referring GPs completed a DUSOI questionnaire for each patient. The outcome measures immediately following the index consultation included the SVQ (patient satisfaction) and the PEI. Offer of a follow-up outpatient appointment in the same speciality was determined by the research nurses from review of the content of the letter written by the hospital specialist following the initial consultation to which patients were randomised (the index consultation). The research nurses extracted data from the letters on the reasons for offering follow-up appointments. These included inappropriate or failed teleconsultations or decision to review the patient when the results of investigations were available. For the intention-to-treat (ITT) analysis, in those cases where it was impossible to arrange a mutually convenient time for the index consultation, or where the GP, consultant or patient had requested an appointment other than the index appointment, or if there had been a technical failure, a further appointment was deemed to have been offered. No offer of a follow-up appointment was deemed to have been made to patients who had moved away, repeatedly did not attend the index consultation, were admitted to hospital, stated that they had got better and no longer wished to be seen, or had died.

In the early phases of the trial, hospital specialists were requested to complete a data form of the consultations, recording information relating to diagnosis, investigations ordered, treatments and interventions prescribed or planned, and any referral to another specialist. In the virtual outreach arm of the trial, they were also asked to rate appropriateness of the consultation using a Likert scale. However, as it proved impossible to achieve satisfactory rates of completion of these questionnaires by the specialists, the form was abandoned in the early stages of the trial.

The 6-month assessment included the SF-12 and, where relevant, the CHQ. In addition, information was collected from general practice and hospital records, for 6 months following the index consultation, about investigations, interventions and treatments, consultations with primary care professionals, and inpatient and outpatient consultations.

To identify resource use that was specific to the randomised interventions, criteria for defining 'attributable items' were agreed by the research team, following independent data extraction from a subsample of records by two nurse researchers. Those where there was agreement that they were specific to the speciality to which the patient had been referred (e.g. gastroscopy for patients referred to a gastroenterologist) were designated as attributable to the index consultation for the final analysis, as were all of the non-specific items carried out within 4 weeks of the consultation. Analyses were carried out on both attributable and total data. Criteria for attribution of tests and investigations are described more fully below (Economic evaluation methods; Tests, investigations, procedures and contacts with healthcare services over 6 months).

Because of the practical difficulties in obtaining prescription data from paper records, prescription data were obtained only from those practices using computerised prescribing systems that readily facilitated data capture in electronic form (12 in London and 11 in Shrewsbury). Criteria for attribution of prescriptions are described more fully below (Economic evaluation methods; Prescription costs).

Statistical methods

The sample size, based on the study by Vierhout and colleagues[35] was chosen to detect a reduction of 20% (from 60% to 40%) in follow-up outpatient appointments offered following the index consultation (the primary outcome) between the randomised groups, both overall and separately for each of the five predefined speciality groups (ENT, orthopaedics, urology, gastroenterology and other medical specialities) with 90% power and 5% significance. The study required 250 patients in each speciality, and allowing for imbalance in anticipated numbers between specialities and a potential 30% of missing outcome data, the study required a total of 1950 patients.[63] The statistical analysis followed a prespecified plan, considering the groups as randomised. Primary and secondary outcomes were specified a priori. The *p*-values reported are not formally adjusted for multiple comparisons. Thus, among the secondary outcomes, some apparently significant differences may have arisen by chance. Adjustment for baseline characteristics (see footnote to *Table 6*, p. 23) was by logistic regression for binary outcomes and normal errors regression for quantitative outcomes. Tests of interaction were used to assess whether the effect of virtual outreach varied by speciality or site (London or Shrewsbury). Health service data were compared using means,[64] as were Ware satisfaction and enablement scores. The latter two analyses were checked, respectively, using proportional odds regression and logistic regression of the proportion of patients with non-zero scores.[65] The analyses on offer of follow-up were calculated both on the basis of ITT and 'per protocol', restricted to those who received the intervention as randomised and those for whom there was a consultant letter. The ITT analysis is presented as the primary results. In the case of satisfaction and patient enablement, analyses were performed per protocol rather than on an ITT basis, because the responses to questions on these issues were related to the patients' experience at the index consultation. A higher proportion of those in the virtual outreach group did not receive the index consultation, and therefore missing outcome data relating to the index consultation were generally more frequent in this group. The extent of these and other missing data also varied somewhat by site and speciality, and by patient age and gender. However, adjustment for these characteristics did not change the interpretation of any of the results, suggesting that any biases caused by missing data are small. Various other sensitivity analyses were performed, for example excluding patients with apparently incomplete GP or hospital notes from the analyses, without changing the interpretation of the results. In the case of outcome data extracted from medical records, the proportion of missing data was very low and did not differ between the groups.

Economic evaluation methods

The hypotheses of the economic evaluation were that, compared with conventional outpatients, virtual outreach will:

- incur no increased costs to the NHS
- reduce the costs incurred by patients attending outpatient appointments
- reduce the time taken off work (positive impact on productivity).

Costs to the NHS

The economic evaluation focused on actual resources used and a cost for each patient was derived for the index consultation and 6-month follow-up period.

Index consultation

The index consultations, that is, the consultations to which patients were randomised, were costed using an 'ingredients'-based approach. The important elements included capital and overhead costs, professional time and telephone line costs. Non-participant observation was used to estimate time spent from a small sample of consultations selected opportunistically because of the logistical problems of scheduling observations and the substantial research time involved. Joint teleconsultations were observed at the GP practice and the hospital clinic to estimate the respective time input of the two physicians. More consultations were observed at the consultant end, because the location was more accessible and because consultants often undertook several trial consultations in a single clinic session. Of the 35 standard outpatient appointments observed, 26 were at Shrewsbury and nine were at London. In London 25 teleconsultations were observed, although the patient did not attend in two cases. Of these, nine were observed at the GP practice and 16 in a hospital setting. Seven consultants, representing urology, endocrinology, rheumatology, ENT, gastroenterology and orthopaedics, were observed in the hospital setting and seven GPs were observed in six different practices. In Shrewsbury six teleconsultations were observed at both GP practice and hospital. In total, four consultants were observed, covering gastroenterology, respiratory medicine and ENT specialities. In all, nine conventional outpatient appointments were observed in ENT and gastroenterology in London. In Shrewsbury 26 conventional appointments in total were observed for specialists in gastroenterology, ENT and respiratory medicine. Sensitivity analysis was used to explore the implications of errors resulting from these estimates.

The costs of training clinicians in the use of the videoconferencing equipment and some administrative functions undertaken by the research team have not been included in the analysis of consultation costs. These administration costs were considered to be largely an artefact of the trial design and of little relevance to service delivery. It was assumed that the relatively small training costs could be absorbed within ongoing training costs that are included within the calculation of the cost of clinician time. The complete record for the timing of index consultations is given in *Table 2*. *Table 3* summarises the ingredients costs used for each consultation type.

The cost calculation for clinician time was based on data compiled by Netten and Curtis.[56] The cost of a minute of GP's time was £1.96 and various

TABLE 3 *Costs of virtual outreach index appointments*

	Teleconsultation	Conventional
Labour		
GP	£50.96	
Consultant	£57.71	£34.22
Consumables		
Call charges	£0.71	
Capital		
Videoconferencing units	£23.52	
Trolleys	£0.12	
Cabinets	£0.10	
Overhead		
ISDN rental	£31.50	
Software installation	£12.37	
ISDN installation	£15.19	
Marginal cost of consultation	£109.38	£34.22
Average cost of consultation	£192.17	£34.22

TABLE 2 *Timings of trial appointments*

	Duration (minutes)			
	n	Mean (SD)	Range	95% CI
Joint teleconsultation				
Consultation duration	31	10.5 (5.1)	3–22	8.6 to 12.4
Total GP time	14	26 (10.1)	9–45	20.2 to 31.8
Total consultant time	22	19.9 (8.3)	8–37	16.2 to 23.6
Conventional outpatient appointments				
Consultation duration	35	9.3 (5.2)	3–25	7.5 to 11.0
Total consultant time	35	11.8 (6.2)	5–27	9.7 to 13.9

CI, confidence interval.

practice overheads and training costs are embodied within this figure. The cost of a minute of consultant's time was £2.90. Overheads, including secretarial support and training costs, are included in Netten and Curtis's figure (£1.82), but nursing and clinic costs associated with an appointment are not. To ensure comparability between GP and consultant costings, estimates of nursing and clinic costs provided by the Royal Free Hospital Trust were added to the Netten's figure for the cost of consultant's time.

Call charges were incurred according to the duration of the triadic consultation. Additional capital and overhead costs associated with virtual outreach for the purchase of equipment and the installation and rental of ISDN telephone lines were included. These costs that do not vary with output, unlike those for line charges, are nevertheless essential to the provision of the service. The cost per consultation was the total fixed costs divided by the number of consultations. The fixed cost component of a consultation is thus an artefact of the number of consultations in the trial. To take this into account, the costs for a single consultation are reported with and without the fixed cost component. The capital costs of the videoconferencing equipment and accessories were annuitised over the expected lifetime of the asset using an interest rate of 6%.[66] The lifetime was assumed to be 5 years for the videoconferencing equipment and 20 years for cabinets and trolleys. A total of 889 teleconsultations took place in the Virtual Outreach Project in 21 months. This works out at approximately 500 teleconsultations per year. Therefore, the equivalent annual cost was divided by 500 to derive a capital cost per consultation. Normal practice and hospital overhead costs are incorporated into the labour costs of GPs and consultants. However, virtual outreach consultations introduce new overheads, such as ISDN line rental and software installation, and these were assigned to individual consultations by dividing the total cost by the number of teleconsultations (n = 889). In total, 225 patients did not attend their index consultation, but as most of them gave notice of this it was assumed that the NHS incurred no costs for these cases. The effects of relaxing this assumption were investigated using sensitivity analysis.

Prescription costs

Prescription issues and costs were collected electronically from the computerised record systems of GP practices using EMIS version 5® software. Appendix 7 provides a detailed description of how these data were collected and organised. As many of the prescriptions issued did not relate to the index consultation, this was adjusted for in the following way. Prescription data were collected for patients in the 6 months either side of the index consultation. (A reference date of 1 month after randomisation was used in the event that the patient did not attend their index appointment.) A prescription issued after the index consultation was deemed to be attributable to the index consultation if the patient did not receive the same named prescription in the 6 months before the index consultation. The attribution was undertaken by a non-clinician and, as subjective assessment was not required, the method was thought to be robust and unbiased. The exercise was validated with a clinician in one practice and agreement was reached on 182 out of 184 items. Clinical methods of attribution were not feasible within the timescale and resources of the project. With the exception of one practice in London, prescription data were not analysed from those GP practices using non-EMIS version 5® computerised systems. This was because the data could not be exported electronically in a timely and useful fashion. The GP practice with the greatest number of trial patients in the London arm of the trial used Torex Premiere®, and data from this practice were collected electronically and included in the analysis. The omission of a number of practices from the prescription analysis is unfortunate, but should not introduce any systematic biases as the patients in these practices were evenly distributed across the two arms of the trial (153 in the virtual outreach group and 150 in the standard outpatient group).

Tests, investigations, procedures and contacts with healthcare services over 6 months

Research nurses collected data on the patient's use of NHS resources in the 6 months after the index consultation from hospital and GP records. A standard form was devised as the data collection instrument and a coding system was agreed for recording items of resource use. Resource items were grouped into the following categories:

- visits to the GP practice
  - visits to GP
  - visits to nurse
  - visits to other clinical practice staff
  - home visits
  - other patient contacts with the practice
- contacts between hospital consultant and GP
- X-ray and radiological investigations
- blood tests and laboratory investigations
- other tests and investigations
- visits to the outpatients department

- inpatient admissions
- attendances at the accident and emergency department
- attendances for day surgery and other inpatient procedures
- any other hospital visits
- any other hospital contacts.

Each resource item was given a code and a unit cost was assigned to it. With the exception of visits to the GP practice, the unit costs were obtained from 1999/00 data supplied by the Royal Free Hampstead NHS Trust, the Royal Shrewsbury Hospital NHS Trust and NHS Reference Costs 2000.[67] Unit costs for visits to GP were derived from Netten and Curtis.[56]

Attribution to the index consultation

As with the prescription data, much of the 6-month resource use was unrelated to the condition that led to the patient's recruitment into the trial. To reduce this noise, criteria were developed for identifying items of resource use that could be deemed to be attributable to the index consultation speciality, for example, a gastroscopy for a patient referred to a gastroenterologist. Other items such as GP visits, blood tests and laboratory investigations were classified as attributable if they occurred within 4 weeks of the index consultation (or from a reference date set 1 month after randomisation if the patient did not attend their index consultation). Although this was felt to be a robust method, it did not determine 'attribution' to the index consultation in a clinical sense. In selecting these criteria a trade-off was made between sensitivity and specificity. By excluding non-speciality specific tests, some resource items were excluded that were genuinely attributable to the index consultation (false negatives). However, had this category been included, many resource items not attributable to the index consultation would have been counted as attributable (false positives). Similarly, reducing the time cut-off for attributable items increased specificity at the expense of sensitivity. In the Shrewsbury arm of the trial the research nurses also categorised attributable resource items using their clinical judgement. They coded each resource item as attributable, not attributable and uncertain. An inter-rater reliability exercise was undertaken which showed that there were no material differences between the assessments of the different research nurses.

Patient costs and impact on productivity

Data on the costs incurred by patients were collected from a postal questionnaire. Patients were asked to record any travel costs incurred by themselves (or anyone accompanying them) in attending their index consultation, and time taken, including travel, to attend the index consultation. They were also asked to provide information about the impact on their work and that of anyone accompanying them. If there was any work lost, questions were asked about whether pay was lost or whether they or anyone accompanying them had had to take annual leave. Questions were also asked about associated childcare costs. Productivity losses were estimated using data from the New Earnings Survey[68] and from responses to questions about whether either the patient or companion had to take time off work.

Comparison with physical outreach

It had originally been intended to include an economic comparison of virtual outreach with physical outreach clinics. This comparison was to have been undertaken using a data set on physical outreach clinics generated by Bowling and Bond.[33] However, it became apparent before the trial commenced that there were too many differences between the two data sets for the comparative analysis to be undertaken. It would not have been feasible within the available financial resource allocation to undertake additional data collection on physical outreach clinics, and it was therefore decided to abandon this comparison.

Economic and statistical methods

Economic evaluation may take various forms. Cost–benefit analysis estimates the costs and benefits to all those affected over the duration of the project in money terms, to allow for comparisons with investments in other sectors of the economy. If the effects can be measured as a single outcome measure, a cost-effectiveness study may be used. Many projects have multiple dimensional outcomes and attempt to aggregate these disparate outcomes using an index to measure the quality-adjusted life-years (QALYs). Some studies do not attempt to aggregate outcomes in this way, but estimate costs and delineate as clearly as possible the consequences of the intervention. Methodologically, one of the key problems with such cost–benefit assessment studies is the requirement to make general conclusions based on the monetary values assigned to outcomes. Unlike the QALY approach, this does not really facilitate comparisons across different healthcare programmes. For example, the willingness to pay (WTP) values from one study

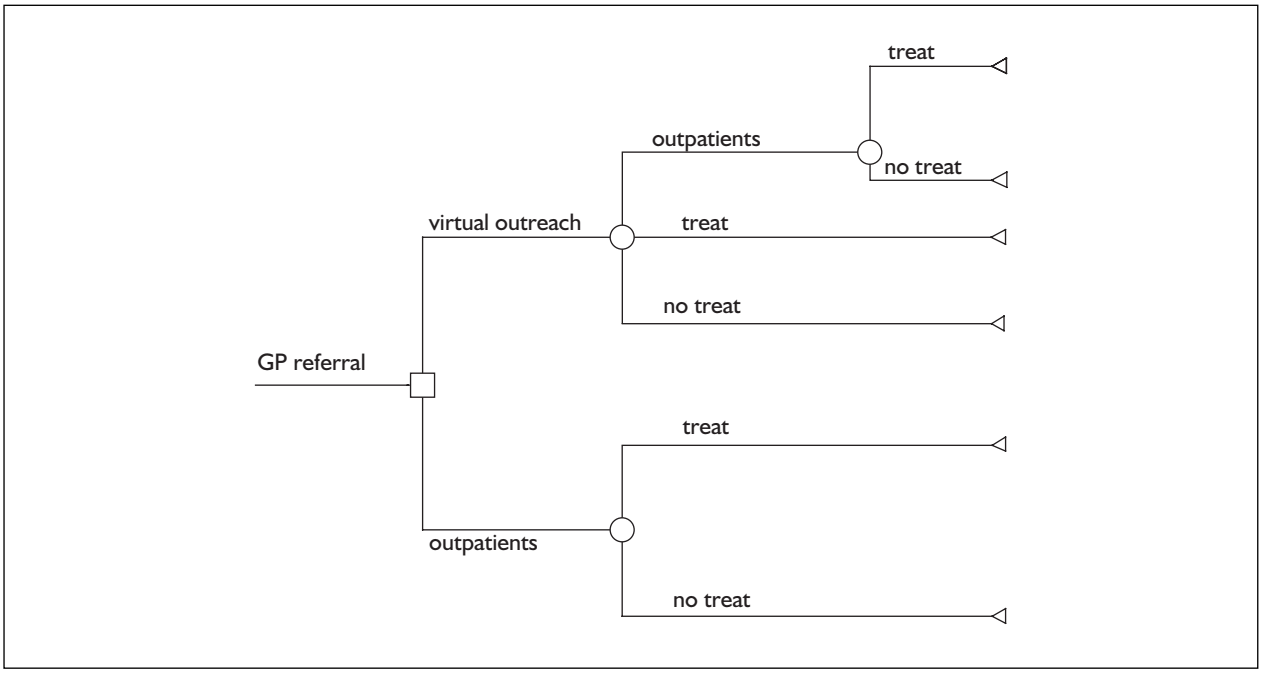

FIGURE 1 *Decision-analysis model*

with a particular set of characteristics cannot easily be compared with the WTP values of another study that valued a different programme with a different set of characteristics.

Decision-analytic modelling is an approach to decision-making under conditions of uncertainty and is widely used in the economic evaluation of healthcare to assess the consequences of different treatment strategies. For each strategy, the important patient pathways are modelled by assigning probabilities to different events and valuing the outcomes and costs associated with each end-point.

A simple decision-analysis model that may have been adopted for the Virtual Outreach Project is shown in *Figure 1*. The 'treatment' arms of the decision tree are essentially a catch-all for the myriad different treatment pathways that patients experience. These pathways vary according to speciality and underlying condition, with marked differences in the probabilities of different events and outcomes.

Such decision-analytic models are sometimes used to complement the data from randomised trials, where a longer time horizon than that provided by the trial is needed to evaluate fully the costs and outcomes, for example. One hypothesis of the Virtual Outreach Project was that teleconsultation would reduce downstream costs to the NHS as a result of improved patient management, although it was acknowledged that not all of these savings may be captured within the 6-month follow-up period.

However, although theoretically it would have been useful to model beyond the 6-month period this was not undertaken because of the practical difficulties involved. The parameters for such models are normally estimated from the literature or expert opinion. In this case, the study would be modelling the counterfactual: how would pathways differ in resource use and health outcomes if patients received an innovative virtual outreach consultation as opposed to a conventional one? Although this study was able to provide evidence for costs and outcomes for the 6-month period immediately after the index consultation, anything beyond this would be pure speculation. Another problem concerned the nature of the treatment arms. Such a generic category would not be useful for extrapolations beyond the 6-month period. Any long-term data on resource use and health outcomes would depend more on the condition than the mode of specialist consultation, although this may moderate both. However, the Virtual Outreach Project included patients with a range of different conditions and many had co-morbidities. Even if a specific condition were identified within the trial, it is likely that the sample sizes would be too small to enable meaningful conclusions to be drawn about the probabilities of outcomes and costs for such conditions, even for the 6-month follow-up period covered by the trial. More

generally, the noise problem encountered in the trial in relation to resource use would be compounded by longer follow-up, and again this would be difficult to address within a decision-analytic model.

Taking all of these factors into account, a cost–consequence approach was adopted for this study that involved reporting an array of output measures alongside costs. The perspective of the evaluation embraced the perspective of the patient in addition to the NHS, but it fell short of a societal approach involved in a full cost–benefit study. The statistical analysis for the economic evaluation followed a prespecified plan. Costings were based on actual not prescribed resource use, as this reflects 'real' practice. For 21 patients the 6-month resource use data were missing. For these patients, resource use was imputed using the mean values for patients with data by site and consultation type. For example, the values imputed for a London patient in the standard outpatient group with missing data would be the mean value obtained for London patients in the standard outpatient group. For the 353 patients with missing prescription data, mean values were imputed according to the same method. Some data were missing from self-completed patient questionnaires, and again values were imputed. For patients who indicated that they had incurred costs for travel by private car but had not stated the amount, the distance of their return trip from their home to appointment location was calculated using http://www.multimap.com, and a cost imputed based on an average cost of travel of 20 pence per mile.[69] Where it was not clear whether the patient had incurred a cost or not, the value imputed was based on the mean of all patients with complete data, regardless of whether they incurred a cost or not.

Resource use and cost data were compared using means, with pooled variance *t*-tests used to test for differences in patient and NHS costs between the two arms of the trial. Other techniques to increase the power of the estimates such as bootstrapping were not required as sample sizes were large.[70] Adjusted analyses using multiple regression models were used to improve the precision of the estimated treatment effect, or to allow for imbalances in baseline characteristics. Adjusted analyses using multiple regression models were used to improve the precision of the estimated treatment effect or to allow imbalances in baseline characteristics: site, speciality, age, gender and DUSOI. In addition, tests of interaction were used to investigate site and speciality effects on resource use and cost.

In economic evaluation, sensitivity analysis is often used to explore the robustness of results in the face of uncertainty about data values. In this trial, the key uncertainty centred on the parameter values used to derive the index consultation costs. Therefore, one-way sensitivity analysis was undertaken on a range of parameters associated with the index consultation, namely teleconsultation duration, conventional consultation duration, total GP time, total consultant time, the cost of videoconferencing equipment, the lifespan of videoconferencing equipment, the cost of non-attendance and the number of consultations per annum. The following parameters were varied in the sensitivity analysis.

- Consultant time, conventional appointment: if conventional outpatients appointments had been typically longer than in the observed sample, then the cost difference would have been less than those based on the present observations. The observed time was 11.8 minutes and this set the benchmark for the bottom of the range (rounded down to 11 minutes). Data from the Royal Free Hospital suggested that a consultation time of 19.1 minutes was used as the basis for calculating the costing of outpatients. This value was therefore used as the basis for the upper range in the sensitivity analysis.
- Teleconsultation duration: this refers to the actual length of the joint teleconsultation. If these had been typically of shorter duration than actually observed, then cost difference between the consultation types would have been reduced. The ranges used reflect the ranges observed in the non-participant observation of virtual outreach consultations.
- Consultant time, teleconsultation: if the observations had overstated the typical consultant input, then the cost difference would have been exaggerated. The ranges were based on the observed joint teleconsultation duration plus the ranges of other consultant input observed in joint teleconsultations, such as administration and set-up.
- GP time, teleconsultation: the same reasoning and method were used as for consultant teleconsultation time.
- Videoconferencing equipment: it was difficult to gauge uncertainty with regard to cost of equipment, as increasing technology tends to increase cost, but the cost of any given technology tends to fall rapidly. Therefore, a wide range was used.

- Videoconferencing equipment lifespan: this was included because it impinges on capital costs. The ranges used were necessarily arbitrary.
- Joint teleconsultations per annum: this factor was included because it has been noted that volume effects can affect cost-effectiveness.

For the best case sensitivity analysis the parameters for a number of variables are varied simultaneously. Time values for virtual outreach are based on the lower interquartile range of observations. Consultant input into conventional outpatients is estimated from Royal Free Hospital data. The values used for the number of consultations and cost of equipment are indeed arbitrary (although both in favour of virtual outreach compared with the baseline), although it is difficult to envisage how they could be determined scientifically, without considerable research effort. Such effort is probably not worthwhile given that their effect on overall costs of a virtual outreach consultation is fairly modest at these levels. Overall, as acknowledged in the report, the best case scenario is optimistic, but illustrates what conditions would be necessary to make virtual outreach consultations a more viable proposition.

In addition, a multiway sensitivity analysis was used to assess a best case scenario for joint teleconsultations. This involved making optimistic assumptions about parameter values relating to

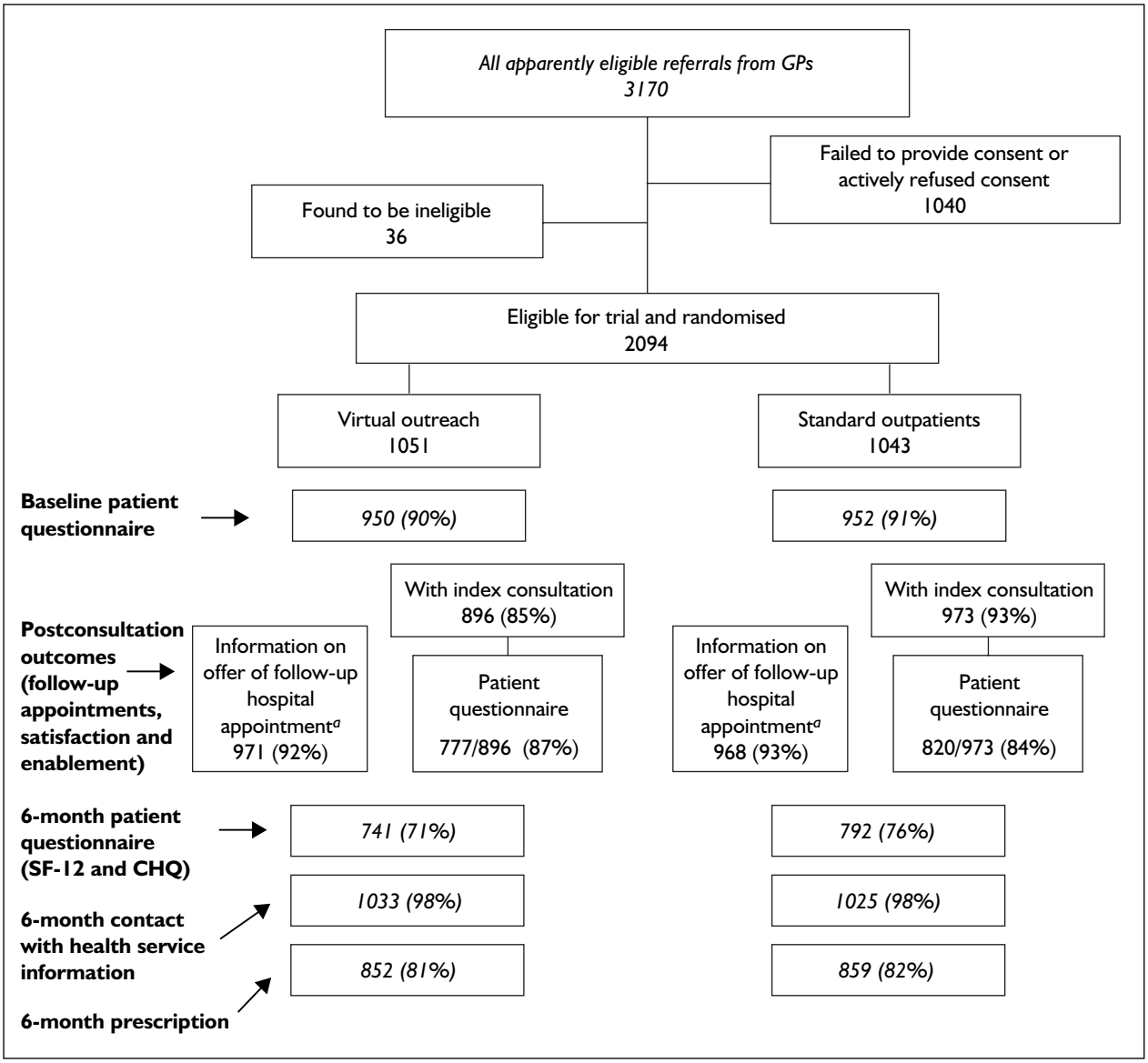

FIGURE 2 *CONSORT diagram: recruitment and completion of the trial. [a] Patients on whom data were extracted from the consultant's letter or from other sources.*

the costs of a virtual outreach appointment and pessimistic assumptions about the duration of a conventional appointment.

Recruitment of patients

For the duration of the recruitment phase of the trial (January 2000 to December 2000), staff in the research offices at each site reviewed all the referral letters sent by the participating GPs to identify eligible patients.

Randomisation

Of 3170 apparently eligible patients considered for the trial, 2094 were randomised (*Figure 2*). In total, 1040 patients were eligible for the trial but, for a variety of reasons, did not provide consent (*Table 4*).

Those that were not randomised, mainly because consent was not obtained, included a greater proportion of younger London patients, but were similar in other ways to the trial participants. Thirty-six patients were subsequently found to be ineligible (most of them because of referral to a consultant who withdrew from the study before seeing any patients) and were excluded from the trial. Different specialities were eligible in London

TABLE 4 *Characteristics of those 1040 patients eligible for the trial but who did not provide consent*

	***n* (%)**
Site	
London	797 (77)
Shrewsbury	243 (23)
Speciality	
Orthopaedics	174 (17)
Urology	194 (19)
ENT	272 (26)
Gastroenterology	226 (22)
Endocrinology	60 (6)
Rheumatology	57 (5)
General medicine	36 (3)
Neurology	21 (2)
Gender	
Male	508 (49)
Female	532 (51)
Age (years)[a]	
Mean (SD)	44 (21)

[a] Age at date of referral letter (missing for ten patients).

TABLE 5 *Baseline comparability of randomised groups*

	Virtual outreach	**Standard**
Number randomised	1051	1043
London centre	616	616
Speciality		
Orthopaedics	185 (30%)	190 (31%)
Urology	117 (19%)	113 (18%)
ENT	109 (18%)	111 (18%)
Gastroenterology	117 (19%)	121 (20%)
Other medical specialities	88 (14%)	81 (13%)
Shrewsbury centre	435	427
Speciality		
Urology	29 (7%)	35 (8%)
ENT	186 (43%)	179 (42%)
Gastroenterology	98 (22%)	95 (22%)
Other medical specialities	122 (28%)	118 (28%)
Both centres		
Male	509 (48%)	508 (49%)
Age at randomisation (years), mean (SD)	48.4 (20.8)	48.1 (20.7)
White ethnic group[a]	848 (90%)	835 (88%)
DUSOI (overall score)[b], mean (SD)	48.2 (17.5)	49.9 (18.2)
SF-12 Physical score[c], mean (SD)	47.1 (12.2)	47.5 (12.3)
SF-12 Mental score[c], mean (SD)	42.1 (11.6)	41.2 (11.8)

[a] Based on 1889 patients.
[b] Based on 1774 patients. Scores range from 0 (low severity) to 100 (high severity).
[c] Based on 1569 adults (>16 years). CHQ scores for those less than 16 years were also balanced between groups.

and Shrewsbury, but these and other baseline characteristics, including marital and employment status and measures of socio-economic status, were well balanced between the two randomised groups (*Table 5*).

For 139 patients, it was impossible to arrange a mutually convenient time for the index consultation, or the GP, consultant or patient requested an appointment other than the index appointment. A technical failure occurred with eight patients, and 78 patients moved away, repeatedly did not attend the index consultation, were admitted to hospital, stated that they had got better and no longer wished to be seen, or were found to have died. Following the index consultation, 15 patients withdrew consent and in 140 cases no consultant letter was available. These latter cases were evenly distributed between the virtual outreach and standard groups, and were therefore not included in the ITT analysis.

Chapter 3
Main trial results

Using the ITT analysis described in Chapter 2, it was calculated that 52% of patients in the virtual outreach group were offered a follow-up appointment, compared with 41% in the standard outpatient group (*Table 6*).

This difference was hardly changed by adjustment for baseline characteristics. Differences in the frequency of offer of follow-up between randomised groups were observed in the two sites, and across different specialities (tests of interaction $p = 0.009$ and $p < 0.001$, respectively). The difference in frequency of offer of follow-up between the two groups was substantially higher in Shrewsbury than in London. It was also higher in ENT and orthopaedics than in urology, gastroenterology or the other medical specialities (*Table 6*). The tests of interaction remained statistically significant when both site and speciality were considered together, and when adjustment was made for baseline characteristics. The absolute differences in the proportions of offered follow-up appointments, calculated on the basis of ITT, are shown in *Figure 3*. When comparisons were made per protocol (i.e. including only those patients who actually received the trial intervention and for whom there was a letter from the specialist), the overall proportion of patients receiving an offer of follow-up was 46% in the virtual outreach group and 42% in the standard outpatient group (odds ratio 1.19, 95% CI 0.99 to 1.44), but significant heterogeneity remained for both site and speciality ($p = 0.001$ and $p < 0.001$, respectively). Information on tests and investigations, and the numbers of contacts with healthcare services over 6 months is summarised in *Table 7*.

On average, there were significantly fewer tests and investigations in the virtual outreach group. Other contacts with healthcare services did not differ between the randomised groups. However, of those 157 patients in the virtual outreach group for whom the consultant letter indicated an inappropriate or a failed joint teleconsultation, 126 (80%) had an attributable outpatient visit in the 6-month follow-up period, compared with 341/876 (39%) of the remaining participants randomised to virtual outreach ($p < 0.001$). Tests of interaction showed evidence of differences in effects by speciality for number of tests and investigations ($p = 0.01$) and outpatient visits ($p = 0.007$). In particular, the effect of virtual outreach in decreasing the number of tests and investigations was more marked in gastroenterology. However, virtual outreach

TABLE 6 *Offer of follow-up appointment (ITT analysis)*

		Virtual outreach	Standard	Odds ratio (95% CI)	*p*-Value
Number of patients		*n* = 971	*n* = 968		
Overall:	Unadjusted	502 (52%)	400 (41%)	1.52 (1.27 to 1.82)	$p < 0.001$
	Adjusted[a]			1.52 (1.26 to 1.81)	
	Adjusted[b]			1.53 (1.27 to 1.83)	
By site:	Unadjusted				Interaction $p = 0.009$
	London	281 (50%)	254 (45%)	1.25 (0.99 to 1.57)	
	Shrewsbury	221 (54%)	146 (37%)	2.02 (1.53 to 2.68)	
By speciality:	Unadjusted				Interaction $p < 0.001$
	Orthopaedics	89 (54%)	59 (34%)	2.24 (1.45 to 3.48)	
	Urology	59 (46%)	49 (35%)	1.59 (0.97 to 2.60)	
	ENT	178 (63%)	94 (36%)	3.13 (2.20 to 4.43)	
	Gastroenterology	88 (44%)	99 (49%)	0.80 (0.54 to 1.18)	
	Other specialities	88 (45%)	99 (52%)	0.76 (0.51 to 1.14)	

[a] Adjusted for site, gender, age at randomisation and speciality.
[b] Adjusted for site, gender, age at randomisation, speciality and DUSOI overall score. Results from missing indicator method (UK 700 Group[71]).

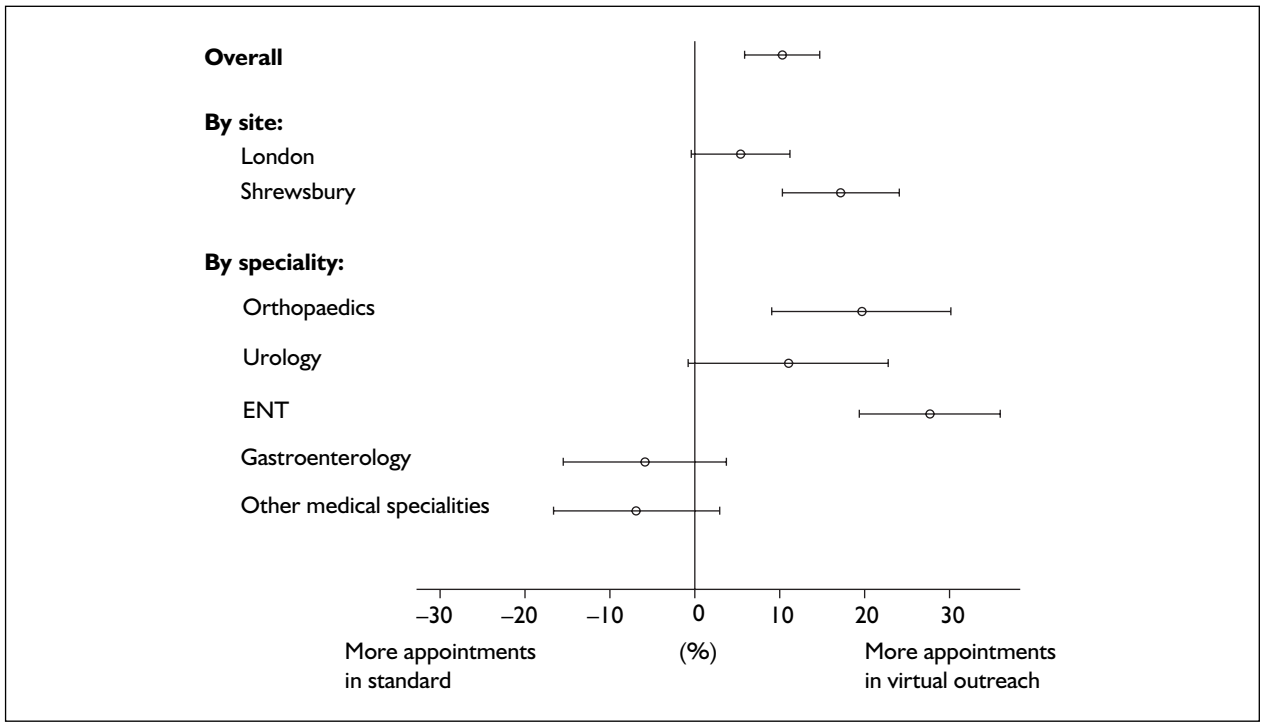

FIGURE 3 *Differences in the percentage of patients offered a follow-up hospital appointment (virtual outreach – standard) with 95% CIs*

TABLE 7 *Tests, investigations and contacts with healthcare services over 6 months*

	Virtual outreach Mean	Standard Mean	Difference (95% CI)	*p*-Value
Patients with resource use data	*n* = 1033	*n* = 1025		
Number of tests and investigations (unadjusted)	3.22	4.01	–0.79 (–1.21 to –0.37)	*p* <0 .001
By speciality (unadjusted):				Interaction *p* = 0.09
Orthopaedics	2.54	2.35	0.19 (–0.77 to 1.15)	
Urology	3.43	4.40	–0.97 (–2.04 to 0.11)	
ENT	1.76	2.30	–0.54 (–1.30 to 0.22)	
Gastroenterology	4.63	6.68	–2.04 (–2.94 to –1.16)	
Other specialities	4.27	4.91	–0.64 (–1.55 to 0.27)	
Number of outpatient visits (unadjusted)	1.32	1.28	0.04 (–0.10 to 0.18)	*p* = 0.57
By speciality (unadjusted):				Interaction *p* = 0.007
Orthopaedics	1.55	1.14	0.41 (0.09 to 0.73)	
Urology	1.45	1.69	–0.24 (–0.61 to 0.12)	
ENT	1.20	1.00	0.20 (–0.05 to 0.46)	
Gastroenterology	1.13	1.43	–0.30 (–0.60 to –0.006)	
Other specialities	1.38	1.34	0.04 (–0.27 to 0.35)	
Total number of contacts with general practice[a]	3.47	3.27	0.20 (–0.11 to 0.50)	*p* = 0.21
Number of accident and emergency visits	0.06	0.06	0.002 (–0.02 to 0.03)	*p* = 0.85
Number of inpatient stays	0.11	0.13	–0.02 (–0.06 to 0.01)	*P* = 0.15
Number of day surgery and inpatient visit	0.11	0.12	–0.01 (–0.04 to 0.02)	*p* = 0.52
Patients with prescription data	852	859		
Number of prescriptions	8.72	8.15	0.57 (–0.64 to 1.78)	*p* = 0.36

[a] GP notes for two patients in the standard group were missing.

TABLE 8 *Patient outcomes*

	Virtual outreach Mean (SD)	Standard Mean (SD)	Difference (95% CI)	*p*-Value
Satisfaction[a] (number of patients)	*n* = 767 3.97 (0.99)	*n* = 817 3.64 (1.06)	0.33 (0.23 to 0.43)	$p < 0.001$
Enablement[b] (number of patients)	*n* = 752 2.5 (3.2)	*n* = 805 2.4 (3.1)	0.07 (–0.24 to 0.38)	$p = 0.67$
SF-12 (number of adult patients)	*n* = 648	*n* = 700		
Physical score	43.1 (12.0)	42.7 (12.2)	0.34 (–0.96 to 1.64)	$p = 0.61$
Mental score	47.5 (11.8)	48.1 (11.9)	–0.51 (–1.78 to 0.76)	$p = 0.43$

[a] Overall satisfaction scored 1=poor, 2=fair, 3=good, 4=very good, 5=excellent.
[b] PEI total score calculated from six questionnaire items as advised by Howie and colleagues.[62] High scores indicate improved enablement.

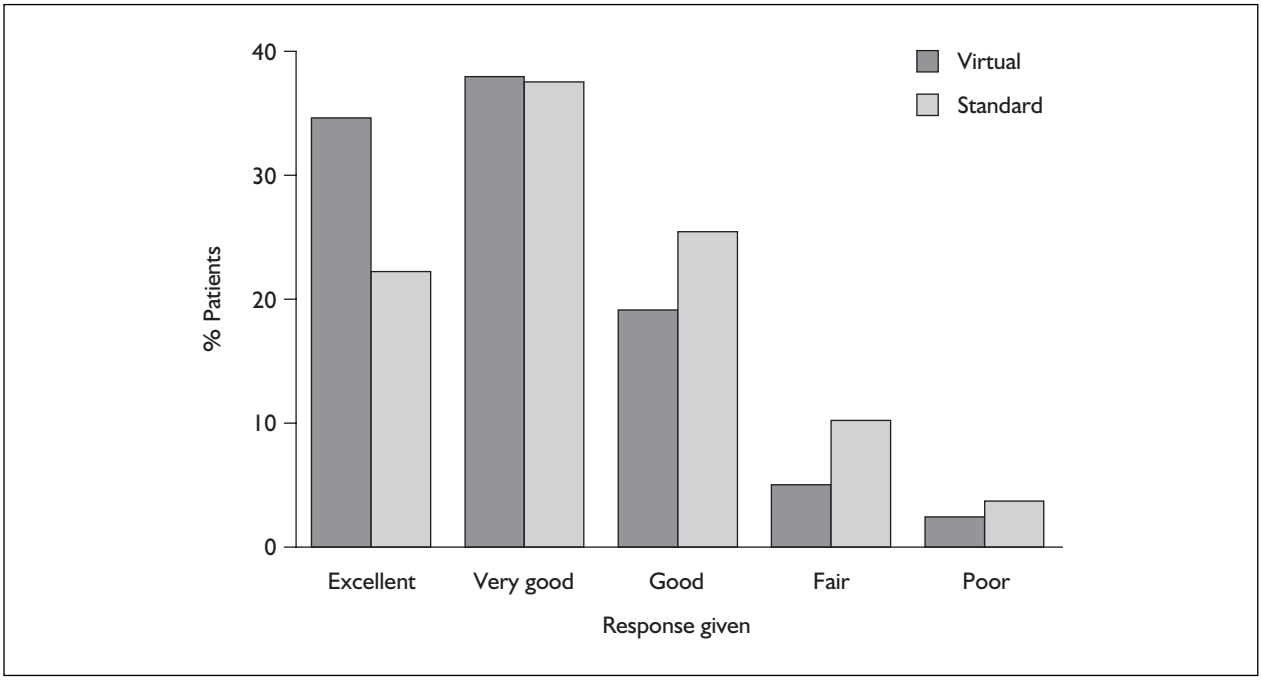

FIGURE 4 *Responses to overall patient satisfaction by randomised group*

increased the number of actual outpatient visits in orthopaedics. Adjustments for baseline characteristics did not change any of these results. The conclusions were the same when restricted to those items regarded as attributable to the index consultation. For example, the difference between the randomised groups in the number of tests and investigations was still around 0.8 per patient, now based on averages of 1.16 and 1.93 in the two groups.

Patient satisfaction was significantly greater after a virtual outreach consultation than after a standard outpatient consultation (*Table 8* and *Figure 4*).

The difference between the randomised groups in overall patient satisfaction was also evident in all 13 individual items in the SVQ, for example convenience of location, waiting area, time of appointment, time in consultation, manner of reception staff and attention to what the patient had to say (*Table 9*).

Patient enablement after the consultation, and the physical and psychological scores of the SF-12 at 6 months, did not differ between the randomised groups (*Table 8*). Scores on the CHQ (used instead of the SF-12 for adults, for the 170 patients under 16 years) also showed no

TABLE 9 *SVQ: descriptive results for 13 patient satisfaction items*[a]

	Virtual outreach Mean (SD)	Standard Mean (SD)
How long you waited for appointment (n = 1588)	3.51 (1.08)	3.32 (1.13)
Convenience of location (n = 1579)	4.25 (0.85)	3.53 (1.05)
Getting through by phone (n = 710)	3.65 (1.15)	3.30 (1.17)
Length of time waiting (n = 1583)	3.83 (1.05)	3.29 (1.25)
Time in consultation (n = 1573)	3.84 (1.02)	3.56 (1.13)
Ease of making/changing appointment (n = 467)	3.56 (1.22)	3.38 (1.20)
Convenience of time of appointment (n = 1582)	3.86 (0.95)	3.52 (0.99)
Personal manner of the reception staff (n = 1587)	4.18 (0.89)	3.82 (1.06)
Waiting area (n = 1587)	3.96 (0.91)	3.14 (1.10)
Attention to what you had to say (n = 1585)	4.05 (0.92)	3.62 (1.08)
Explanation of what was done to you (n = 1560)	3.90 (0.99)	3.62 (1.13)
Technical skills of doctor (n = 1564)	4.11 (0.92)	3.94 (1.02)
Personal manner of doctor (n = 1587)	4.30 (0.83)	3.97 (1.07)

[a] All items scored 1=poor, 2=fair, 3=good, 4=very good, 5=excellent.

difference between randomised groups, either considered separately or combined with the SF-12 results using standardised differences.[72] There was no evidence of interactions by site or speciality for satisfaction, enablement or SF-12 (all $p > 0.2$), and adjustment for baseline characteristics (including baseline SF-12) did not change the results.

Chapter 4

Economic evaluation results

Costs to the NHS

Index consultation

In total, 66 consultations were observed. The timings for the virtual outreach and standard outpatient consultations observed are shown in *Table 2*. The costs for the virtual outreach and standard outpatient consultations calculated from these observations are given in *Table 3*.

A total of 225 patients did not attend their index consultation, 155 in the virtual outreach group and 70 in the standard outpatient group. Assuming that the NHS did not incur any costs as a result of the non-attendance of patients in the trial, the mean cost of the patient's index consultation was £164 in virtual outreach and £32 in standard outpatients, an increased cost of £132 in the virtual outreach project.

Costs of tests, investigations and contacts with healthcare services over 6 months

The use of NHS resources in the 6 months after the index consultation was divided into use of resources associated with primary care visits and contacts, secondary care visits and contacts, and tests and procedures. The mean costs per patient for these subcategories are shown in *Table 10*.

In none of these categories was there a significant difference between the two arms of the trial, and this remained the case after adjusting for baseline characteristics. As reported elsewhere,[63] the number of tests was larger in the standard outpatients group, and this is reflected in the higher mean costs for tests and procedures. However, the cost impact of this excess is modified by the fact that the greatest difference occurred in the subcategory of laboratory investigations, which are generally cheaper than less routine tests and investigations.

The breakdown of costs for tests and procedures by speciality is shown in *Table 14*. The attribution exercises undertaken by the research nurses in the Shrewsbury arm of the trial gave similar results to those reported in *Table 11* for secondary care visits and contacts, and tests and procedures. Costs were higher in the standard outpatient group, with the mean difference between the groups in costs being £7.10 (95% CI –£25 to £39, $p = 0.67$) and £33.96 (95% CI –£8 to £75, $p = 0.11$), respectively. However, this exercise found that the costs of primary care contacts and visits were significantly greater in the virtual outreach group. The mean difference in costs was £8.05 (95% CI £1.59 to £14.51, $p = 0.01$).

Prescription costs

The mean number and cost of total prescriptions issued per patient in the 6 months after the index consultation are shown in *Table 10*. There were no significant differences between the costs in the two arms of the trial overall, or by site or speciality. Basing the analysis on the subset of attributable prescriptions also failed to show any significant differences.

Total NHS costs

The total costs to the NHS were estimated as £723 per patient in the virtual outreach group and £632 per patient in the standard outpatient group, a mean difference of £91 (95% CI £2 to £180, $p = 0.03$) (*Table 11*). Differences in mean total NHS costs between virtual outreach and standard outpatient groups by site and speciality are shown in *Figure 5*.

Tests of interaction did not demonstrate heterogeneity by site or speciality (*Table 12*), although the difference in cost between the virtual outreach and standard outpatient group was not statistically significant in Shrewsbury or in any speciality other than orthopaedics. The use of bootstrapping to allow for the skewed distribution of costs gave very similar results; this was as expected because the sample size was large.

When the analysis was restricted to attributable resource use (*Table 13*), costs to the NHS were £393 per patient in the virtual outreach group and £293 per patient in the standard outpatient group. The mean difference of £100 is similar to that obtained using total resource use, but is now highly significant (95% CI £65 to £134, $p < 0.001$).

Adjusting for baseline characteristics did not affect these results. Tests of interaction suggested that

TABLE 10 *Use of resources during the 6-month follow-up period, with unit costs*

Item	Use of resources Mean (SD)		Unit cost or range	Source of unit cost
	Virtual outreach	Standard		
Number of patients	*n* = 1033	*n* = 1025		
Primary care services				
GP	2.40 (2.59)	2.27 (2.39)	£25.00	Netten and Curtis[56]
Practice nurse	0.73 (1.49)	0.63 (1.32)	£9.00	Netten and Curtis[56]
Other clinical staff	0.04 (0.38)	0.06 (0.43)	£9.00	Netten and Curtis[56]
Home visits	0.05 (0.30)	0.07 (0.44)	£45.00	Netten and Curtis[56]
Other contacts	0.25 (0.68)	0.24 (0.74)	£6–19.60	Netten and Curtis[56] GP estimate
Contacts between hospital and GP	0.24 (0.62)	0.16 (0.49)	£18.90	Netten and Curtis[56] GP estimate
Tests, investigations and procedures				
X-ray and radiological investigations	0.48 (0.95)	0.54 (0.92)	£36–580	Royal Free/ Royal Shrewsbury
Blood tests and laboratory investigations	2.36 (3.93)	3.01 (4.57)	£1.02–236.30	Royal Free/ Royal Shrewsbury
Other tests and investigations	0.39 (0.74)	0.46 (0.77)	£2.58–989.68	Royal Free/ Royal Shrewsbury/ NHS Reference Costs
Hospital services				
Visits to outpatient departments	1.32 (1.57)	1.28 (1.59)	£9–127	Royal Free/ Royal Shrewsbury/ Netten and Curtis[56]/ NHS Reference Costs
Inpatient admissions	0.11 (0.35)	0.13 (0.39)	£76.33–218 per day	Royal Free/ Royal Shrewsbury
Accident and emergency	0.06 (0.30)	0.06 (0.28)	£111.91	Royal Free
Day surgery and other inpatient procedures	0.11 (0.36)	0.12 (0.38)	£28.62–4956	Royal Free/ Royal Shrewsbury/ NHS Reference Costs
Other hospital visits	0.07 (0.30)	0.12 (0.42)	£9–70.94	Royal Free/ Royal Shrewsbury/ Netten and Curtis[56]/ NHS Reference Costs
Other hospital contacts	0.05 (0.26)	0.09 (0.36)	£5.60–18.17	Netten and Curtis[56] GP estimate
Prescriptions				
Number of patients	*n* = 852	*n* = 859		
Prescriptions	8.72 (12.97)	8.15 (12.53)		Computerised records at GP practices

TABLE 11 *Summary of costs (£), by sector*

Mean (SD)	Virtual outreach Mean (SD)	Standard Mean (SD)	Difference (95% CI)
NHS costs[a]	*n* = 1044	*n* = 1035	
Index consultation[b]	162.96	39.14	
Primary care visits and contacts[c]	75.11 (77.40)	70.41 (72.14)	4.70 (–1.74 to 11.14)
Secondary care visits and contacts[c]	188.76 (532.28)	208.08 (1068.86)	–19.32 (–91.86 to 53.21)
Tests and procedures[c]	182.21 (403.23)	209.23 (384.31)	–27.02 (–60.90 to 6.87)
Prescription costs[d]	114.26 (206.48)	105.63 (173.62)	8.63 (–7.79 to 25.04)
Total NHS cost (imputed)	723.29 (832.04)	632.49 (1199.68)	90.80 (2.07 to 179.54)
		Adjusted[e]	93.87 (7.34 to 180.40)
Attributable NHS costs (imputed)	392.65 (388.88)	292.98 (407.15)	99.67 (65.42 to 133.91)
		Adjusted[e]	102.58 (68.87 to 136.29)
Patient costs	*n* = 777	*n* = 820	
Patient transport costs[f]	1.12 (3.06)	4.52 (8.18)	–3.40 (–4.02 to –2.79)
Lost pay[g]	2.53 (16.58)	6.46 (32.51)	–3.93 (–6.48 to –1.38)
Patient childcare costs[h]	0.03 (0.37)	0.40 (3.93)	0.37 (0.09 to 0.64)
Total patient costs (imputed)	3.69 (16.89)	11.38 (33.85)	–7.70 (–10.35 to –5.05)
		Adjusted[e]	–7.65 (–10.30 to –5.01)

[a] These data exclude 15 patients who withdrew their consent from the study.
[b] 255 patients in the trial did not attend their index consultation; of these 155 patients in the virtual outreach group and 70 patients in the standard outpatient group did not attend their index consultation. A zero cost has been assigned to the index consultation for these patients.
[c] Values were imputed for 21 patients with missing data; the imputed value was the mean cost for patients with data.
[d] Values were imputed for 368 patients with missing data; the imputed value was the mean cost for patients with data.
[e] Adjusted for age at randomisation, gender, speciality, site and DUSOI total score (by missing indicator method).[71]
[f] Values were imputed for 163 patients with missing data.
[g] Values were imputed for 12 patients with missing data.
[h] Values were imputed for 70 patients with missing data.

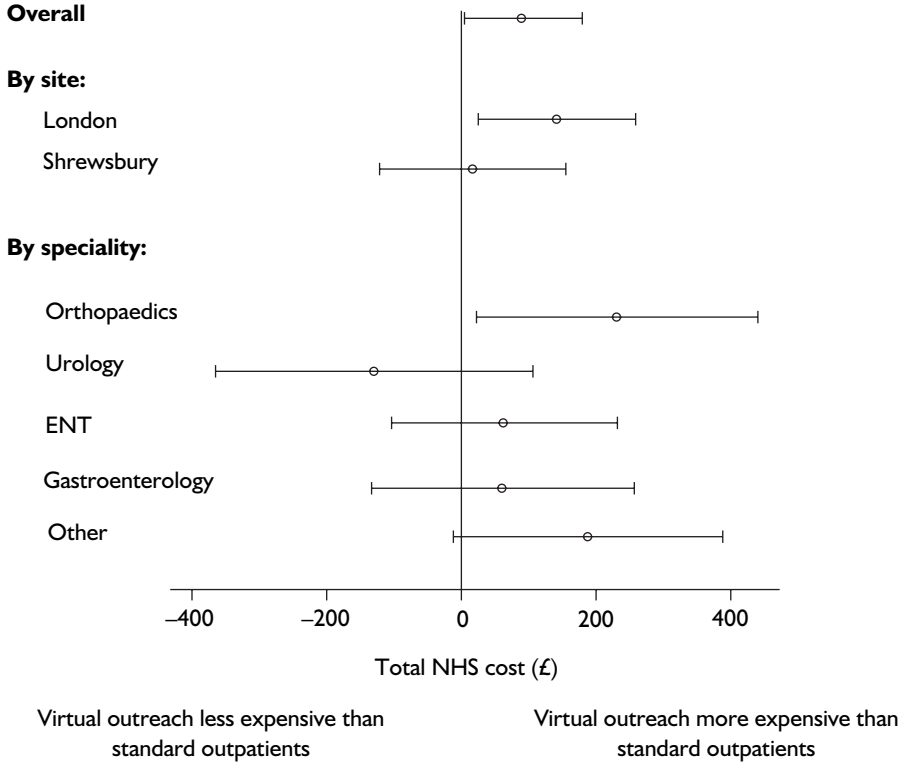

FIGURE 5 *Difference in mean total NHS cost (£) between virtual outreach and standard groups*

TABLE 12 *Total NHS cost (imputed) (£), by site and speciality*

	Virtual outreach (*n* = 1033) Mean (SD)	Standard (*n* = 1025) Mean (SD)	Difference (95% CI)
Site			
London (*n* = 1222)	725 (883)	583 (664)	142 (26 to 258)
Shrewsbury (*n* = 857)	721 (756)	703 (1694)	17 (–121 to 155)
		Test of interaction	*p* = 0.17
Speciality			
Orthopaedics (*n* = 372)	700 (668)	469 (549)	231 (22 to 440)
Urology (*n* = 292)	826 (789)	955 (1060)	–129 (–365 to 107)
ENT (*n* = 585)	662 (940)	598 (1963)	64 (–103 to 231)
Gastroenterology (*n* = 428)	716 (829)	654 (641)	61 (–134 to 256)
Other (*n* = 405)	767 (830)	578 (526)	189 (–12 to 389)
		Test of interaction	*p* = 0.19

TABLE 13 *Total attributable NHS cost (£), by speciality*

	Virtual outreach (*n* = 1033) Mean (SD)	Standard (*n* = 1025) Mean (SD)	Difference (95% CI)
Orthopaedics (*n* = 372)	385 (393)	252 (463)	133 (53 to 213)
Urology (*n* = 292)	470 (499)	500 (575)	–30 (–120 to 61)
ENT (*n* = 585)	384 (370)	264 (413)	120 (56 to 184)
Gastroenterology (*n* = 428)	365 (192)	286 (289)	79 (4 to 153)
Other (*n* = 405)	385 (465)	229 (211)	156 (79 to 233)
		Test of interaction	*p* = 0.023

TABLE 14 *Cost (£) of tests and procedures, by speciality*

	Virtual outreach (*n* = 1033) Mean (SD)	Standard (*n* = 1025) Mean (SD)	Difference (95% CI)
Orthopaedics (*n* = 372)	145 (298)	148 (381)	–3 (–82 to 76)
Urology (*n* = 292)	275 (421)	419 (590)	–145 (–234 to –56)
ENT (*n* = 585)	160 (326)	169 (374)	–9 (–72 to 54)
Gastroenterology (*n* = 428)	184 (425)	235 (268)	–50 (–124 to 23)
Other (*n* = 405)	179 (524)	143 (236)	36 (–40 to 112)
		Test of interaction	*p* = 0.034

speciality effects existed for attributable resource use. *Table 13* shows that in urology, mean costs per patient were lower in the virtual outreach group, although this difference was not statistically significant. However, in all other specialities, the mean cost per patient was higher in virtual outreach and this difference was statistically significant.

Patient costs

Patients' questionnaires were returned by 1597 (77%) patients, 777 (74%) in the virtual outreach group and 820 (79%) in the standard outpatient group. The results are summarised in *Table 10*. Patients in the virtual outreach group incurred lower transport costs for the index consultation than those in the standard outpatients group. The mean difference in travel cost was £3.22 (95% CI £2.56 to £3.88, $p < 0.0001$) and did not differ across site. Mean travel costs were higher in the Shrewsbury arm of the trial for both virtual outreach and standard outpatient groups, but the magnitude of difference between the two arms of the trial was almost identical at both sites. In addition, it was found that mean childcare costs arising from the index consultation were £0.33

TABLE 15 *One-way sensitivity analysis*

Parameter	Default	Range	Cost of index consultation		
			Virtual outreach	Virtual outreach (1)[a]	Standard outpatient
Consultant time, conventional appointment (minutes)	11.8	11–19	£164 £164	£123 £123	£30 £51
Teleconsultation duration (minutes)	10.5	3–22	£132 £212	£92 £171	£32 £32
GP time, teleconsultation (includes 10.5-minute consultation) (minutes)	26	10.5–35.5	£138 £179	£97 £139	£32 £32
Consultant time, teleconsultation (includes 10.5-minute consultation) (minutes)	19	10.5–30.5	£140 £190	£100 £149	$32 £32
Videoconferencing equipment (£)	52,000	10,000–100,000	£147 £182	£107 £141	£32 £32
Videoconferencing equipment lifespan (years)	5	1–7	£233 £159	£193 £118	£32 £32
Teleconsultations per annum	500	100–10,000	£244 £144	£204 £103	£32 £32

[a] Virtual outreach (1): as virtual outreach but assumes that the service can be offered over the existing NHS telecommunications network.

(95% CI £0.05 to £0.61, $p = 0.02$) lower for virtual outreach patients. Patients in the virtual outreach arm also lost substantially less pay than those in the standard outpatient group. The mean loss of pay for virtual outreach group patients was £2.58 against a mean of £6.21 in the standard outpatients group. The mean difference of £3.64 (95% CI £1.11 to £6.17, $p < 0.01$) was significant at the 5% level. Total patient costs were significantly lower in the virtual outreach arm, with the mean difference between group being £7.24 (95% CI £4.62 to £9.87, $p < 0.0001$).

Productivity losses

Using data on the time that patients took attending their index consultation, it was estimated that virtual outreach led to reduced potential productivity losses. The mean improvement was £10.76 per patient (95% CI £9.77 to £11.75, $p < 0.0001$). There was little difference by site of the mean productivity loss; the virtual outreach group was £10.09 higher in London and £11.57 higher in Shrewsbury. Patients in the virtual outreach group were also less likely to have to take time off work to attend their index consultation. In the standard outpatients group, 32.7% patients took time off work to attend their index appointment compared with 25.5% in the virtual outreach group. The difference was more marked in Shrewsbury, with 12% fewer in the virtual outreach group having to take time off work, compared with 3% in London.

Sensitivity analysis

The results of the one-way sensitivity analysis are shown in *Table 15*. Two costs are indicated for an index teleconsultation. The lower value does not include telecommunication costs, which would no longer be incurred if the trial was conducted now, as improved telecommunications facilities in the health service mean that a virtual outreach service could be offered over existing networks. Virtual outreach appointments remained more expensive under all scenarios presented here. Under most scenarios, total costs to the NHS, based on attributable resource use remained significantly higher in the virtual outreach group. However, with either very short teleconsultation duration or reduced GP time the difference in total attributable NHS costs just ceases to be statistically significant at the 5% level (on the basis that the service could be offered over existing health service telecommunication networks at no extra charge). The magnitude of the difference was particularly sensitive to the duration of the teleconsultation, reflecting the implications that this has for two clinicians' time. Relaxation of the assumption that non-attendance at appointments did not result in any costs being incurred increased the cost of virtual outreach

TABLE 16 *Multiway sensitivity analysis (virtual outreach best case)*

Parameter	Default	Best case	Virtual outreach	Virtual outreach (1)[a]	Standard outpatient
Number of consultations	500	10,000			
Teleconsultation duration (minutes)	10.5	7			
GP time (excluding teleconsultation duration) (minutes)	15.5	13			
Consultant time (excluding teleconsultation duration) (minutes)	9.4	5	£114	£74	£51
Consultant time, conventional (minutes)	11.8	19			
Videoconferencing equipment (£)	52,500	30,000			

[a] Virtual outreach (1): as virtual outreach but assumes that the service can be offered over the existing NHS telecommunications network.

appointments relative to conventional ones. This was because there was a greater prevalence of non-attendance in the virtual outreach group, and also because any opportunity costs associated with non-attendance were likely to be greater for teleconsultations than for conventional outpatient appointments.

Under the best case scenario (*Table 16*), virtual outreach consultations were only £23 more expensive than conventional outpatient appointments, and no significant difference exists between total attributable NHS costs for the virtual outreach and standard outpatient groups.

Chapter 5
Discussion

It had been hypothesised that, as in the case of actual joint consultations reported by Vierhout and colleagues,[35] the ability of the GPs and consultants to review the patients together would have resulted in better communication, leading to more effective management and fewer patients being asked to return to outpatients for subsequent review. However, in general, patients seen in virtual outreach were more frequently offered follow-up than those who underwent a standard outpatient consultation. These results showed statistically significant heterogeneity for both speciality and site. Increased offer of follow-up was highest in the surgical specialities (ENT, orthopaedics and urology) and was not seen in gastroenterology or the other medical specialities. While it seems likely that the difference between specialities was largely a reflection of the different requirements of the consultations (surgical specialities having a greater requirement for direct 'hands-on' examination), it may also be that the findings were confounded by the characteristics of the individual specialists involved, especially as the numbers of those in each speciality were relatively small. It was also higher for those patients seen by specialists based at the Royal Shrewsbury Hospital than for those based at the Royal Free Hampstead NHS Trust, even following adjustment for the different specialities participating at each of the two sites. This suggests that there may have been different norms for offer of follow-up appointments between the two hospitals, although a review of records for routine outpatient appointments before the trial did not show any evidence of such differences. Furthermore, the ITT analysis was conservative, in that more of those randomised to virtual outreach than standard outpatients did not receive the index appointment and therefore were considered to have been offered a follow-up appointment. The per protocol analysis of those who received the intervention to which they were randomised showed a smaller difference between the groups.

While offering a novel opportunity for the GPs and hospital specialists to share their medical expertise, the virtual outreach consultation posed significant challenges for the participants. It required GPs to be present at their patients' consultations, whereas specialists were obliged to conduct their consultations at a distance. Many specialists may have felt uneasy at having to rely on the GPs' clinical findings, and this was particularly relevant in ENT and orthopaedics, where specialised examination techniques may require skills and access to instrumentation beyond the scope of most of the GPs. The specialists' perceived need to undertake the physical examination themselves is likely to explain a substantial part of the increase in offers of follow-up appointment found in the trial, and for most of those virtual outreach consultations that were considered to be inappropriate by the specialists. This explanation is given support by a qualitative study carried out in parallel to the main trial,[73] which confirmed the problems posed in some cases by remote consultation. The persistence of the significant differences in the frequency of offer of follow-up between randomised groups in London and Shrewsbury following adjustment for the specialities participating in the trial at each hospital may have been due to different settings. In general, telemedicine applications have been more widely implemented in countries with dispersed rural populations, and there is some evidence that they are most cost-effective in such settings.[74] Indeed, this was the rationale for carrying out the London and Shrewsbury arms of the trial. However, there were few differences between the patients entered in the trial at the two sites, and there was no evidence of systematic differences in the operation of the outpatient systems at the two hospitals. It therefore seems much more likely that the findings resulted from differences between clinicians. Because of the relatively small numbers of participating specialists, it was not possible to determine the relationship between rates of offer of follow-up and attitudes towards virtual outreach and dealing with clinical uncertainty,[75] but it seems probable that these factors played an important role.

The lack of any difference in overall numbers of attendances at outpatients between the two groups contrasts with the increased frequency of offer of a follow-up appointment to the virtual outreach group. However, the findings of increased offer of a follow-up consultation and increased numbers of outpatient appointments in patients referred to

orthopaedics receiving virtual outreach are consistent, and the authors have no reason to believe that there was any systematic under-recording of actual outpatient attendances. Some offers of outpatient follow-up were clearly not translated into actual attendances, perhaps in part because the results of investigations requested at the index consultation subsequently became available and suggested that an appointment was, after all, unnecessary. Virtual outreach had been expected to reduce the need for patients to consult their GPs to clarify the outcome of their outpatient consultation, or for medication recommended by the specialist. However, it was also expected to enable as many patients as possible to continue to be managed in primary care, rather than being transferred to outpatients. These two effects may have operated to the same degree in opposite directions, thus resulting in the lack of difference found in the trial.

The trial demonstrated significant reductions in tests and investigations performed on patients seen in virtual outreach. This is in line with the findings of the joint consultations study carried out by Vierhout and colleagues,[35] and suggests that virtual outreach enabled the participating clinicians to be more efficient in undertaking patient investigation, probably largely by avoiding unnecessary duplication. This is supported by findings from the qualitative study,[73] which indicated that during the virtual outreach consultations, the GPs were able to supply the hospital specialists with information from the general practice record about recent tests and investigations. The reduction in tests and investigations is likely to be important, both in terms of resource savings for the health service,[76] and in reducing inconvenience, discomfort and possibly risk for the patients involved.

The lack of difference in prescription rates between the two arms of the trial was not unexpected, and it is likely that it was influenced unduly by the methodological limitations of the study. The analysis relating to rates of prescribing was inevitably compromised by the failure to collect prescription data from all of the participating practices. However, it is unlikely that the missing data constituted a significant problem. First, patients were not randomised by practice, and therefore missing data were evenly distributed across both arms of the trial. Indeed, there were no systematic differences in prescription data collected between the virtual outreach group (n = 852) and the standard outpatient group (n = 859). Second, underestimation of the variances (standard errors) would have led to a greater confidence than was warranted in the difference in means between the two arms of the trial. This would have been important if statistically significant results had been found; however, the null hypothesis that the difference was due to chance could not be rejected (p = 0.30), even with the possibility that the variance had been underestimated.

Patient satisfaction was consistently higher in the virtual outreach group, across all the parameters measured by the Ware SVQ, and apparently independent of the outcome of the consultation. Although some smaller studies have produced similar findings, the validity of these results has been rightly questioned,[77] and to the authors' knowledge this is the first time that a properly conducted trial of adequate size has been able to provide such strong evidence of this effect. The convenience of the site and timing of the consultation appeared to contribute, as did the attitude of primary care reception staff. The higher ratings for these and other items relating to customer care may well have been responsible for the difference in the overall satisfaction ratings given by the virtual outreach patients. However, satisfaction ratings were also higher for those subscales relating to physician behaviour, indicating that patients felt that the clinical content of the consultation was of greater quality. In addition to the opportunity for their problem to be discussed by two physicians, many patients may have been more relaxed in a consultation carried out in the familiar setting of their local surgery, and in the presence of their GP. Favourable behavioural responses obtained in an experimental setting are often not repeated in the context of routine service. Hence, although patients were very positive about the joint teleconsultations in this study, this would not necessarily be the case in routine service. Although this may have been the case, it seems likely that items in the SQ such as convenience, waiting rooms and staff attitudes may well endure over time, even if such consultations became commonplace in GP surgeries. It is more difficult to know whether the higher ratings for the actual consultation would persist, although the patients' perceptions of having more attention and feeling more confident that the specialist had a full understanding of their medical condition seem unlikely to be susceptible to change with time. Indeed, with training, especially for GPs, and a more discriminating selection of patients for referral, satisfaction may be sustainable at even greater levels.

In the present study, enablement as measured by the PEI did not show any appreciable differences between the two groups, irrespective of site or speciality. Overall, scores were similar to the mean score reported by Howie and colleagues for GPs in conventional general practice consultations.[62] Patient enablement is related to satisfaction, but is different in that it is a measure of patients' perceptions of their ability to cope with their health problems following a consultation. The PEI scale was developed specifically for general practice consultations. To the authors' knowledge it had not been used previously in the context of either standard outpatients or joint consultations, but following the start of the trial, a report appeared of its use in a hospital outpatients department, which found a mean score of 47, some 50% higher than either Howie[63] or the present results.[78] Many factors in the consultation have been found to correlate with enablement, including length of consultation and continuity of care,[79] but the recent outpatient study suggests that the patient's expectation, the doctor's empathy (as perceived by the patient) and the doctor's own confidence in the therapeutic relationship are key factors. Problems in communication that the virtual outreach consultations posed for many of the clinicians may have interfered with their ability to convey genuine empathy or to communicate confidence in the therapeutic relationship with the patient. The question of the potential for virtual outreach to help or hinder patient enablement remains open, but it is reassuring that patients seen in this way fared no worse than those seen in the standard outpatients setting.

This study did not find difference in the measures of quality of life, such as those found in the Vierhout study,[35] but this may have been because of differences in case-mix and the nature of the consultations.

For this study, a cost–consequences approach was adopted for the economic evaluation. In economic evaluations, the cost–consequences approach is considered a variant of cost-effectiveness analysis,[80] but it does not use the cost-effectiveness ratios associated with that technique. It was chosen because the multidimensional character of the outcomes made aggregation difficult. First, health outcomes were measured using SF-12, and such generic health surveys are of limited value in the context of an economic evaluation, because they do not indicate the value placed on any change in outcome. Attempts are being made to convert such scores into a preference-based measure, but such algorithms for SF-12 remain in the development stage (Brazier JE, University of Sheffield: personal communication, 2002). Furthermore, this study was also interested in patient satisfaction. It is not possible to combine these measures to form a single effectiveness measure. A contingent valuation study (such as WTP) may have been used as part of a cost–benefit analysis. However, this technique is still in a developmental stage and would have required additional surveys of participating patients, who had already been required to fill in a large number of questionnaires.

The effects of virtual outreach on NHS costs have to be interpreted with caution. The analysis based on total use (as opposed to attributable resource use) suggests that overall the mean cost per patient was £91 higher in the virtual outreach group than in the standard outpatients group, and that this difference was just significant at the 5% level. Thus, the initial hypothesis that virtual outreach would not lead to increased costs in the NHS was not supported. Furthermore, when the analysis was restricted to attributable resource data, the mean cost per patient was £100 more in the virtual outreach project, but was now highly significant. The similarity in the mean difference between the two approaches suggests that the attributable data excluded a similar number of resource items from both arms of the trial. However, this attributable analysis is likely to reflect more accurately the true position, because of the noise inherent in an analysis based on total resource use.

The definition of attributable for a particular resource item was governed by what was practical and robust. For example, a chest X-ray is unlikely to be attributable to an index consultation in the virtual outreach project, because of the specialities involved. The same method of attribution was used in Shrewsbury and London. However, an additional exercise was undertaken in Shrewsbury, in which the research nurses attempted to attribute resource items using their clinical judgement. The analysis of this data indicated very similar results to the reported attribution method. In the case of prescriptions, it would have been impractical to use clinical judgement to review each of the 14,427 prescriptions issued in the 6 months following the index consultation, and the attribution method used was thus necessarily automated. Nonetheless, the validation exercise undertaken by a clinician on a subset of data suggested that the lack of clinical input into this method of attribution did not lead to any substantial reduction in accuracy. Although it

seems likely that the method produced both false positives and false negatives, there would have been no systematic differences in these effects between the two arms of the trial.

The hypothesis that virtual outreach would not lead to increased costs to the NHS was based on the expectation that better patient management arising from improved communication would lead to downstream savings. The results as presented here do not provide evidence that such savings exist. In the paper on the clinical findings published in the *Lancet*, it was reported that virtual outreach led to a significant reduction in tests and investigations.[55] This study found a downstream saving to the NHS of about £4 per case (based on analysis of either total or attributable resource use) arising from this reduction in the number of tests. The difference in costs was not as marked as the difference in the number of tests, as the greatest difference in tests and investigations between the two groups occurred in low-cost routine tests. For statistical analysis it was necessary to pool resource categories, and the real, but small cost savings from reduced tests could no longer be detected when combined with resource use data on hospital procedures. It may be that additional resource savings would have accrued beyond the 6-month assessment limit used in the trial. This is an area that merits further investigation.

This trial suggests that downstream savings, arising from better patient management, would have had to be large to compensate for the costs of a consultation using two physicians. However, sensitivity analysis highlighted that the cost difference between the two consultation types was sensitive to a number of parameters. The trial was pragmatic and avoided undue constraints on the participating clinicians, but the introduction of the technique into routine practice may differ from the trial setting. For example, increasing familiarity with the technology and service type may lead to improvements in the delivery of virtual outreach consultations. The educational value of the joint teleconsultations could lead to improved primary care management and different referral patterns by the GPs. However, because of the relatively small number of teleconsultations that the participating GPs undertook in each speciality area, such an effect would have been too small to detect in the trial. Technical failures of virtual outreach are likely to be a function of training, experience and the state of technology, and could be reduced, so leading to less inefficient use of physician time.

There are several reasons why the ingredients-based cost used in the analysis could have overestimated costs. First, the average cost of a virtual outreach consultation is in some respects an artefact of the trial itself. The capital and overhead costs are essentially fixed, and therefore the fixed cost per consultation depends crucially on the number of consultations undertaken.[81] The marginal cost of a consultation has been included in *Table 3*, because it removes considerations of volume. Nevertheless, the sensitivity analysis demonstrated that at 500 consultations per annum, the volume passes the threshold where significant economies of scale remain available. Second, ISDN lines and videoconferencing equipment had to be installed and purchased specifically for the purposes of the trial. It seems likely that in the future, a virtual outreach service would 'piggyback' onto the existing IT and telecommunications facilities of the hospital and GP practice. For example, the Digital All Wales Network is now configured to support videoconferencing with a 256 kilobit link into every GP practice. In England NHSnet 2 is likely to offer a similar service, with a central payment made for as much bandwidth as the NHS can take. Therefore, only a proportion of these capital costs would be assigned to virtual outreach and so the marginal telecommunication costs would approach zero. Finally, the problems of evaluating an emerging health technology have been well documented. By evaluating the teleconsultations at a fixed point in time, the study could not incorporate changes in the prices of IT and telecommunications equipment, which are likely to fall and thus reduce the capital costs of consultation. Although the potential effects of this are included in the sensitivity analysis, an evaluation of any new technology may be criticised for not reflecting potential improvements. Innovative service provision could lead to economies of scale and scope beyond those outlined above, which would further lower the average cost of a consultation.

The higher costs in virtual outreach are entirely accounted for by the difference in the costs of the index consultation, and a key finding of the economic evaluation of the trial was the large cost difference between a conventional outpatient appointment and a virtual outreach consultation. This was therefore used as the prime factor in the sensitivity analysis. In the analysis, a traditional approach was adopted, using a range of values for parameters and considering the effect of altering these parameters within this range individually (univariate/one-way sensitivity analysis) or in

combination with others (multivariate/multiway sensitivity analysis: the 'best case'). There has been increasing interest in methods for probabilistic sensitivity analysis that involve assigning a distribution to each of the parameters. However, these methods are usually used where an incremental cost-effectiveness ratio is being calculated within a model. In a cost–consequence approach, costs are considered alongside an array of outputs. The key driver of the costs of both consultation types was the duration of clinician involvement. However, this was also the principal source of uncertainty in the analysis, given the small sample of non-random consultations observed. Therefore, the most important aspect of the sensitivity analysis was to see how sensitive the findings were to different types of clinician input. With the baseline data, the results were unfavourable to the adoption of virtual outreach, and therefore it was appropriate to bias the sensitivity analysis against the most favourable strategy, in this case conventional outpatient consultations.[82] To do otherwise would simply strengthen the baseline conclusion.

If the index consultation was excluded from the analysis then the mean differences in costs for prescriptions, primary care contacts, secondary care contacts, and tests and procedures were not significant at the 5% level. These data are 'noisy', as much of the recorded use of NHS resources will be unrelated to the index consultation. An attempt was made to overcome this problem by attributing resource items to the index consultation, but it may be this did not pick up real changes in patient management. It is also possible that 6 months of follow-up may be insufficient to detect downstream savings as a result of changes in patient management. Furthermore, if the virtual outreach consultation is of educational value to GPs, patients other than those in the trial stand to benefit from improved management in the primary care setting. These potential cost savings to the NHS could not be captured by this study. Whatever the assumptions made in this study, the hypothesis that virtual outreach would not lead to increased NHS costs is not supported by the results. This finding that virtual outreach consultations are considerably more expensive than standard outpatients makes it unlikely that policy makers will be persuaded that it is worth adopting, especially as no resulting health gains were detected.

This study demonstrated that patients attending a teleconsultation incur significantly lower transport costs than those attending conventional outpatient appointments, although the magnitude of the difference (£3) was relatively small. Thus, the second hypothesis was supported. The results are similar to those obtained in another RCT of telemedicine.[53] A total of 138 patients reported that they incurred transport costs, but did not record an amount. However, 742 patients reported that they incurred no transport costs, including 89 patients in the Shrewsbury standard outpatients group. This suggests that there may have been some under-reporting of transport costs. This study also found that patients in the virtual outreach group lost significantly less pay. Overall, this study provides strong evidence of financial benefits to patients in attending a teleconsultation appointment, compared with a conventional outpatient appointment. Patients in the virtual outreach group reported times off work that were significantly shorter than for those in the standard outpatient group. However, the distribution of the answers to the questions suggests that some respondents may have interpreted the question as referring solely to travel time. Nonetheless, the trial results provide good evidence that virtual outreach consultations consume less patient time, and are thus likely to have a positive impact on productivity. This is also supported by the results of the patient questionnaire, showing that the proportion of patients in the virtual outreach group who reported taking time off work was lower than in the standard outpatients group. This is further evidence of the potential benefits of virtual outreach to economic activity, thus supporting the third hypothesis. Time loss is suggestive of productivity loss, not firm evidence of actual loss. There is the possibility that some productivity is lost forever, but some is made up later by the worker or by other workers working harder. Patient/productivity costs for the 6-month period after the index consultation were not examined, because of the difficulties involved in collecting such comprehensive data for approximately 2000 patients. As it was, trial patients were asked to fill in many questionnaires. Ascertaining a large amount of additional information on the costs that they had incurred for every NHS resource item used would have imposed an unfair burden on the patients. Furthermore, as no significant differences were found in 6-month NHS resource use (excluding the index consultation), it seems unlikely that patients' private costs would differ significantly. Had significant differences in downstream NHS resource use been found, it would have certainly been worth modelling the possible impact of this on patient costs/productivity.

As this was a pragmatic trial where the clinicians were not in a position to select the types of patient included, it may have underestimated the benefits that virtual outreach could deliver to appropriately selected patients. However, by keeping the inclusion criteria broad and by including a number of specialities in the trial, evidence was obtained that suggests that some specialities may be generally less appropriate for virtual outreach than others. It may be that the conservative approach adopted in the ITT analysis on offer of follow-up has unduly weighted the findings against virtual outreach. Nonetheless, the overall difference in the offer of follow-up between randomised groups was small, and even in those specialities where significant differences were found, a substantial proportion of patients seen in virtual outreach did not need a follow-up appointment. This suggests that appropriately selected patients in these specialities may well be suitable for virtual outreach. This study assessed a technology which is rapidly evolving, resulting in reduced costs, improved reliability, ease of use and quality of transmission, all of which are likely to make virtual outreach more practicable in the future. Increasing familiarity with the equipment will probably change professional attitudes and reduce the time required to set up consultations, thus reducing costs. In settings where joint teleconsultations are particularly indicated, for example, in dispersed rural populations, it may become feasible to provide enhanced training for GPs to undertake specialist examinations in areas such as orthopaedics and ENT, and to equip primary care sites with peripherals, instruments such as fibre-optic scoping devices, which would enable remote visualisation by the specialist in the context of the virtual outreach examination.[83]

The finding that the initial virtual outreach consultation is more expensive than the conventional alternative does not necessarily mean that in the longer term virtual outreach would be more expensive. Downstream savings could result from the educational benefit derived from joint consultations and improved communication, leading to better patient management. There is some evidence in this study that joint consultations may reduce unnecessary follow-up and the number of tests and investigations. There are management implications of this for conventional clinical appointments.

This was a pragmatic trial; as yet, the NHS does not offer virtual outreach appointments and the delivery of such a service routinely may differ from the service delivered as part of the trial protocol. The study has, however, produced a number of important and interesting findings. Conventional wisdom suggests that telemedicine applications are best suited to environments where patients are separated by distance from medical care.[54] However, this trial found that virtual outreach patients in an inner-city setting achieved as great a saving in the travel costs of attending their index consultation as those in the Shrewsbury arm, which included rural areas and small market towns. This suggests that the convenience that virtual outreach offers to patients is not solely contingent on their distance from the hospital. Nor does virtual outreach depend solely on generating cost savings for the NHS. The cost-effectiveness of healthcare depends on its outcomes as well as its costs. The trial found that there were no statistically significant differences in health status between the patients at 6 months, but that the virtual outreach group had higher levels of satisfaction than the standard outpatient group and that difference was statistically significant at the 5% level. A WTP study could be used to explore whether the extra satisfaction generated by virtual outreach was worth the additional cost. Further exploration of this is recommended as an area for future research. Increased patient satisfaction has been reported in other telemedicine studies.[43,84] This study strongly suggests that virtual outreach may reduce societal costs outside the NHS, for example through lower patient transport costs and a positive impact on productivity. Optimal resource allocation depends on a societal perspective and the economic case for virtual outreach would be improved under this broader approach. However, this study has not established that virtual outreach is more cost-effective than conventional consultations with a hospital specialist.

Chapter 6
Conclusions

This trial has demonstrated that virtual outreach consultations result in significantly higher levels of patient satisfaction than standard outpatient appointments and lead to substantial reductions in numbers of tests and investigations, but that they are variably associated with increased rates of offer of follow-up according to speciality and site. The main hypothesis that virtual outreach would be cost neutral is not supported, but the hypotheses that patient costs and productivity losses would be less were supported. Changes in costs and technological advances may improve the relative position of virtual consultations in future.

These findings have important implications for the design and implementation of virtual outreach services within healthcare systems, and suggest that several key factors need to be taken into account in planning the implementation of such services. Appropriate patient selection, significant service reorganisation, and provision of logistical support for arranging and conducting consultations will be required to enable such services to operate efficiently. Clearly, these factors will be very important in designing services that could be successfully incorporated into routine health service provision. However, a wealth of evidence is available that indicates that whatever the evidence on effectiveness, the incorporation and normalisation of such systems depend on additional factors.[85] The extent to which virtual outreach is implemented is thus likely to be dependent on factors such as patient demand, costs, and the attitudes of staff working in general practice and hospital settings. Further research is needed on the use of virtual outreach for other purposes, such as follow-up appointments, and this report does not take into account potential educational benefits for clinical participants, which are the subject of qualitative research to be reported elsewhere.

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Contributions of the authors

Paul Wallace (Professor of Primary Care) had overall responsibility for design, direction and management, as well as writing and editing the report. Robert Harrison (Senior Research Fellow) carried out design, supervised data collection and analysis, and was involved in report writing. Andy Haines (Professor of Primary Care) carried out design, direction and management and was involved in report writing. Julie Barber (Lecturer in Statistics) and Simon Thompson (Professor of Statistics) were responsible the planning and execution of the statistical analyses. Jenny Roberts (Senior Lecturer in Health Economics) and Paul Jacklin (Research Fellow in Health Economics) were responsible for the planning and executive of the economic analyses. Will Clayton (Hon. Lecturer in General Practice) was responsible for liaising, training and supporting the clinicians involved with the project. Leo Lewis (Project Director Shrewsbury) and Rushmi Jayasuriya (Project Director London) undertook the trial administration, staff liaison and data collection. Paul Wainright (Senior Lecturer) and Rosemary Carroll (Senior Lecturer) undertook direction and management with special reference to nursing. Carol Jarrett (Research Nurse) and Sophie Parker (Research Nurse) undertook data collection and analysis. Kim Fleming (Director of Service Development) was responsible for integrating the virtual outreach service at the Royal Free Hospital. Paul Garner (Development Officer BT) undertook direction with special reference to information and communications technologies.

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Appendix 1

GP training manual

GP Virtual Outreach Manual

Contents

Timetable

1.10.96	Project office starts processing letters through hospital computer to generate appointments. Non-participating GPs' and non-participating consultants' letters fed back into normal hospital administration
20.10.96	Teleconsult appointments can be anticipated from here on
23 or 29	October Training day
20 or 26	November Training day
17 or 18	December Training day
22 or 28	January Training day
25 or 26	February Training day

GP Practice Admin Guidelines

1. GPs dictate referral letters
2. Secretary types and, after signature, posts all Royal Free letters to:
   Ms Marcia Rigby
   Virtual Outreach Project
   Dept of Primary Care
   Royal Free Hospital School of Medicine
   Rowland Hill Street
   LONDON NW3 2PF
3. Practice appointments desk receives call from project office to book appointment in GP's surgery diary. This will usually be an early morning appointment. ISDN phone number to be dialled will also be noted in the appointment book.
4. Project office confirms with patient by phone.
5. Patient receives information pack, questionnaire and consent form. Relevant items returned to Virtual Outreach Office in SAE.
6. Patient attends practice for appointment. Practice member makes call to relevant outpatients at the appointment time to set up the link, calls GP when ready.
7. Practice receives severity of illness score sheet (DUSOI) for some patients, placed with notes in doctor's file for them to complete.

Equipment guidelines

Starting the machine

Power and ISDN telephone connection are required, then you need to switch on the computer and open the teleconferencing program (known as PCC). *To do this*:

1. Check the power lead is plugged into mains, and phone lead plugged into the ISDN socket.
2. Switch on power at the mains then switch on the computer (red button on computer box). The phone will bleep when powered up.
3. The computer will start up and automatically open the PCC program as far as *PCC Desk*. Do not touch the controls while this is happening, it takes a minute or two.
4. The program is designed to receive calls automatically from this display.
5. To make a video call, select the *CallDesk* button from the PCC Desk using the mouse to press the button once. Double click on consultant name to pull up their usual ISDN number, double click on the number and this will transfer it to *FCC Desk*.
6. With the correct number in the number field (you can also type it in) click on the *Video Talk* button and drag it onto the *Call* button. This will make the call; it takes a few seconds. The clinic should be on automatic answer; if there is no ring tone they may not be switched on, in which case a call to the clinic, see Fallback Procedures, page 6, will remind them.

To close down the system

It is important to close down all the programs before switching off.

1. The top right of *PCC Desk* has a button with a cross, press this to close the PCC program.
2. Press the Start button in the bottom left corner of your screen and then press *Shutdown*. Press *Yes* to confirm this instruction. You will get a message when shutdown is complete to say it is safe to switch off. Use the red button on the computer and then switch off at the wall.

Using PCC

The system is configured to receive calls when PCC is open. The clinics are instructed to await your call. It is helpful to set up the connection a few minutes early so that everyone is prepared. The system is usually used hands free; if you pick up the handset during a call, perhaps because you want to hear the consultant in private, be sure to press hands-free button on the phone before replacing the handset or you will cut off the call.

The speaker unit has two buttons to adjust the volume up or down. To help cancel out background noise if you are calling from a noisy environment, press and hold down both buttons for three seconds until the green light starts flashing.

Practice calls to the project office are welcome. Our ISDN number is 0207 794 2758.

To make a call

1. Press the *CallDesk* button on the PCC Desk.

Title bar

Call Desk Number fieldCall
Call End

ISDN	kbps	64	Bwidth
Time _____ Charges			

2. In the *CallDesk* window double click with the left mouse button on the consultant's name.
3. Then double click on their phone number. This will copy this number into the call field on PCC Desk.
4. Click and drag the *VideoTalk* button over to the *Call* button and release the button.
5. PCC will now call the selected Teleclinic. Wait for them to answer; it takes about thirty seconds for their image to appear after they have picked up the call. If you have selected self-view you will only see yourself. Change the VideoTalk options to deselect self-view.

Fallback procedures

1. If you cannot get through on time
   (a) call through to the clinic by dialling the hospital, 0207 794 0500, and asking for the relevant clinic:

Mr Morgan	Clinic 1	3359
Dr Epstein	Clinic 4	4648
Mr Quiney	Clinic 5	5092/5312
Paediatrics	Clinic 5	5312
Dr Bouloux	Clinic 1	3359
Mr Kaisary	Prostate lab	5494
Mr Goddard	Fracture clinic	4046
Ms Eastwood	Fracture clinic	4046
Prof. Black	Rheumatology	4620
Dr Beynon	Rheumatology	4620

   (b) still problems? Ring project office, 0207 830 2482, or
   (c) call the hospital on 0207 794 0500 and bleep project liaison. Bleep number 529 (Dr Clayton).
2. If you have difficulties using the software call the project office.
3. If you have problems with the software not running properly,
   (a) close down PCC Desk.
   (b) reboot the computer (via the Start button and shutdown).
4. If a call is lost, return to PCC Desk, type in the number and click call button, or use *CallDesk* as before.
5. If unable to re-establish link or unable to power up computer or run the software, ring the project office or bleep 529.

Completing the DUSOI

Ideally, the DUSOI should be completed by the doctor immediately after seeing the patient or immediately after completing the medical record. It may be completed subsequently, however, using the patient's record.

The DUSOI is important as it provides a measure of the degree of illness in the two groups in the study; if the randomisation has been successful they should be the same.

Health problems

Record all the patient's current health problems. Current health problems include all those present within the week preceding the visit. Chronic and

acute illnesses should be included. The order in which they are written does not matter. If a diagnosis is not clear then state the most prominent symptom.

Do not infer anything from the medical records that you do not have personal knowledge of, even if you think there has been an error.

If an 'either/or' diagnosis has been recorded, record the principal symptom or problem.

Rating

Basically, the advice is not to think too much about rating. It is accepted and works satisfactorily on the basis of subjective judgements. Each item is scored on a severity score 0–4.

1. **Severity**
   Doctor's judgement of severity at the time of visit or one week before.
2. **Complications**
   Again this is rated subjectively for the day of the visit or previous week. NB. If the complication results in another diagnosis do not enter it as a complication; enter it as another diagnosis, otherwise it will be counted twice.
3. **Prognosis**
   Assess the threat to life in the next six months if *untreated*.
4. **Treatability**
   This is based upon the need for treatment and the expected response to treatment. It is important that you provide a score for each of the four items. Although the questionnaire requires a degree of judgement, use of the DUSOI shows that variability in ratings is ironed out by overall scores.

If you want to know more about the way the final DUSOI is calculated, this information is available. The research office will also be pleased to let individual GPs know in confidence how your referral pattern has changed, if at all, during the course of the trial.

Example DUSOI

(See Appendix 3.)

Project overview

The Virtual Outreach Project: a randomised controlled trial and economic appraisal of teleconferenced joint consultations between general practitioners, patients and specialists.

1. Project summary and objectives

The project represents the planned extension of the work of the feasibility study of teleconferenced medical consultations funded by the National R&D Programme. A randomised controlled trial involving 15 group general practices is planned to determine the effectiveness in selected clinical areas of virtual outreach consultations compared with conventional outpatient consultations. The principal objective of the trial will be to evaluate the relative impact of the two modes of consultation on patient welfare and health service usage. The study will also develop an analytical framework for an economic appraisal of virtual outreach and conventional outpatient consultations, and their relative performance compared to the quality of doctor–patient communication, participant satisfaction, health outcomes and use of health service resources. The current phase is the piloting of the research design.

2. Benefits the proposed investigation will bring the NHS

There is now good evidence that joint medical consultations (where hospital specialists and general practitioners review patients together) can lead to a substantial reduction in subsequent outpatient referral and further health service usage as well as an improvement in health outcomes for the patient and in educational value for the general practitioner (GP).[1] However, with the exception of joint domiciliary consultations, there have been relatively few attempts to establish facilities for joint consultation within the NHS. Despite early enthusiasm, conventional outreach clinics have failed to fulfill their promise. This appears to be largely because of the inconvenience to hospital specialists of having to travel to general practices, and because of the failure in the great majority of cases to establish proper communication between hospital specialists and GPs.[2]

Our feasibility study has demonstrated clearly the unique opportunity which teleconferencing offers despite its current technical limitations. Joint consultations can readily be achieved without the need for either GP or consultant to leave their usual place of work. Moreover, we now have firm indications that the virtual outreach service is

likely to prove highly attractive to patients, and that it will be popular for clinical and educational reasons with both GPs and hospital specialists. Virtual outreach could thus constitute a natural and potentially major application for the NHS Health Technologies initiative, with its ability to provide GPs and hospital consultants ready access to multimedia terminals linked through HealthNet.

3. Background to the study

Referrals from general practice form a major part of the workload at the interface between primary and secondary care, with around 6–10% of consultations in general practice resulting in a referral and up to 20% of patients who consult GPs in a year being referred to specialists. Nationally there are an estimated 40,000 outpatient consultations each day, of which a substantial proportion result from new referrals from general practice.[3]

Key findings of the feasibility study include the following:

- Virtual outreach is both feasible and practical and can be readily arranged as a comprehensive service for general practice.
- Virtual outreach was popular with all three groups of participants, patients, specialists and GPs.
- Virtual outreach appears to be an appropriate alternative to routine outpatients in a large proportion of referred patients and in a wide variety of specialities.
- Virtual outreach can offer substantial educational benefits for GPs, patients and hospital specialists.
- A randomised controlled trial to evaluate the relative value of virtual outreach and routine outpatient referral is feasible.

4. Plan of investigation including research methodology proposed

We have elected to undertake a randomised controlled trial (RCT) in order to carry out a rigorous evaluation of virtual outreach relative to conventional outpatient referral. This will be preceded by a pilot phase.

Recruitment of general practitioners and consultants

General practitioners will be recruited to the study on the basis of an agreement to allow allocation of all their eligible patients in the identified specialities to be seen by virtual outreach and a commitment to participate in all the virtual outreach consultations (up to 3 per week) arranged for their patients during the study period. Preference will be given to general practitioners who have participated successfully in the feasibility study as well as to those operating in practices where three or more full-time partners wish to participate in the study and where there is existing compatible teleconferencing equipment. Practices with an established relationship with the Royal Free will also be recruited preferentially. Participating GPs will be required to make a considerable commitment to participate in the research. This will include learning to use the equipment, attending monthly discussion groups and undertaking the joint consultations from the practice. The GPs will require adequate recompense to cover costs.

Randomisation

In order to ensure that both GP and patient outcomes can be evaluated in the trial, the unit of randomisation for the study will be participating GPs (see below). Each GP will be allocated on a Latin square basis a random selection of 50% of the consultants identified for the study, with whom to undertake joint virtual outreach consultations. For all other areas, they will continue to have access only to the routine outpatient service. This experimental design will give the study the potential to evaluate the impact of a virtual outreach service, both for patients and for general practitioners.

Recruitment of subjects

For the duration of the study, all patients referred for a specialist opinion from the identified consultants by the participating GPs will be potentially eligible for recruitment to the study. The criteria for inclusion in the study will be:

- routine referral principally for diagnosis
- referral primarily for advice about management where decisions can be made on the basis of a history and tests
- referral for medical intervention(s) to which the GP does not have direct access (such as MRI scan, endoscopic investigation, etc.)
- emergency referrals will be excluded.

All referral letters to the Royal Free Hospital Trust generated by the participating GPs will be sent to the research team. Letters relating to patients referred to non-participating consultants will be forwarded immediately to the routine outpatient

service. All other letters will be reviewed within 24 hours by a medically qualified researcher who will determine whether the letter suggests that the patient satisfies the criteria for inclusion to the study. Referral letters relating to patients who fail to satisfy the inclusion criteria and those relating to patients allocated to the control group will be forwarded within 24 hours to the outpatients' department to be dealt with in the routine way.

Consent

All those satisfying the criteria will be invited to participate in the study. In line with the Zelen method, consent will be actively sought only for patients assigned to virtual outreach.[4] The research team will send these patients an appointment letter including an explanation of the nature of virtual outreach and an information sheet, as well as a consent form which the patient will be asked to complete and return to the research team. While actively inviting the patients to participate, the letter will explain their right to seek further information or to refuse participation and to undergo a conventional outpatient consultation. Further information will be accessible to patients, including an information telephone line. The research team will send patients allocated to the control arm of the study a standard letter seeking their cooperation with the research team in evaluating their experience of routine outpatient referral. Ethical committee approval for the study has been granted by the Royal Free Ethics Committee.

The intervention group

Referral letters relating to patients allocated to virtual outreach will be managed by the project team, who will provide ready access to specialists contracted to participate in the study. The project team will operate an appointment system using the hospital PAS computer. They will also use a range of quality administrative systems for record keeping and data collection relating to the consultations and subsequent case management; these will ensure that no letters are lost or delayed during their passage through the project office. On selection of a patient for intervention the project team will identify a potential virtual outreach appointment consistent with the availability of the specialist and GP. Once the patient's confirmation of availability and willingness to attend has been obtained, written confirmation of the arrangements will be provided to all three parties. Each teleconsultation will involve the following components:

- a scheduled videolink between the GP practice and the identified consultant
- the patient and GP will be present together in the GP's surgery
- written clinical records will be kept by both GP and consultant of the content and outcome of the consultation.

If the virtual outreach consultation cannot be satisfactorily performed because of technical problems, the GP and consultant will be at liberty to offer either a further virtual outreach appointment or a conventional outpatients appointment. If the patient fails to attend, s/he will be offered one further appointment for a virtual outreach consultation.

Evaluation

The evaluation has been designed to test the following hypotheses:

When compared with conventional outpatients virtual outreach consultations will:

- improve access for patients to specialist opinion and reduce waiting times for appointments
- have a positive impact on patient satisfaction and health status
- improve the quality of communication between the patient, general practitioner and consultant
- reduce GP referrals to hospital and lead to more appropriate referral patterns with implications for workload
- reduce the number of medical interventions and follow-up visits to routine outpatients
- result in greater professional satisfaction for both GPs and consultants
- reduce the costs to the patients (in terms of travelling costs and time) while not resulting in any increased costs to the NHS.

Questionnaires

On entry to the study, patients recruited to either virtual outreach or conventional outpatients will receive an initial set of assessment questionnaires to complete and return in a prepaid envelope to the research team. The set will include a brief questionnaire seeking routine demographic data and a copy of the SF-12 to determine health status.[5–8] Additional information about the severity of the patient's condition will be sought from the referring GP, who will be requested to complete a Duke's Severity of Illness (DUSOI) questionnaire.[9] Questions to collect economic data will also be included (see economic appraisal below).

Immediately following the consultation patients will be sent copies of the Ware's Visit Specific Satisfaction Questionnaire (VSQ) to complete and

return using reply-paid envelopes.[10,11] Both questionnaires have been validated and widely used in primary care settings.[10] The questionnaire seeks information on a range of domains relating to the patient's subjective experience of the consultation.[12] Subsequently, at three, six and twelve months, patients will receive a copy of the SF-12 to complete and return to the research team in a prepaid envelope.

At 12 months from recruitment to the study the research team also will undertake a retrospective case-notes review of both the general practitioner's medical record and the hospital clinical record. Relevant medical records will be scrutinised by a researcher with clinical training and blind to the allocation status of the patient. The review will identify diagnostic tests, primarily laboratory tests and radiological investigations, and also those in receipt in either setting over the preceding 12 months of other investigations such as endoscopy and MRI, as well as therapeutic interventions (primarily medication but also injections, surgery and other procedures).

GP outcomes

GP outcomes will be assessed in terms of changes in referral behaviour in the first and last 3 months of the study. The GPs' referral rates to the intervention (virtual outreach) specialities and control (conventional outpatients) specialities will be monitored throughout the study period, as will the 'case-mix' of the patients referred to the intervention and control specialities. 'Case-mix' will be measured using the DUSOI questionnaire completed by the GPs for all the patients recruited to the study. Although referral rates for any given period should ideally be calculated in relation to the number of individual patients seen in that period, this is technically difficult to ascertain and this study will use crude patient consultation rates (calculated from the practices' appointments and home visits registers) as the denominator.

5. Project timetable

(1) Pilot RCT and expansion of the service: June 1996–May 1997 (12 months)

In the first phase of the study, the existing teleconferencing network linking the Royal Free with local practices will participate in a pilot study. The objective of this phase is to test and refine all the key components of the RCT, from the randomisation process to outcome assessment and follow-up. The pilot will further assist in the main trial by providing more precise estimates of key parameters, including patient recruitment rates and values for outcomes in the intervention and control groups. Formal training programmes will be provided for the relevant clinical and administrative staff in the Royal Free and in the participating practices, together with user support groups, equipment familiarisation and teaching sessions.

(2) Main randomised controlled trial and follow-up: June 1997–November 1998 (18 months)

The main study will commence once the pilot is complete and all of the practices, participating specialists and virtual outreach services are fully operational. It is anticipated that the intervention phase of the study will last for 6 months, with the follow-up completed within 18 months.

Write-up and dissemination of results: November 1998–July 1999 (9 months)

For details see Section 6. Methods of disseminating results.

6. Methods of disseminating results

The findings of the study will be made available as soon as possible after completion of the study for presentation at scientific and other relevant meetings. Papers will be submitted for publication in relevant peer-reviewed journals, and subsequently in the more general medical and popular press. The authors are actively collaborating with the NHS Information Management Group, the British Association of Medical Managers, the National Association of Health Authorities and Trusts, the Belfast Telemedicine Institute and the Royal College of General Practitioners, all of whom will be fully consulted and briefed on the findings of the study.

7. Project people

Mr Robert Harrison will be piloting and modifying as necessary the data collection forms, outcome measures, monitoring and assessing relevant literature, designing the process evaluation, organising and supervising data analysis, attending, supervising and presenting at conferences, seminars and meetings during the development recruitment and subsequent dissemination of the research, preparing articles

for publications, assisting in the administration of questionnaires and interviews, and data collection including information for the economic appraisal.

Drs Will Clayton and Alasdair Unwin will be liaising, recruiting, training and supporting the clinicians involved with the project, liaising with the NHS Trust and its staff, selecting outpatient referrals according to the research criteria, analysis of clinical records, assisting in the management of the project, and general troubleshooting.

Ms Marcia Rigby will be designing, setting up and running administrative systems for the smooth running of the virtual outreach service, and for general office procedures, developing contractual arrangements with GPs and consultants, maintaining task schedules and the project diary for planning and timetabling the project, assisting in the day-to-day work, supporting the virtual outreach service and the research team, answering the office phone and appointments hotline, dealing with correspondence, and helping to prepare reports, letters and publications.

Professor Paul Wallace retains overall responsibility for the project and is particularly involved with strategic and planning decisions.

Dr Jennifer Roberts will be designing the economic appraisal, supervising the work of the BT Research Fellow, *Hamnet Patel*, and undertaking the analysis of the economic data.

Mr Paul Gamer represents BT's interest in the project, which is to fund the technology and the economic appraisal.

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Patient's appointment letter

The Royal Free Hospital School of Medicine
THE UNIVERSITY OF LONDON
0207 435 1368

OUTPATIENTS BY TELEVISION

Dear Patient,

An outpatient appointment has been made for you to see Mr Quinsy ENT Consultant on **Friday 18 October 1996** at **9.00am**. This appointment will take place at **Dr Finlay's surgery** at the **Hollywood Medical Centre**. If possible could you please arrive at Dr Finlay's surgery 15 minutes before your appointment time. If you cannot attend this consultation, please inform your practice as soon as possible.

You and your doctor will then be able to discuss your problem together with the consultant at the Royal Free via a television link-up. This is called the Teleclinic and is part of a research project at the hospital. The use of the Teleclinic means that we have been able to offer you an appointment without you having to travel to the hospital. We would like you to read the enclosed information sheet and hope that you will feel you want to use this new facility.

If you have any doubts you may choose to have a normal appointment at the hospital in due course. This will not affect your care in any way. If you decide now to help with this research but later want to withdraw, you are free to do so, just let me know at the above telephone number.

Enclosed is a **questionnaire and consent form**, which should be completed and returned to the Teleclinic office in the enclosed prepaid envelope before your appointment.

I will telephone you to confirm your Teleclinic appointment but in the meantime, if you have any questions, please do not hesitate to contact me at the Project Office on the number above.

Yours sincerely

Marcia Rigby (Project Administrator)

Patient consent form

OUTPATIENTS by TELEVISION

Your name
Place of consultation
Your doctor

Date

Please read this form carefully. If anything is unclear, or if you wish to know more, please contact Ms Marcia Rigby on: 0207-435-1368.

I am the: patient/parent/guardian (delete as necessary)

I have received and read the information sheet YES/NO

I agree to take part in a Teleconsultation YES/NO

I understand that this is part of a scientific evaluation of Teleconferenced medical consultations YES/NO

I agree to my consultation being video recorded and used solely for research YES/NO

N.B. If you agree to the consultation being recorded, we will re-confirm this with you by post after the consultation.

Signed…… DATE / /

MANY THANKS – YOUR HELP WITH THIS RESEARCH IS APPRECIATED

Please return to:
Marcia Rigby
Department of Primary Care & Population Sciences
Upper 3rd Floor, Rowland Hill Street
LONDON NW3 2PF
Tel. 0207-435-1368

Patient information sheet

Outpatients by television

We have asked you to take part in research about the use of some new technology. Teleconferencing is providing a way of getting a hospital doctor's opinion while sitting with your GP in their surgery. This information sheet is to help you decide if you want to have a teleconsultation. If you do not want one it will not affect your care in any way.

What is a teleconsultation?

Your doctor can now phone the hospital and get the specialist on his computer screen. It is like bringing the hospital doctor to the surgery but without him actually being there. They can see and hear you and you can see and hear them. This means that you may not need to go to the hospital outpatients to see the specialist.

We have found that the hospital doctors can often gather all the information they need using teleconferencing. When they cannot, they ask your GP to examine you.

Teleconsulting is new and exciting. We believe it can provide a better service, however we must examine it scientifically. We will be seeing if it can improve the result of consultations.

What will happen after the consultation?

We will keep notes of the sort of cases that use the system. This information will be kept safe and confidential, just like your doctor's records. The results of the work will be published in medical journals but none of your personal details will be published.

If you give permission, some of the consultations will be recorded on video. This is so that we can study the consultation in detail. These recordings may also be used for teaching. They will not be used for any other purpose.

What will taking part in the research involve?

We will send you 4 short questionnaires to gather basic information on you and your feelings about the consultation as well as how you are. One will be before and one after your consultation, one 3 months later and a final one at 6 months. An addressed, reply-paid envelope will be provided for you to return them to us.

Who is paying for the study?

The research is being paid for by the NHS. This covers the salaries and expenses of the research project. BT are paying for the teleconferencing equipment.

How confidential is it?

We use special high-capacity phone lines to transmit the sound and images between the hospital and GP's surgery. These are safer and more confidential than the phone you use to phone your doctor – there is almost no chance of getting a 'crossed line'.

Changing your mind

You can end your involvement at any time during the consultation or afterwards. To withdraw either write to the project administrator, Marcia Rigby, or telephone the project office on 0207 435 1368. Withdrawal will not alter your care in any way.

IF THERE IS ANYTHING ELSE YOU NEED TO KNOW, PLEASE ASK.
THE PROJECT OFFICE NUMBER IS 0207 435 1368.

Specialities & consultants at the Royal Free Hospital

Availability guide

Prof Carol Black	Monday 8.45
Dr Gareth Beynon	
Dr Pierre Bouloux	Tuesday 8.45, Thursday 1.30
Ms Deborah Eastwood	Monday 8.45
Dr Owen Epstein	Tuesday 9.30
Dr David Flynn	
Mr Nick Goddard	Tuesday 8.45
Dr Alison Jones	
Mr Amir Kaisary	Tuesday 14.00
Dr Ben Lloyd	Monday 8.45
Mr Robert Morgan	Monday 9.30
Mr Robert Quiney	Friday 9.00
Dr van Someron	
Prof Brent Taylor	
Dr Anthony White	

Appendix 2

Patient information leaflet and consent form

Patient information leaflet

Outpatients by television – a trial

As part of this practice's commitment to medical research and education we have decided to take part in a trial to look at a new way in which you might be able to get a hospital doctor's advice. This sheet will give you some information about a new technology, its purpose and how a trial of its use might affect you.

Teleconferenced outpatient consultations (teleclinics)

It is now possible, using computers and video cameras, to send and receive pictures down the telephone network. We have installed a trial system in the practice so that your doctor can phone the hospital and get a specialist on a computer screen. It is like bringing the hospital doctor to the surgery but without him actually being there. They can see and hear you and you can see and hear them. This means that you may be able to have a joint consultation with your doctor and the specialist in this surgery. The hospital specialists will not be able to examine you so they may ask your doctor to help or ask you to go up to the hospital outpatients at a later date.

What is the purpose of the trial?

This technology is new and exciting, but is it any use? This is the question we want to look at with the doctors at the Royal Free Hospital. We will be seeing which specialities and which sort of problems it most suits.

How might the trial affect you?

Because we are helping in this trial, if your doctor refers you to a hospital specialist, some of you will be offered a 'teleclinic' appointment. The selection will be made by doctors at the hospital based on your doctor's letter.

What will happen if I am selected?

If you are selected for a 'teleclinic' appointment you will be contacted by the trial team and offered an appointment time for you to come to this surgery. After the consultation you will be asked to complete a short questionnaire. A small number of people will also be interviewed by a researcher. If you do not want to be part of this trial then please let us know, it will not affect your care in any way.

What will happen to the results?

Notes will be kept of the sort of cases that use the system. This information will be kept safe and confidential, just like your records here. The results of the trial will be published in medical journals but none of your personal details will be published. If you agree, some of the consultations will be video recorded. This is so that we can study the consultation in detail.

How confidential is it?

We use special high-capacity phone lines. These are as confidential as the phone you use to phone your doctor, probably more so. There may be other people at the hospital end but out of your sight. They will be introduced. You will be asked if they can stay. The sort of people who might be in the room with the hospital doctor are: other doctors, medical students or a member of the research team.

Information sheet

Outpatients by television

We have asked you to take part in research about the use of some new technology. Teleconferencing is providing a way of getting a hospital doctor's opinion while sitting with your GP in their surgery. This information sheet is to help you decide if you want to have a teleconsultation. If you do not want one it will not affect your care in any way.

What is a teleconsultation?

Your doctor can now phone the hospital and get the specialist on his computer screen. It is like bringing the hospital doctor to the surgery but without him actually being there. They can see and hear you and you can see and hear them. This means that you may not need to go to the hospital outpatients to see the specialist.

We have found that the hospital doctors can often gather all the information they need using teleconferencing. When they cannot, they ask your GP to examine you.

Teleconsulting is new and exciting. We believe it can provide a better service, however we must examine it scientifically. We will be seeing if it can improve the result of consultations.

What will happen after the consultation?

We will keep notes of the sort of cases that use the system. This information will be kept safe and confidential, just like your doctor's records. The results of the work will be published in medical journals but none of your personal details will be published.

If you give permission, some of the consultations will be recorded on video. This is so that we can study the consultation in detail. These recordings may also be used for teaching. They will not be used for any other purpose.

What will taking part in the research involve?

We will send you 4 short questionnaires to gather basic information on you and your feelings about the consultation as well as how you are. One will be before and one after your consultation, one 3 months later and a final one at 6 months. An addressed, reply-paid envelope will be provided for you to return them to us.

Who is paying for the study?

The research is being paid for by the NHS. This covers the salaries and expenses of the research project. BT are paying for the teleconferencing equipment.

How confidential is it?

We use special high-capacity phone lines to transmit the sound and images between the hospital and GP's surgery. These are safer and more confidential than the phone you use to phone your doctor – there is almost no chance of getting a 'crossed line'.

Changing your mind:

You can end your involvement at any time during the consultation or afterwards. To withdraw either write to the project administrator, Marcia Rigby, or telephone the project office on 0207 435 1368. Withdrawal will not alter your care in any way.

IF THERE IS ANYTHING ELSE YOU NEED TO KNOW, PLEASE ASK.
THE PROJECT OFFICE NUMBER IS 0207 435 1368.

Patient consent form

OUTPATIENTS by TELEVISION

Your name
Place of consultation
Your doctor

Date

Please read this form carefully. If anything is unclear, or if you wish to know more, please contact Ms Marcia Rigby on: 0207-435-1368.

I am the: patient/parent/guardian (delete as necessary)

I have received and read the information sheet YES/NO

I agree to take part in a Teleconsultation YES/NO

I understand that this is part of a scientific evaluation of Teleconferenced medical consultations YES/NO

I agree to my consultation being video recorded and used solely for research YES/NO

N.B. If you agree to the consultation being recorded, we will re-confirm this with you by post after the consultation.

Signed…… DATE / /

MANY THANKS – YOUR HELP WITH THIS RESEARCH IS APPRECIATED

Please return to:
Marcia Rigby
Department of Primary Care & Population Sciences
Upper 3rd Floor, Rowland Hill Street
LONDON NW3 2PF
Tel. 0207-435-1368

Appendix 3

Duke Severity of Illness (DUSOI) questionnaire

DUSOI Cover Sheet

GPs: Please fill in patient's details below

Patient Name:
(BLOCK CAPITALS PLEASE) _____

DOB: _____

Address:
(BLOCK CAPITALS PLEASE) _____

Telephone Numbers _____

Day _____

Home _____

Mobile _____

Coding Criteria – Use for guidance when filling in the form:

	None	Questionable	Mild	Moderate	Major
Symptoms (past week)	0	1	2	3	4
Complications (past week)	0	1	2	3	4

	Disability			Threat to Life	
	None	Questionable	Mild	Moderate	Major
Prognosis (6 months without treatment)	0	1	2	3	4

	Need for treatment		Expected response to treatment		
Treatability	No	Questionable (if yes)	Good	Questionable	Poor
	0	1	2	3	4

Duke severity of illness checklist (DUSOI)

Strictly confidential

Please answer each question by placing a cross in the appropriate box(es),

see below for an example .... ☒

Describe each health problem and indicate the relevant severity scores, cross one box between 0–4 for each item.

Health Problems	Symptoms	Complications	Prognosis	Treatability
1. _____	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
2. _____	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
3. _____	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
4. _____	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
5. _____	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
6. _____	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
7. _____	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
8. _____	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
9. _____	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
10. _____	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
11. _____	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
12. _____	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4

Appendix 4

Patient questionnaire 1 (Adult and Child)

Patient Questionnaire 1 (Adult)

THIS SECTION IS FOR OFFICE USE ONLY

(a) Patient Identifier

(b) TELECONSULT ☐
OUTPATIENT ☐

(c) LONDON ☐
SHREWSBURY ☐

(d) SPECIALITY

0	1	2	3	4	5	6	7	8	9	10	
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	10
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1

(e) PRACTICE CODE

0	1	2	3	4	5	6	7	8	9	10	
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	10
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1

(f) GP CODE

0	1	2	3	4	5	6	7	8	9	10	
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	10
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1

Virtual Outreach Project

Patient Questionnaire 1

Please do not write your name anywhere on this questionnaire. All information provided is strictly confidential.

Please ensure this questionnaire is completed only by the patient to whom the letter was sent. If this is not possible this should be filled in with a relative or carer.

Please answer all the questions in the correct order by placing a cross in the appropriate box(es) like this …… ☒ Begin with Q2 at the top of the next page.

Thank you for your help.

We would like to start with a little basic information about yourself.

Q2 What is your date of birth?
(*start with the day, month and then year*)

D	D	M	M	Y	Y	Y	Y

Q3 What is your sex?
(*place a cross in one box only*)

Male ☐ Female ☐

Q4 Is there a car or van that you or someone in the home can use?
(*place a cross in one box only*)

Yes ☐ No ☐

Q5 What is your marital status?
(*place a cross in one box only*)

Married	☐	Co-habiting	☐
Single (never married)	☐	Divorced or separated	☐
Widowed	☐		

Q6 Are you still in full time education?

Yes ☐ No ☐
If no, at what age did you leave?
(*write the correct age in the box*) ☐☐

Q7 Which of the following do you think describes you?
(*place a cross in one box only*)

White	☐	Black Caribbean	☐	Black African	☐
Black Other	☐	Indian	☐	Pakistani	☐
Bangladeshi	☐	Chinese	☐	Other Asian	☐

Other ethnic groups (*please write in box below*)

Q8 At present are you....
(*place a cross in one box only*)

At school or a student	☐	Employed full time	☐
Employed part time	☐	Unemployed seeking work	☐
Unemployed not seeking work	☐	Retired	☐

Other (*please write in box below*)

Now we want to ask you about your health in the last 4 weeks. This information will help keep track of how you feel and how well you are able to do your usual activities. Please answer every question by marking one box. If you are unsure about how to answer, please give the best answer you can.

Q9 In general would you say your health is:
(*Please put a cross in one box*)

Excellent ☐ Very good ☐ Good ☐ Fair ☐ Poor ☐

Q10 The following questions are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?
(*Please put a cross in one box on each line*)

Moderate activities, lifting or carrying shopping, pushing a vacuum cleaner or playing golf

Yes, limited a lot ☐ Yes, limited a little ☐ No, not limited at all ☐

Climbing several flights of stairs

Yes, limited a lot ☐ Yes, limited a little ☐ No, not limited at all ☐

Q11 During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health? (*Please put a cross in one box on each line*)

Accomplished less than you would like Yes ☐ No ☐

Were limited in the kind of work or other activities Yes ☐ No ☐

Q12 During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?
(*Please put a cross in one box on each line*)

Accomplished less than you would like Yes ☐ No ☐

Didn't do work or other activities as carefully as usual Yes ☐ No ☐

Q13 During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)? (*Please put a cross in one box*)

Not at all ☐ A little bit ☐ Moderately ☐ Quite a bit ☐
Extremely ☐

The next questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling.

Q14 How much of the time during the past four weeks … (*Please put a cross in one box on each line*)

	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
Have you felt calm and peaceful?	☐	☐	☐	☐	☐	☐
Did you have a lot of energy?	☐	☐	☐	☐	☐	☐
Have you felt downhearted and low?	☐	☐	☐	☐	☐	☐

Q15 During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends and relatives)?
(*Please put a cross in one box*)

All of the time	☐	Most of the time	☐	Some of the time	☐
A little of the time	☐	None of the time	☐		

Please make any additional comments below ....

Patient Questionnaire 1 (Child)

THIS SECTION IS FOR OFFICE USE ONLY

(a) Patient Identifier

(b) TELECONSULT ☐
OUTPATIENT ☐

(c) LONDON ☐
SHREWSBURY ☐

(d) SPECIALITY

0	1	2	3	4	5	6	7	8	9	10	
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	10
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1

(e) PRACTICE CODE

0	1	2	3	4	5	6	7	8	9	10	
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	10
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1

(f) GP CODE

0	1	2	3	4	5	6	7	8	9	10	
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	10
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1

Virtual Outreach Project

Children's Questionnaire 1

Please do not write your name anywhere on this questionnaire. All information provided is strictly confidential.

This questionnaire is for patients under 16 years old and should be completed by a parent or guardian.

For children between 5 and 16 years old please complete all questions. For children under 5 years complete questions 2 to 10 only.

Please answer all the questions in the correct order by placing a cross in the appropriate box(es) like this …… ☒ Begin with Q2 at the top of the next page.

We would like to start with a little basic information.

Q2 What is your child's date of birth?
(*start with the day, month and then year*)

D	D	M	M	Y	Y	Y	Y

Q3 What is your child's sex?
(*place a cross in one box only*)

Male ☐ Female ☐

Q4 Which of the following best describes your relationship with your child?
(*place a cross in one box only*)

Biological parent ☐ Step parent ☐ Foster parent ☐
Adoptive parent ☐ Guardian ☐

Other (*please explain in the box below*)

Q5 Is there a car or van that you or someone in the home can use?

Yes ☐ No ☐

Q6 What is your marital status?
(*place a cross in one box only*)

Married ☐ Co-habiting ☐ Single (never married) ☐
Divorced or separated ☐ Widowed ☐

Q7 At present are you....
(*place a cross in one box only*)

At school or a student ☐ Employed full time ☐
Employed part time ☐ Unemployed seeking work ☐
Unemployed not seeking work ☐ Retired ☐

Other (*please write in box below*)

Q8 Are you still in full time education?

Yes ☐ No ☐ If no, at what age did you leave? ☐☐
(*write the correct age in the box*)

Q9 Which of the following do you think describes you?
(*place a cross in one box only*)

White ☐ Black Caribbean ☐ Black African ☐
Black Other ☐ Indian ☐ Pakistani ☐
Bangladeshi ☐ Chinese ☐ Other Asian ☐

Other ethnic groups (*please write in box below*)

☐

Q10 Is your child less than 5 years old?

Yes ☐ No ☐

If 'yes' terminate the question here.

This section asks about your child's health and well being. Your individual answers will not be shared with anyone. Certain questions may look alike but each one is different. Some questions ask about problems your child may not have. That's great, but it's important for us to know. Please answer each question. There are no right or wrong answers. If you are unsure how to answer a question, please give the best answer you can and make a comment in the margin. All comments will be read, so please feel free to make as many as you wish.

Q11 In general would you say your child's health is:
(*Please put a cross in one box*)

Excellent ☐ Very good ☐ Good ☐ Fair ☐ Poor ☐

Q12 During the past four weeks, has your child been limited in any of the following activities due to health problems?
(*place a cross in one box on each line*)

	Yes, limited a lot	Yes, limited some	Yes, limited a little	No, not limited
Doing things that take a lot of energy, such as playing soccer or running?	☐	☐	☐	☐
Doing things that take some energy, such as riding a bike or skating?	☐	☐	☐	☐
Bending, lifting or stooping?	☐	☐	☐	☐

Q13 During the past four weeks, has your child been limited in the AMOUNT of time he/she could spend on schoolwork or activities with friends due to EMOTIONAL difficulties or problems with his/her BEHAVIOUR? (*place a cross in one box only*)

Yes, limited a lot ☐ Yes, limited some ☐ Yes, limited a little ☐
No, not limited ☐

Q14 During the past four weeks, has your child been limited in the KIND of schoolwork or activities he/she could do with friends due to problems with his/her PHYSICAL health?
(*place a cross in one box only*)

Yes, limited a lot ☐ Yes, limited some ☐ Yes, limited a little ☐
No, not limited ☐

Q15 During the past four weeks, how often has your child had bodily pain or discomfort?

None of the time	Once or twice	A few times	Fairly often	Very often	Every or almost every day
☐	☐	☐	☐	☐	☐

Below is a list of items that describe children's behaviour or problems they sometimes have.

Q16 How often during the past four weeks did each of the following statements describe your child? (*please place a cross in one box on each line*)

	Very often	Fairly often	Sometimes	Almost never	Never
Argued a lot	☐	☐	☐	☐	☐
Had difficulty concentrating or paying attention	☐	☐	☐	☐	☐
Lied or cheated	☐	☐	☐	☐	☐

Q17 Compared to other children your child's age, in general would you say his/her behaviour is:

Excellent ☐ Very good ☐ Good ☐ Fair ☐ Poor ☐

Q18 During the past four weeks how much of the time do you think your child: (*please place a cross in one box on each line*)

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
Felt lonely?	☐	☐	☐	☐	☐
Acted nervous?	☐	☐	☐	☐	☐
Acted bothered or upset?	☐	☐	☐	☐	☐

The following ask about your child's satisfaction with self, school and others. It may be helpful if you keep in mind how other children your child's age might feel about these areas.

Q19 During the past four weeks, how satisfied do you think your child has felt about: (*please place a cross in one box on each line*)

	Very satisfied	Somewhat satisfied	Neither satisfied or dissatisfied	Somewhat dissatisfied	Very dissatisfied
his/her school ability?	☐	☐	☐	☐	☐
his/her friendships?	☐	☐	☐	☐	☐
his/her life overall?	☐	☐	☐	☐	☐

Q20 How true or false is the statement for your child? (*please place a cross in one box on each line*)

	Definitely true	Mostly true	Don't know	Mostly false	Definitely false
My child seems to be less healthy than other children I know	☐	☐	☐	☐	☐
My child has never been seriously ill	☐	☐	☐	☐	☐
I worry about my child's health more than other people worry about their children's	☐	☐	☐	☐	☐

Q21 Compared to one year ago, how would you rate your child's health?

Much better now than 1 year ago ☐
Somewhat better than 1 year ago ☐
About the same now as 1 year ago ☐
Somewhat worse now than 1 year ago ☐
Much worse now than 1 year ago ☐

Q22 During the past 4 weeks, how MUCH emotional worry or concern did each of the following cause YOU? (*please place a cross in one box on each line*)

	None at all	A little bit	Some	Quite a bit	A lot
Your child's physical health	☐	☐	☐	☐	☐
Your child's emotional well being or behaviour	☐	☐	☐	☐	☐

Q23 During the past 4 weeks, were you LIMITED in the amount of time YOU have for your own needs because of: (*please place a cross in one box on each line*)

	None at all	A little bit	Some	Quite a bit	A lot
Your child's physical health?	☐	☐	☐	☐	☐
Your child's emotional well being or behaviour?	☐	☐	☐	☐	☐

Q24 During the past 4 weeks, how often has your child's health or behaviour (*please place a cross in one box on each line*)

	Very often	Fairly often	Sometimes	Almost never	Never
Limited the types of activities you could do as a family?	☐	☐	☐	☐	☐
Interrupted various everyday family activities (eating meals, watching TV)?	☐	☐	☐	☐	☐

Q25 Sometimes families may have difficulty getting along with one another. They do not always agree and they may get angry. In general, how often would you rate your family's ability to get along with one another?

Excellent ☐ Very good ☐ Good ☐ Fair ☐ Poor ☐

Q26 Have you ever been told by a teacher, school official, doctor or other health professional that your child has any of the following conditions? (*please place a cross in one box on each line*)

	Yes	No
Anxiety problems	☐	☐
Asthma	☐	☐
Attentional problems	☐	☐
Behavioural problems	☐	☐
Chronic allergies or sinus trouble	☐	☐
Chronic orthopaedic, bone or joint problems	☐	☐
Chronic respiratory, lung or breathing trouble (NOT ASTHMA)	☐	☐
Chronic rheumatic disease	☐	☐
Depression	☐	☐
Developmental delay or learning difficulties	☐	☐
Diabetes	☐	☐
Epilepsy (seizure disorder)	☐	☐
Hearing impairment or deafness	☐	☐
Learning problems	☐	☐
Sleep disturbance	☐	☐
Speech problems	☐	☐
Vision problems	☐	☐

Q27 Does your child have any chronic medical condition that is affecting what they do or how they feel?

Yes ☐ No ☐

(*Please describe in box below*)

Appendix 5

Patient questionnaire 2 (Adult and Child – standard outpatient and teleconsultation)

Patient Identifier

Virtual Outreach Project

Patient Questionnaire 2 (Adult – outpatient)

Please do not write your name anywhere on this questionnaire. All information provided is strictly confidential.

Please ensure this questionnaire is completed only by the patient to whom the letter was sent. If this is not possible this should be filled in with a relative or carer.

When answering these questions you will be asked to either place a cross in a box like this ☒ or enter numbers in the boxes.

Begin with Q2 below

Q2 Please enter today's date below

for example 1st March 1999 would be 01/03/1999

D	D	M	M	Y	Y	Y	Y

Now, we would like to ask some questions about the consultation with the hospital specialist

Q3 (a) How would you rate each of the following? (b) place a cross in one box on each line

	Excellent	Very good	Good	Fair	Poor
1. how long you waited to get an appointment	☐	☐	☐	☐	☐
2. convenience of the location of the hospital/clinic	☐	☐	☐	☐	☐
3. getting through to the hospital, surgery or project office by phone *If not applicable place a cross here*	☐	☐	☐	☐	☐
4. length of time waiting at the hospital/clinic	☐	☐	☐	☐	☐
5. time spent in the consultation with the doctor you saw	☐	☐	☐	☐	☐
6. ease of making/changing an appointment time *If not applicable place a cross here*	☐	☐	☐	☐	☐
7. convenience of day and/or time of appointment with the specialist	☐	☐	☐	☐	☐
8. personal manner (courtesy, respect, sensitivity, friendliness) of the reception staff	☐	☐	☐	☐	☐
9. waiting area and facilities	☐	☐	☐	☐	☐
10. attention given to what you had to say	☐	☐	☐	☐	☐
11. explanation of what was done for you	☐	☐	☐	☐	☐
12. the technical skills (the thoroughness, carefulness, competence) of the doctor you saw	☐	☐	☐	☐	☐
13. the personal manner (courtesy, respect, sensitivity, friendliness) of the doctor you saw	☐	☐	☐	☐	☐
14. the visit overall	☐	☐	☐	☐	☐

Q4 As a result of the consultation with the hospital specialist do you feel you are *place a cross in one box on each line*

	Much better	Better	Same or less	Not applicable
Able to cope with life	☐	☐	☐	☐
Able to understand your illness	☐	☐	☐	☐
Able to cope with your illness	☐	☐	☐	☐
Able to keep yourself healthy	☐	☐	☐	☐
	Much more	**More**	**Same or less**	**Not applicable**
Confident about your health	☐	☐	☐	☐
Able to help yourself	☐	☐	☐	☐

Do you have any additional comments? *please use the space below*

We would now like to ask you some questions about the costs of attending your outpatient's appointment

Q5 Thinking about your recent health problem and your referral to see the hospital specialist, did you have to go back and see your GP for the same health problem while you were waiting for your appointment?

Yes ☐ No ☐

If yes, please tell us how many times ☐☐

Q6 Has your GP visited you at home about your health problem, since the referral?

Yes ☐ No ☐

If yes, please tell us how many times ☐☐

Q7 Were you visited by someone from any other service about your health problem? (*for example by the district nurse*)

Yes ☐ No ☐

If yes, please specify in Q8

If no, carry on to Q9

Q8 Were you visited by ...

District nurse?	Yes	☐	Number of times	☐☐
Practice nurse?	Yes	☐	Number of times	☐☐
Home care?	Yes	☐	Number of times	☐☐
Meals on wheels?	Yes	☐	Number of times	☐☐

Other ☐ *please state in boxes below*

1. *other*	Yes	☐	Number of times	☐☐
2. *other*	Yes	☐	Number of times	☐☐
3. *other*	Yes	☐	Number of times	☐☐

Q9 Did you, or anyone accompanying you to the consultation with the hospital specialist, incur any travel costs?

write to the nearest £ what you thought your costs were in the boxes below

none	☐	£☐☐	taxi	☐	£☐☐
public transport	☐	£☐☐	other (*specify below*)	☐	£☐☐
private car	☐	£☐☐			

Q10 How long does it take to visit the hospital and return home again?
place a cross in one box only

up to 30 minutes	☐	30 minutes to 1 hour	☐
l to 2 hours	☐	3 to 4 hours	☐
5 to 6 hours	☐	longer than 6 hours	☐

Q11 Since being referred to the specialist for your health problem did you have to buy anything special? (e.g. clothing, foods, dressings)

Yes ☐ No ☐

How much to the nearest pound did you have to spend? £☐☐☐
What did you buy?

Q12 Did you, or anyone accompanying you, have to take time off work?

Yes ☐ *If Yes, please complete Q13*
No ☐ *If No, please go to Q14*

Q13 Did either you or your companion lose any pay?

Yes ☐ *If yes fill in how much below to the nearest £, if no carry on to the next question*
No ☐

You	£☐☐☐
Your companion	£☐☐☐

Q14 Did you, or anyone accompanying you, take annual leave in order to attend your appointment with the specialist?

	you	*your companion*
Yes	☐	☐
No	☐	☐

Q15 Did you, or anyone accompanying you, have to miss any activity or routine responsibility, other than work, in order to attend your appointment?

Yes ☐ *If 'Yes', please cross the appropriate box below*
No ☐ *If 'No' go to Ql6*

If 'Yes', was the activity …

a social occasion or pastime ☐
picking up or dropping off children at school ☐
other ☐
Please specify other in box

Q16 If you, or a person attending with you, had to make special arrangements for childcare did it cost you anything?

Yes ☐ *please tell us to the nearest how much in the boxes* £ ☐☐☐
No ☐ *If you answered No please go to the next question*

Q17 As a result of seeing the specialist, were you? *Please place a cross in all boxes that apply*

given a prescription ☐

put on a waiting list for surgery ☐

discharged or told the specialist did not need to see you again ☐

given a further appointment to see the specialist ☐

sent for complementary medicine (e.g. osteopathy, acupuncture) ☐

sent for an x-ray, scan or other test or examination, given injections, given bandages ☐

sent for therapy (e.g. physiotherapy) ☐

other *please specify other in box below*

Q18 If you have any comments about the consultation, write them in the box below *continue overleaf if required*

Patient Identifier

Virtual Outreach Project

Patient Questionnaire 2 (Child – outpatient)

Please do not write your name anywhere on this questionnaire. All information provided is strictly confidential.

This questionnaire is for patients under 16 years old and should be completed by a parent or guardian.

When answering these questions you will be asked to either place a cross in a box like this ☒ or enter numbers in the boxes.

Begin with Q2 below

Q2 Please enter today's date below

for example 1st March 1999 would be 01/03/1999

D	D	M	M	Y	Y	Y	Y

Now, we would like to ask some questions about the consultation with the hospital specialist

Q3 (a) How would you rate each of the following? (b) *place a cross in one box on each line*

	Excellent	Very good	Good	Fair	Poor
1. how long you waited to get an appointment	☐	☐	☐	☐	☐
2. convenience of the location of the hospital/clinic	☐	☐	☐	☐	☐
3. getting through to the hospital, surgery or project office by phone *If not applicable place a cross here*	☐	☐	☐	☐	☐
4. length of time waiting at the hospital/clinic	☐	☐	☐	☐	☐
5. time spent in the consultation with the doctor you saw	☐	☐	☐	☐	☐
6. ease of making/changing an appointment time *If not applicable place a cross here*	☐	☐	☐	☐	☐
7. convenience of day and/or time of appointment with the specialist	☐	☐	☐	☐	☐
8. personal manner (courtesy, respect, sensitivity, friendliness) of the reception staff	☐	☐	☐	☐	☐
9. waiting area and facilities	☐	☐	☐	☐	☐
10. attention given to what you had to say	☐	☐	☐	☐	☐
11. explanation of what was done for you	☐	☐	☐	☐	☐
12. the technical skills (the thoroughness, carefulness, competence) of the doctor you saw	☐	☐	☐	☐	☐
13. the personal manner (courtesy, respect, sensitivity, friendliness) of the doctor you saw	☐	☐	☐	☐	☐
14. the visit overall	☐	☐	☐	☐	☐

Q4 As a result of the consultation with the hospital specialist do you feel you are *place a cross in one box on each line*

	Much better	Better	Same or less	Not applicable
Able to cope with life	☐	☐	☐	☐
Able to understand your child's illness	☐	☐	☐	☐
Able to cope with your child's illness	☐	☐	☐	☐
Able to keep your child healthy	☐	☐	☐	☐
	Much more	**More**	**Same or less**	**Not applicable**
Confident about your child's health	☐	☐	☐	☐
Able to help your child	☐	☐	☐	☐

Do you have any additional comments? *please use the space below*

We would now like to ask you some questions about the costs of attending your outpatient's appointment

Q5 Thinking about your child's recent health problem and your referral to see the hospital specialist, did you have to go back and see your GP for the same health problem while you were waiting for your child's appointment?

Yes ☐ No ☐

If yes, please tell us how many times ☐☐

Q6 Has your GP visited your child at home about your health problem, since the referral?

Yes ☐ No ☐

If yes, please tell us how many times ☐☐

Q7 Were you visited by someone from any other service about your child's health problem? (for example by the district nurse)

Yes ☐ No ☐

If yes, please specify in Q8

If no, carry on to Q9

Q8 Were you visited by ...

District nurse?	Yes	☐	Number of times	☐☐
Practice nurse?	Yes	☐	Number of times	☐☐
Home care?	Yes	☐	Number of times	☐☐
Meals on wheels?	Yes	☐	Number of times	☐☐

Other ☐ *please state in boxes below*

1. *other*	Yes	☐	Number of times	☐☐
2. *other*	Yes	☐	Number of times	☐☐
3. *other*	Yes	☐	Number of times	☐☐

Q9 Did you, or anyone accompanying you to the consultation with the hospital specialist, incur any travel costs?

write to the nearest £ what you thought your costs were in the boxes below

none	☐	£☐☐	taxi	☐	£☐☐
public transport	☐	£☐☐	other (*specify below*)	☐	£☐☐
private car	☐	£☐☐			

Q10 How long does it take to visit the hospital and return home again?
place a cross in one box only

up to 30 minutes	☐	30 minutes to 1 hour	☐
l to 2 hours	☐	3 to 4 hours	☐
5 to 6 hours	☐	longer than 6 hours	☐

Q11 Since being referred to the specialist for your child's health problem did you have to buy anything special? (e.g. clothing, foods, dressings)

Yes ☐ No ☐

How much to the nearest pound did you have to spend? £☐☐☐
What did you buy?

Q12 Did you, or anyone accompanying you, have to take time off work?

Yes ☐ *If Yes, please complete Q13*
No ☐ *If No, please go to Q14*

Q13 Did either you or your companion lose any pay?

Yes ☐ *If yes fill in how much below to the nearest £, if no carry on to the next question*
No ☐

You	£☐☐☐
Your companion	£☐☐☐

Q14 Did you, or anyone accompanying you, take annual leave in order to attend your child's appointment with the specialist?

	you	*your companion*
Yes	☐	☐
No	☐	☐

Q15 Did you, or anyone accompanying you, have to miss any activity or routine responsibility, other than work, in order to attend your child's appointment?

Yes ☐ *If 'Yes', please cross the appropriate box below*
No ☐ *If 'No' go to Ql6*

If 'Yes', was the activity ...

a social occasion or pastime ☐
picking up or dropping off children at school ☐
other ☐
Please specify other in box

Q16 If you, or a person attending with you, had to make special arrangements for childcare did it cost you anything?

Yes ☐ *please tell us to the nearest how much in the boxes* £ ☐☐☐
No ☐ *If you answered No please go to the next question*

Q17 As a result of your child seeing the specialist, was your child *Please place a cross in all boxes that apply*

given a prescription ☐

put on a waiting list for surgery ☐

discharged or told the specialist did not need to see you again ☐

given a further appointment to see the specialist ☐

sent for complementary medicine (e.g. osteopathy, acupuncture) ☐

sent for an x-ray, scan or other test or examination, given injections, given bandages ☐

sent for therapy (e.g. physiotherapy) ☐

other *please specify other in box below*

Q18 If you have any comments about the consultation, write them in the box below *continue overleaf if required*

Patient Identifier

Virtual Outreach Project

Patient Questionnaire 2 (Adult – teleconsultation)

Please do not write your name anywhere on this questionnaire. All information provided is strictly confidential.

Please ensure this questionnaire is completed only by the patient to whom the letter was sent. If this is not possible this should be filled in with a relative or carer.

When answering these questions you will be asked to either place a cross in a box like this ☒ or enter numbers in the boxes.

Begin with Q2 below

Q2 Please enter today's date below

for example 1st March 1999 would be 01/03/1999

D	D	M	M	Y	Y	Y	Y

Now, we would like to ask some questions about the teleconsultation at your GP's surgery …

Q3 (a) How would you rate each of the following? (b) *place a cross in one box on each line*

	Excellent	Very good	Good	Fair	Poor
1. how long you waited to get an appointment	☐	☐	☐	☐	☐
2. convenience of the location of the hospital/clinic	☐	☐	☐	☐	☐
3. getting through to the hospital, surgery or project office by phone *If not applicable place a cross here*	☐	☐	☐	☐	☐
4. length of time waiting at the hospital/clinic	☐	☐	☐	☐	☐
5. time spent in the consultation with the doctor you saw	☐	☐	☐	☐	☐
6. ease of making/changing an appointment time *If not applicable place a cross here*	☐	☐	☐	☐	☐
7. convenience of day and/or time of appointment with the specialist	☐	☐	☐	☐	☐
8. personal manner (courtesy, respect, sensitivity, friendliness) of the reception staff	☐	☐	☐	☐	☐
9. waiting area and facilities	☐	☐	☐	☐	☐
10. attention given to what you had to say	☐	☐	☐	☐	☐
11. explanation of what was done for you	☐	☐	☐	☐	☐
12. the technical skills (the thoroughness, carefulness, competence) of the doctor you saw	☐	☐	☐	☐	☐
13. the personal manner (courtesy, respect, sensitivity, friendliness) of the doctor you saw	☐	☐	☐	☐	☐
14. the visit overall	☐	☐	☐	☐	☐

Q4 As a result of the teleconsultation at your GP's surgery, do you feel you are *place a cross in one box on each line*

	Much better	Better	Same or less	Not applicable
Able to cope with life	☐	☐	☐	☐
Able to understand your illness	☐	☐	☐	☐
Able to cope with your illness	☐	☐	☐	☐
Able to keep yourself healthy	☐	☐	☐	☐
	Much more	**More**	**Same or less**	**Not applicable**
Confident about your health	☐	☐	☐	☐
Able to help yourself	☐	☐	☐	☐

Do you have any additional comments? *please use the space below*

We would now like to ask you some questions about the costs of attending the GP's surgery for your teleconsultation with the hospital specialist …

Q5 Thinking about your recent health problem and your referral to see the hospital specialist, did you have to go back and see your GP for the same health problem while you were waiting for your appointment?

Yes ☐ No ☐

If yes, please tell us how many times ☐☐

Q6 Has your GP visited you at home about your health problem, since the referral?

Yes ☐ No ☐

If yes, please tell us how many times ☐☐

Q7 Were you visited by someone from any other service about your health problem? (for example by the district nurse)

Yes ☐ No ☐

If yes, please specify in Q8

If no, carry on to Q9

Q8 Were you visited by …

District nurse?	Yes	☐	Number of times	☐☐
Practice nurse?	Yes	☐	Number of times	☐☐
Home care?	Yes	☐	Number of times	☐☐
Meals on wheels?	Yes	☐	Number of times	☐☐

Other ☐ *please state in boxes below*

1. *other*	Yes	☐	Number of times	☐☐
2. *other*	Yes	☐	Number of times	☐☐
3. *other*	Yes	☐	Number of times	☐☐

Q9 Did you, or anyone accompanying you to the GP's surgery, incur any travel costs?

write to the nearest £ what you thought your costs were in the boxes below

none	☐	£☐☐	taxi	☐	£☐☐
public transport	☐	£☐☐	other (*specify below*)	☐	£☐☐
private car	☐	£☐☐			

Q10 How long does it take to visit the surgery and return home again?
place a cross in one box only

up to 30 minutes	☐	30 minutes to 1 hour	☐
l to 2 hours	☐	3 to 4 hours	☐
5 to 6 hours	☐	longer than 6 hours	☐

Q11 Since being referred to the specialist for your health problem, did you have to buy anything special? (e.g. clothing, foods, dressings)

Yes ☐ No ☐

How much to the nearest pound did you have to spend? £☐☐☐
What did you buy?

Q12 Did you, or anyone accompanying you, have to take time off work?

Yes ☐ *If Yes, please complete Q13*
No ☐ *If No, please go to Q14*

Q13 Did either you or your companion lose any pay?

Yes ☐ *If yes fill in how much below to the nearest £, if no carry on to the next question*
No ☐

You	£☐☐☐
Your companion	£☐☐☐

Q14 Did you, or anyone accompanying you, take annual leave in order to attend your appointment with the specialist?

	you	*your companion*
Yes	☐	☐
No	☐	☐

Q15 Did you, or anyone accompanying you, have to miss any activity or routine responsibility, other than work, in order to attend your appointment?

Yes ☐ *If 'Yes', please cross the appropriate box below*
No ☐ *If 'No' go to Ql6*

If 'Yes', was the activity …

a social occasion or pastime ☐
picking up or dropping off children at school ☐
other ☐
Please specify other in box

☐

Q16 If you, or a person attending with you, had to make special arrangements for childcare did it cost you anything?

Yes ☐ *please tell us to the nearest how much in the boxes* £ ☐☐☐
No ☐ *If you answered No please go to the next question*

Q17 As a result of seeing the specialist, were you *Please place a cross in all boxes that apply*

given a prescription ☐

put on a waiting list for surgery ☐

discharged or told the specialist did not need to see you again ☐

given a further appointment to see the specialist ☐

sent for complementary medicine (e.g. osteopathy, acupuncture) ☐

sent for an x-ray, scan or other test or examination, given injections, given bandages ☐

sent for therapy (e.g. physiotherapy) ☐

other *please specify other in box below*

☐

Q18 If you have any comments about the consultation, write them in the box below *continue overleaf if required*

☐

Patient Identifier

Virtual Outreach Project

Patient Questionnaire 2 (Child – teleconsultation)

Please do not write your name anywhere on this questionnaire. All information provided is strictly confidential.

This questionnaire is for patients under 16 years old and should be completed by a parent or guardian.

When answering these questions you will be asked to either place a cross in a box like this ☒ or enter numbers in the boxes.

Begin with Q2 below

Q2 Please enter today's date below

for example 1st March 1999 would be 01/03/1999

D	D	M	M	Y	Y	Y	Y

Now, we would like to ask some questions about the teleconsultation at your GP's surgery …

Q3 (a) How would you rate each of the following? (b) *place a cross in one box on each line*

	Excellent	Very good	Good	Fair	Poor
1. how long you waited to get an appointment	☐	☐	☐	☐	☐
2. convenience of the location of the hospital/clinic	☐	☐	☐	☐	☐
3. getting through to the hospital, surgery or project office by phone *If not applicable place a cross here*	☐	☐	☐	☐	☐
4. length of time waiting at the hospital/clinic	☐	☐	☐	☐	☐
5. time spent in the consultation with the doctor you saw	☐	☐	☐	☐	☐
6. ease of making/changing an appointment time *If not applicable place a cross here*	☐	☐	☐	☐	☐
7. convenience of day and/or time of appointment with the specialist	☐	☐	☐	☐	☐
8. personal manner (courtesy, respect, sensitivity, friendliness) of the reception staff	☐	☐	☐	☐	☐
9. waiting area and facilities	☐	☐	☐	☐	☐
10. attention given to what you had to say	☐	☐	☐	☐	☐
11. explanation of what was done for you	☐	☐	☐	☐	☐
12. the technical skills (the thoroughness, carefulness, competence) of the doctor you saw	☐	☐	☐	☐	☐
13. the personal manner (courtesy, respect, sensitivity, friendliness) of the doctor you saw	☐	☐	☐	☐	☐
14. the visit overall	☐	☐	☐	☐	☐

Q4 As a result of the teleconsultation at your GP's surgery do you feel you are *place a cross in one box on each line*

	Much better	Better	Same or less	Not applicable
Able to cope with life	☐	☐	☐	☐
Able to understand your child's illness	☐	☐	☐	☐
Able to cope with your child's illness	☐	☐	☐	☐
Able to keep your child healthy	☐	☐	☐	☐
	Much more	More	Same or less	Not applicable
Confident about your child's health	☐	☐	☐	☐
Able to help your child	☐	☐	☐	☐

Do you have any additional comments? *please use the space below*

We would now like to ask you some questions about the costs of attending the GP's surgery for your teleconsultation with the hospital specialist.

Q5 Thinking about your child's recent health problem and your referral to see the hospital specialist, did you have to go back and see your GP for the same health problem while you were waiting for your child's appointment?

Yes ☐ No ☐

If yes, please tell us how many times ☐☐

Q6 Has your GP visited your child at home about your health problem, since the referral?

Yes ☐ No ☐

If yes, please tell us how many times ☐☐

Q7 Were you visited by someone from any other service about your child's health problem? (for example by the district nurse)

Yes ☐ No ☐

If yes, please specify in Q8

If no, carry on to Q9

Q8 Were you visited by …

District nurse?	Yes	☐	Number of times	☐☐
Practice nurse?	Yes	☐	Number of times	☐☐
Home care?	Yes	☐	Number of times	☐☐
Meals on wheels?	Yes	☐	Number of times	☐☐

Other ☐ *please state in boxes below*

1. *other*	Yes	☐	Number of times	☐☐
2. *other*	Yes	☐	Number of times	☐☐
3. *other*	Yes	☐	Number of times	☐☐

Q9 Did you, or anyone accompanying you to the GP's surgery, incur any travel costs?

write to the nearest £ what you thought your costs were in the boxes below

none	☐	£☐☐	taxi	☐	£☐☐
public transport	☐	£☐☐	other (specify below)	☐	£☐☐
private car	☐	£☐☐			

Q10 How long does it take to visit the surgery and return home again?
place a cross in one box only

up to 30 minutes	☐	30 minutes to 1 hour	☐
l to 2 hours	☐	3 to 4 hours	☐
5 to 6 hours	☐	longer than 6 hours	☐

Q11 Since being referred to the specialist for your child's health problem did you have to buy anything special? (e.g. clothing, foods, dressings)

Yes ☐ No ☐

How much to the nearest pound did you have to spend? £☐☐☐
What did you buy?

Q12 Did you, or anyone accompanying you, have to take time off work?

Yes ☐ *If Yes, please complete Q13*
No ☐ *If No, please go to Q14*

Q13 Did either you or your companion lose any pay?

Yes ☐ *If yes fill in how much below to the nearest £, if no carry on to the next question*
No ☐

You	£☐☐☐
Your companion	£☐☐☐

Q14 Did you, or anyone accompanying you, take annual leave in order to attend your child's appointment with the specialist?

	you	*your companion*
Yes	☐	☐
No	☐	☐

Q15 Did you, or anyone accompanying you, have to miss any activity or routine responsibility, other than work, in order to attend your child's appointment?

Yes ☐ *If 'Yes', please cross the appropriate box below*
No ☐ *If 'No' go to Ql6*

If 'Yes', was the activity …

a social occasion or pastime ☐
picking up or dropping off children at school ☐
other ☐
Please specify other in box

Q16 If you, or a person attending with you, had to make special arrangements for childcare did it cost you anything?

Yes ☐ *please tell us to the nearest how much in the boxes* £ ☐☐☐
No ☐ *If you answered No please go to the next question*

Q17 As a result of your child seeing the specialist, was your child *Please place a cross in all boxes that apply*

given a prescription ☐

put on a waiting list for surgery ☐

discharged or told the specialist did not need to see you again ☐

given a further appointment to see the specialist ☐

sent for complementary medicine (e.g. osteopathy, acupuncture) ☐

sent for an x-ray, scan or other test or examination, given injections, given bandages ☐

sent for therapy (e.g. physiotherapy) ☐

other *please specify other in box below*

Q18 If you have any comments about the consultation, write them in the box below *continue overleaf if required*

Appendix 6

Patient questionnaire 3 (Adult and Child)

Patient Identifier

Virtual Outreach Project

Patient Questionnaire 3 (Adult)

Please do not write your name anywhere on this questionnaire.

All information provided is strictly confidential.

Please ensure this questionnaire is completed only by the patient to whom the letter was sent. If this is not possible it should be filled in with a relative or carer.

Please answer all the questions in the correct order by placing a cross in the appropriate box(es) like this …. ☒

Begin with the question at the top of the next page.

Thank you very much for your help.

Now we want to ask you about your health in the last 4 weeks. This information will help keep track of how you feel and how well you are able to do your usual activities. Please answer every question by marking one box. If you are unsure about how to answer, please give the best answer you can.

Q2 In general would you say your health is: (*Please put a cross in one box*)

Excellent ☐
Very good ☐
Good ☐
Fair ☐
Poor ☐

Q3 The following questions are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much? (*Please put a cross in one box on each line*)

Moderate activities, lifting or carrying shopping, pushing a vacuum cleaner or playing golf

Yes, limited a lot ☐ Yes, limited a little ☐ No, not limited at all ☐

Climbing **several flights of** stairs

Yes, limited a lot ☐ Yes, limited a little ☐ No, not limited at all ☐

Q4 During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health? (*Please put a cross in one box on each line*)

Accomplished less than you would like	Yes	☐	No	☐
Were limited in the **kind** of work or other activities	Yes	☐	No	☐

Q5 During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)? (*Please put a cross in one box on each line*)

Accomplished less than you would like	Yes	☐	No	☐
Didn't do work or other activities as carefully as usual	Yes	☐	No	☐

Q6 During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)? (*Please put a cross in one box*)

Not at all ☐ A little bit ☐ Moderately ☐ Quite a bit ☐
Extremely ☐

The next questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling.

Q7 How much of the time during the past week … (*Please put a cross in one box on each line*)

	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
Have you felt calm and peaceful?	☐	☐	☐	☐	☐	☐
Did you have a lot of energy?	☐	☐	☐	☐	☐	☐
Have you felt downhearted and low?	☐	☐	☐	☐	☐	☐
Have you felt a happy person?	☐	☐	☐	☐	☐	☐

Q8 During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends and relatives)?
(*Please put a cross in one box*)

All of the time ☐ Most of the time ☐ Some of the time ☐
A little of the time ☐ None of the time ☐

Q9 Have you in the past six months received a home visit from a nurse?

Yes ☐ No ☐ Don't know ☐

Q10 If yes, how many times did the nurse visit?

1 ☐ 2–3 ☐ 4–5 ☐ 5–10 ☐ More than 10 ☐
Don't know ☐

Q11 Have you in the past six months received a visit from a health visitor?

Yes ☐ No ☐ Don't know ☐

Q12 If yes, how many times did the health visitor visit?

1 ☐ 2–3 ☐ 4–5 ☐ 5–10 ☐ More than 10 ☐
Don't know ☐

Q13 Have you attended accident & emergency or been admitted to any hospital in the last six months?

Yes ☐ If 'yes' please state which hospital(s) in the box below
No ☐

Q14 Have you attended any hospital as an outpatient in the last six months?

Yes ☐ If 'yes' please state which hospital(s) in the box below
No ☐

Please make any additional comments below ….

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Patient Identifier

Virtual Outreach Project

Patient Questionnaire 3 (Child)

Please do not write your name anywhere on this questionnaire.

All information provided is strictly confidential.

This questionnaire should be completed by the parent or guardian.

Please answer all the questions in the correct order by placing a cross in the appropriate box(es) like this … ☒

Begin with Q2. Thank you very much for your help.

This section asks about your child's health and well being. Your individual answers will not be shared with anyone. Certain questions may look alike but each one is different. Some questions ask about problems your child may not have. That's great, but it's important for us to know. Please answer each question. There are no right or wrong answers. If you are unsure how to answer a question, please give the best answer you can and make a comment in the margin. All comments will be read, so please feel free to make as many as you wish.

Q2 In general would you say your child's health is: (Please put a cross in one box)

Excellent ☐ Very good ☐ Good ☐ Fair ☐ Poor ☐

Q3 During the past four weeks, has your child been limited in any of the following activities due to health problems? (*place a cross in one box on each line*)

	Yes, limited a lot	Yes, limited some	Yes, limited a little	No, not limited
Doing things that take a lot of energy, such as playing soccer or running?	☐	☐	☐	☐
Doing things that take some energy, such as riding a bike or skating?	☐	☐	☐	☐
Bending, lifting or stooping?	☐	☐	☐	☐

Q4 During the past four weeks, has your child been limited in the AMOUNT of time he/she could spend on schoolwork or activities with friends due to EMOTIONAL difficulties or problems with his/her BEHAVIOUR? (*place a cross in one box only*)

Yes, limited a lot ☐ Yes, limited some ☐ Yes, limited a little ☐
No, not limited ☐

Q5 During the past four weeks, has your child been limited in the KIND of schoolwork or activities he/she could do with friends due to problems with his/her PHYSICAL health?
(*place a cross in one box only*)

Yes, limited a lot ☐ Yes, limited some ☐ Yes, limited a little ☐
No, not limited ☐

Q6 During the past four weeks, how often has your child had bodily pain or discomfort?

None of the time	Once or twice	A few times	Fairly often	Very often	Every or almost every day
☐	☐	☐	☐	☐	☐

Below is a list of items that describe children's behaviour or problems they sometimes have.

Q7 How often during the past four weeks did each of the following statements describe your child?
(*please place a cross in one box on each line*)

	Very often	Fairly often	Sometimes	Almost never	Never
Argued a lot	☐	☐	☐	☐	☐
Had difficulty concentrating or paying attention	☐	☐	☐	☐	☐
Lied or cheated	☐	☐	☐	☐	☐

Q8 Compared to other children your child's age, in general would you say his/her behaviour is:

Excellent	☐
Very good	☐
Good	☐
Fair	☐
Poor	☐

Q9 During the past four weeks how much of the time do you think your child:
(*please place a cross in one box on each line*)

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
Felt lonely?	☐	☐	☐	☐	☐
Acted nervous?	☐	☐	☐	☐	☐
Acted bothered or upset?	☐	☐	☐	☐	☐

The following ask about your child's satisfaction with self, school and others. It may be helpful if you keep in mind how other children your child's age might feel about these areas.

Q10 During the past four weeks, how satisfied do you think your child has felt about:
(*please place a cross in one box on each line*)

	Very satisfied	Somewhat satisfied	Neither satisfied or dissatisfied	Somewhat dissatisfied	Very dissatisfied
his/her school ability?	☐	☐	☐	☐	☐
his/her friendships?	☐	☐	☐	☐	☐
his/her life overall?	☐	☐	☐	☐	☐

Q11 How true or false is the statement for your child? (*please place a cross in one box on each line*)

	Definitely true	Mostly true	Don't know	Mostly false	Definitely false
My child seems to be less healthy than other children I know	☐	☐	☐	☐	☐
My child has never been seriously ill	☐	☐	☐	☐	☐
I worry about my child's health more than other people worry about their children's	☐	☐	☐	☐	☐

Q12 Compared to one year ago, how would you rate your child's health?

- Much better now than 1 year ago ☐
- Somewhat better than 1 year ago ☐
- About the same now as 1 year ago ☐
- Somewhat worse now than 1 year ago ☐
- Much worse now than 1 year ago ☐

Q13 During the <u>past 4 weeks</u>, how MUCH emotional worry or concern did each of the following cause YOU? (*please place a cross in one box on each line*)

	None at all	A little bit	Some	Quite a bit	A lot
Your child's physical health	☐	☐	☐	☐	☐
Your child's emotional well being or behaviour	☐	☐	☐	☐	☐

Q14 During the <u>past 4 weeks</u>, were you LIMITED in the amount of time YOU have for your own needs because of: (*please place a cross in one box on each line*)

	None at all	A little bit	Some	Quite a bit	A lot
Your child's physical health?	☐	☐	☐	☐	☐
Your child's emotional well being or behaviour?	☐	☐	☐	☐	☐

Q15 During the <u>past 4 weeks</u>, how often has your child's health or behaviour (*please place a cross in one box on each line*)

	Very often	Fairly often	Sometimes	Almost never	Never
Limited the types of activities you could do as a family?	☐	☐	☐	☐	☐
Interrupted various everyday family activities (eating meals, watching TV)?	☐	☐	☐	☐	☐

Q16 Sometimes families may have difficulty getting along with one another. They do not always agree and they may get angry. In general, how often would you rate your family's ability to get along with one another?

- Excellent ☐
- Very good ☐
- Good ☐
- Fair ☐
- Poor ☐

Q17 Have you ever been told by a teacher, school official, doctor or other health professional that your child has any of the following conditions? (*please place a cross in one box on each line*)

	Yes	No
Anxiety problems	☐	☐
Asthma	☐	☐
Attentional problems	☐	☐
Behavioural problems	☐	☐
Chronic allergies or sinus trouble	☐	☐
Chronic orthopaedic, bone or joint problems	☐	☐
Chronic respiratory, lung or breathing trouble (NOT ASTHMA)	☐	☐
Chronic rheumatic disease	☐	☐
Depression	☐	☐
Developmental delay or learning difficulties	☐	☐
Diabetes	☐	☐
Epilepsy (seizure disorder)	☐	☐
Hearing impairment or deafness	☐	☐
Learning problems	☐	☐
Sleep disturbance	☐	☐
Speech problems	☐	☐
Vision problems	☐	☐

Q18 Does your child have any chronic medical condition that is affecting what they do or how they feel?

Yes ☐ No ☐

(*Please describe in box below*)

Q19 Has your child attended or been admitted to any hospital in the last six months?

Yes ☐ If 'yes' please state which hospital(s) in the box below
No ☐

Q20 Have you in the past six months received a visit from a health visitor?

Yes ☐ No ☐ Don't know ☐

Q21 If yes, how many times did the nurse visit?

1 ☐ 2–3 ☐ 4–5 ☐ 5–10 ☐ More than 10 ☐
Don't know ☐

Q22 Has your child attended any hospital as an out-patient in the last six months?

Yes ☐ No ☐

Appendix 7

Collection of routine prescription cost data

EMIS version 5® data collection

Access to the system

In order to carry out the data collection exercise it is necessary to be given high-level access to the practice computer system.

What is needed in advance

A list of trial patients from the GP practice where data are being collected. This allows data collection to be limited to those patients in the trial who, by virtue of their participation, have given their consent. It is also useful to have their date of birth and possibly their address for cases where there may be ambiguity about correct patient identification (e.g. if the name is shared with another patient at the practice). The person collecting the data should also take a form where they can record each patient's practice ID against their trial ID. Floppy disks are needed to save collected data.

Creating a 'tag'

This is done to identify patients in the practice who are participating in the trial. A code (field) is created in EMIS, which can be used to identify patients in the virtual outreach trial. Data collection is then limited to these patients.

- MAIN MENU
- SELECT: **DT** Dictionaries and templates
- SELECT: **C** Codes/Templates/Protocols
- SELECT: **M** Advanced code management
- SELECT: **F** Create a new code
- SELECT: **J** Administration
- **F4** *See note on function keys*
- SELECT: **B** Research
- **<Insert>** Insert key on keyboard
- ENTER NEW RUBRIC: **'Pt in Telemed Trial'** Text identifier for code
- SELECT: **C** Just a code
- 1st Synonym: **VO1**

Tagging a patient

- MAIN MENU
- SELECT: **MR** Medical records

Which patient?

Type in the patient's surname and choose the correct patient from the list of patients sharing that surname. Where a surname is common it is often better to search on date of birth.

- SELECT: **A** Add data
- ENTRY: **VO1** <RETURN>
- TEXT: <RETURN>
- ENTER AS PROBLEM (Y/N): **N** <RETURN> N is default
- F1
- F5

Repeat the above steps until all patients have been tagged.

Searching

- Main Menu
- SELECT: **ST** Search and statistics
- SELECT: **B** Patient searches
- SELECT: **A** Build and perform a new search
- SELECT: **B** Perform search on all patients, including those who have left/died
- SELECT: **A** Add feature
- SELECT: **CC** Classification codes
- ENTRY: **VO1** <RETURN>
- <RETURN> To accept
- SELECT: **A** There will be no date range applied to the search
- ENTRY: **N** Include currently active problems only? (Y/N)
- SELECT: **A** Shared
- <RETURN>
- ENTRY: **Y** Are these features correct? (Y/N)
- ENTRY: Search title (e.g. vo1 14.5.2001) <RETURN>
- ENTRY: **2** Select directory to store search (one-off search file)
- ENTRY: **Y** Do you wish to run the search now? (Y/N)

When the search has been performed and named, a new menu offers a number of options.

Once a search has been performed it is possible to repeat it (using the name it has been given).

Search reports

Two search reports are required for the analysis of prescription data. First, a report of patients' names and addresses that allows practice IDs to be matched to trial IDs. The cost data are obtained via the prescription cost report. For this report, a date range needs to be set: the start date should be 6 months before the earliest patient's index consultation and the end date should be today's date (or the day before if EMIS does not allow this). This report takes several minutes to generate.

- Patient Searches menu
- SELECT: **S** Search results
- ENTRY: **2** One-off search file
- ENTRY: Number corresponding to search title
- SELECT: **B** Names and addresses
- SELECT: **8** Save to disk (text with layout)

Default directory is: C:\ESPOOL\DEFAULT.txt
Change to: A:\surgery name.txt

If the search is being undertaken at a terminal other than the practice server, then it may not be possible to save directly to a floppy disk. Saving to the clipboard and pasting into Microsoft Word® or Microsoft WordPad® is an acceptable alternative.

- Patient Searches menu
- SELECT: **S** Search results
- ENTRY: **2** One-off search file
- ENTRY: Number corresponding to search title
- SELECT: **J** Prescription cost report
- SELECT: **R** Run report and export to disk
- ENTRY: set start date (e.g. 28.09.1998)

Default directory is: C:\ESPOOL\DEFAULT.csv
Change to: A:\surgery name.csv

This file can then be exported using the CSV (comma separated variable file) or Excel format. If difficulty is experienced in setting the correct filepath for a floppy, and/or locating the file on the local hard drive, the data can be saved to the clipboard. A clipboard file can then be saved on the local hard drive and exported to a floppy disk. The contents of this file can then be imported into a Microsoft Excel file.

Notes on function keys

F1 BACK A SCREEN
F2 FIND A CODE
F4 'FIND' KEY
F5 CHANGE PATIENT

Appendix 8

Staff who participated in the trial

London

Hospital Specialists
Mr Mahmoud Al-Akraa
Dr Pierre Bouloux
Mr Tim Briggs
Dr Owen Epstein
Mr Nick Garlick
Mr Nick Goddard
Dr Inam Haq
Mr Amir Kaisary
Mr Robert Morgan
Mr Robert Quiney
Mr Mike Stearns
Dr Roger Wolman

Hospital Secretaries
Ms Alison Bell
Ms Marva Brown
Ms Colette Durcan
Ms Liz Scott
Ms Lisa Thane
Ms Sylvie Vingoe
Ms Norma White

Hospital Nurses
Ms Margaret Cummings
Ms Anna-Maria Kennedy
Ms Nina Shaw
Mr Nick Simmonds
Ms Geetha Somrah

Hospital Receptionists
Ms Ann Goodall
Ms Mary Herman
Ms Coretta Hyatt
Ms Beth Jacobs
Ms Phyl Odd

Other Hospital Staff
Mr Steve Ashmore
Ms Jill Brook
Ms Jacki Edwards
Mr Peter Goulton
Ms Bernadette Lobo
Ms Angela Mcguire
Ms Rachel Ryan
Ms Sonia Summerbell

General Practitioners
Dr Miranda Abraham
Dr Rajnikant Acharya
Dr N Andrawis
Dr Eric Ansell
Dr A Antoniou
Dr Nicky Beck
Dr Annette Bendor
Dr John Bentley
Dr Paul Blom
Dr Hoda Botros
Dr Surendar Brar
Dr Helen Bygrave
Dr Claire Chalmers-Watson
Dr Harry Chester
Dr Caroline Crockard
Dr Sarah Davey
Dr Cristina Davis
Dr Charles Edmondson
Dr Martin Foley
Dr Samantha Foster
Dr Karen Fraser
Dr Barbara Frosh
Dr Brian Golden
Dr Andrew Goodstone
Dr Nicholas Graham
Dr Stephen Graham
Dr Tina Grimble
Dr Lucia Grun
Dr Helen Halpern
Dr Clare Halsted
Dr Jane Higgins
Dr Simon Hodes
Dr Kathy Hoffman
Dr John Horton
Dr Alexis Ingram
Dr Lesley Isenberg
Dr Rhian Jones
Dr T Kelly
Dr Eunice Laleye
Dr Jane Lim
Dr Julia Lim
Dr Doris Lister
Dr Vivienne Manheim
Dr Claire Manktelow
Dr Margaret McCollum
Dr Kokila Mehta
Dr Richard Mendall
Dr Sarah Morgan
Dr Irwin Nazareth
Dr Helen Parkes
Dr Sarah Robins
Dr Peter Rudge
Dr Mahesh Saini
Dr Jeremy Sandford
Dr Hilary Shaw
Dr Jonathan Sheldon
Dr Joe Slesenger
Dr Charlotte Smailes
Dr Liam Smeeth
Dr Sarah Smith
Dr Teresa Smith
Dr Peter Soutter
Dr Robert Speight
Dr Thomas Strommer
Dr Andrew Stuart
Dr Barry Subel
Dr David Thompson
Dr D Twena
Dr Tony Uzoka
Dr Paul Wallace
Dr Adrian N Wayne
Dr Mary Windle
Dr Paul Wiseman
Dr Stuart Wolfman

General Practice Staff
Ms Maureen Aldridge
Ms Pauline Atkinson
Mr Michael Cahalan
Ms Theresa Callum
Mrs Beverly Clark
Ms Joan Costello
Ms Jane Davis
Ms Pauline Dudman
Ms Gail Green
Ms Tracey Grossman
Ms Chris Hayward
Mr Nick Hooker
Ms Yvonne Less
Mr Mike Mair
Ms Maura McAssery
Mr Michael Morton
Ms Cindy O'Garo
Ms Ethel Orr
Mr John Orr
Ms Jill Stephens
Ms Virginia Woods

Shrewsbury

Hospital Specialists

Mr Andrew Hay
Dr David Maxton
Mr Bill Neil, Consultant
Dr Simon Nightingale
Dr Warren Perks
Mr Andrew Prichard
Dr Mark Smith
Dr Bob Wilson

Outpatient Department
Nursing staff
Medical Secretaries
Appointments and Medical
Records staff

Members of the IT Group

General Practitioners (by practice)

Bishops Castle
Dr John Campbell
Dr Adrian Fairbanks
Dr Nick Howell
Dr Adrian Penny
Dr Clare Stanford

Caxton Surgery, Oswestry
Dr Michael Arthur
Dr David Campbell
Dr Alastair Mackereth
Dr Paul Middleton
Dr Hilary Rees

Clive
Dr John Ballantyne
Dr Julia Bennett
Dr Geoff Davies

Church Stretton
Dr Jonathan Beach
Dr Jenny Howard
Dr Steve Novick
Dr Timothy Parker
Dr Karen Robinson
Dr Rachel Taylor
Dr Charles West
Dr Deborah West

Craven Arms
Dr David Appleby
Dr Philippa Winter

Knighton
Dr Kevin Howcroft
Dr Sue Lambert

Llanfair Caereinion
Dr Anthony Evans
Dr Alun Jones-Evans
Dr Lesley Milne
Dr Gillian O'Dwyer
Dr Patrick O'Dwyer

Llanfyllin
Dr Huw Evans
Dr Richard Griffiths
Dr Marcia Hancorn
Dr Peter Jones
Dr Melanie Plant
Dr Adrian Weston

Montgomery
Dr Simon Currin
Dr Donna Griffiths
Dr Patricia Lindsay
Dr Ainsley Reid
Dr Ann Welton
Dr John Wynn-Jones

Newtown
Dr Richard Evans
Dr Steve James
Dr Margaret Jones
Dr Tim McVey
Dr Chris Nevill
Dr Alan Porter
Dr Michael Wilson

Pontesbury
Dr Steve Edmunds
Dr Helen Hawkridge
Dr Julian Povey

Ty Maen, Oswestry
Dr Wendy Dyke
Dr David Loveday
Dr Ray McMurray
Dr Anthony Treasure
Dr Helen Willows

Willow Street, Oswestry
Dr Tim Breese
Dr Anthony St John Taylor

Worthen
Dr Tim Watson

Practice Managers and other practice administrative and support staff

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Professor John Brazier, Director of Health Economics, Sheffield Health Economics Group, School of Health & Related Research, University of Sheffield

Dr Andrew Briggs, Public Health Career Scientist, Health Economics Research Centre, University of Oxford

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Dr Andrew Farmer, Senior Lecturer in General Practice, Department of Primary Health Care, University of Oxford

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Professor F D Richard Hobbs, Professor of Primary Care & General Practice, Department of Primary Care & General Practice, University of Birmingham

Professor Peter Jones, Head of Department, University Department of Psychiatry, University of Cambridge

Professor Sallie Lamb, Research Professor in Physiotherapy/Co-Director, Interdisciplinary Research Centre in Health, Coventry University

Professor Julian Little, Professor of Epidemiology, Department of Medicine and Therapeutics, University of Aberdeen

Professor Stuart Logan, Director of Health & Social Care Research, The Peninsula Medical School, Universities of Exeter & Plymouth

Professor Tim Peters, Professor of Primary Care Health Services Research, Division of Primary Health Care, University of Bristol

Professor Ian Roberts, Professor of Epidemiology & Public Health, Intervention Research Unit, London School of Hygiene and Tropical Medicine

Professor Peter Sandercock, Professor of Medical Neurology, Department of Clinical Neurosciences, University of Edinburgh

Professor Mark Sculpher, Professor of Health Economics, Centre for Health Economics, Institute for Research in the Social Services, University of York

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Dr Jonathan Shapiro, Senior Fellow, Health Services Management Centre, Birmingham

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Dr Christine Hine, Consultant in Public Health Medicine, Bristol South & West Primary Care Trust

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Dr Simon de Lusignan, Senior Lecturer, Primary Care Informatics, Department of Community Health Sciences, St George's Hospital Medical School, London

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Dr John C Pounsford, Consultant Physician, North Bristol NHS Trust

Dr Vimal Sharma, Consultant Psychiatrist & Hon Snr Lecturer, Mental Health Resource Centre, Victoria Central Hospital, Wirrall

Dr L David Smith, Consultant Cardiologist, Royal Devon & Exeter Hospital

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Project Manager, World Confederation for Physical Therapy, London

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Information Unit, MIND – The Mental Health Charity, London

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Professor of Paediatric Epidemiology, London

Mr John Dunning,
Consultant Cardiothoracic Surgeon, Cardiothoracic Surgical Unit, Papworth Hospital NHS Trust, Cambridge

Mr Jonothan Earnshaw,
Consultant Vascular Surgeon, Gloucestershire Royal Hospital, Gloucester

Professor Martin Eccles,
Professor of Clinical Effectiveness, Centre for Health Services Research, University of Newcastle upon Tyne

Professor Pam Enderby,
Professor of Community Rehabilitation, Institute of General Practice and Primary Care, University of Sheffield

Mr Leonard R Fenwick,
Chief Executive, Newcastle upon Tyne Hospitals NHS Trust

Professor David Field,
Professor of Neonatal Medicine, Child Health, The Leicester Royal Infirmary NHS Trust

Mrs Gillian Fletcher,
Antenatal Teacher & Tutor and President, National Childbirth Trust, Henfield

Professor Jayne Franklyn,
Professor of Medicine, Department of Medicine, University of Birmingham, Queen Elizabeth Hospital, Edgbaston, Birmingham

Ms Grace Gibbs,
Deputy Chief Executive, Director for Nursing, Midwifery & Clinical Support Servs, West Middlesex University Hospital, Isleworth

Dr Neville Goodman,
Consultant Anaesthetist, Southmead Hospital, Bristol

Professor Alastair Gray,
Professor of Health Economics, Department of Public Health, University of Oxford

Professor Robert E Hawkins,
CRC Professor and Director of Medical Oncology, Christie CRC Research Centre, Christie Hospital NHS Trust, Manchester

Professor F D Richard Hobbs,
Professor of Primary Care & General Practice, Department of Primary Care & General Practice, University of Birmingham

Professor Allen Hutchinson,
Director of Public Health & Deputy Dean of ScHARR, Department of Public Health, University of Sheffield

Dr Duncan Keeley,
General Practitioner (Dr Burch & Ptnrs), The Health Centre, Thame

Dr Donna Lamping,
Research Degrees Programme Director & Reader in Psychology, Health Services Research Unit, London School of Hygiene and Tropical Medicine, London

Mr George Levvy,
Chief Executive, Motor Neurone Disease Association, Northampton

Professor James Lindesay,
Professor of Psychiatry for the Elderly, University of Leicester, Leicester General Hospital

Professor Rajan Madhok,
Medical Director & Director of Public Health, Directorate of Clinical Strategy & Public Health, North & East Yorkshire & Northern Lincolnshire Health Authority, York

Professor David Mant,
Professor of General Practice, Department of Primary Care, University of Oxford

Professor Alexander Markham,
Director, Molecular Medicine Unit, St James's University Hospital, Leeds

Dr Chris McCall,
General Practitioner, The Hadleigh Practice, Castle Mullen

Professor Alistair McGuire,
Professor of Health Economics, London School of Economics

Dr Peter Moore,
Freelance Science Writer, Ashtead

Dr Andrew Mortimore,
Consultant in Public Health Medicine, Southampton City Primary Care Trust

Dr Sue Moss,
Associate Director, Cancer Screening Evaluation Unit, Institute of Cancer Research, Sutton

Professor Jon Nicholl,
Director of Medical Care Research Unit, School of Health and Related Research, University of Sheffield

Mrs Julietta Patnick,
National Co-ordinator, NHS Cancer Screening Programmes, Sheffield

Professor Robert Peveler,
Professor of Liaison Psychiatry, University Mental Health Group, Royal South Hants Hospital, Southampton

Professor Chris Price,
Visiting Chair – Oxford, Clinical Research, Bayer Diagnostics Europe, Cirencester

Ms Marianne Rigge,
Director, College of Health, London

Dr Eamonn Sheridan,
Consultant in Clinical Genetics, Genetics Department, St James's University Hospital, Leeds

Dr Ken Stein,
Senior Clinical Lecturer in Public Health, Director, Peninsula Technology Assessment Group, University of Exeter

Professor Sarah Stewart-Brown,
Director HSRU/Honorary Consultant in PH Medicine, Department of Public Health, University of Oxford

Professor Ala Szczepura,
Professor of Health Service Research, Centre for Health Services Studies, University of Warwick

Dr Ross Taylor,
Senior Lecturer, Department of General Practice and Primary Care, University of Aberdeen

Mrs Joan Webster,
Consumer member, HTA – Expert Advisory Network

Feedback

The HTA Programme and the authors would like to know your views about this report.

The Correspondence Page on the HTA website (http://www.ncchta.org) is a convenient way to publish your comments. If you prefer, you can send your comments to the address below, telling us whether you would like us to transfer them to the website.

We look forward to hearing from you.

The National Coordinating Centre for Health Technology Assessment,
Mailpoint 728, Boldrewood,
University of Southampton,
Southampton, SO16 7PX, UK.
Fax: +44 (0) 23 8059 5639 Email: hta@soton.ac.uk
http://www.ncchta.org

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