

REPORT TO ALLAN BROOKING NHS TRAVEL FELLOWSHIP, 26TH
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PODIATRY TELECONFERENCING IN HONG KONG

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Introduction

The Sheffield Podiatry Service has low numbers of staff when benchmarked against similar services and in response has developed new and innovative approaches to practice (Moore et. al., 2003). This situation is similar to that experienced by other services whereby creative approaches are being sought in order to meet the needs of the population served. The purpose of this visit was to learn about a new approach to podiatry patient examination which has been developed in Hong Kong and bring this back to the UK for implementation.

There is an extremely low ratio of podiatry staff to population size in Hong Kong, with 17 public service-based podiatrists serving a population of 7 million (Corcoran, 2007). This service has developed a teleconferencing approach to meeting the needs of the local population who attend care centres/homes. In this, video technology is used to examine foot conditions remotely, enabling diagnoses to be made without face to face contact. 80% of such examinations are reported to be successful, with the remaining 20% requiring a face to face contact (Corcoran, 2007).

Teleconferencing approaches are not new, and have covered education (Coleman et. al., 2004, Hui et. al., 2004), counselling (Schopp et. al., 2006), rehabilitation (Ricker et. al., 2002), medical consultation (Balas et. al., 1997), clinical data transmission (Haufe, 1997, Myers, 2003), clinical supervision (Wood et. al., 2005) and conferencing (Eadie et. al., 2003). Previous use of teleconferencing has been used most commonly in the fields of psychiatry (Shore et. al., 2007), psychology (Schopp et. al., 2005), radiology (Ashkenazi et.al., 2007), cancer care (Delaney et.al., 2004), surgery (Mendez et.al., 2005), burn care (Nguyen et.al., 2004), dermatology (Norton et.al., 1997) and nursing (Chaffey, 1999). Developments outside the medical profession are however uncommon especially in relation to the Allied Health Professions and podiatry in particular. It was considered that the Hong Kong initiative would provide an opportunity to learn about the application of this technology in the more unusual and distinct context of podiatry practice. While anecdotally, it was believed that similar teleconferencing work has commenced in Australia, study of the Australian work was considered to not be as valuable as that undertaken in Hong Kong, being less accessible and currently unreported. Teleconferencing publications also available from Hong Kong (Hui, 2004a,b,c,d), suggested that the work there has a stronger foundation. Research data supporting the success of this initiative in podiatry was reported at a recent international podiatry conference (Corcoran, 2007).

The proposal for this award was to visit the Hong Kong Podiatry Service, to learn about its' teleconferencing facility, this being the only reported successful development of this type in the context of podiatry practice and the learning objectives intended from the proposal were as follows:

- To learn how to implement and utilise the teleconferencing system in relation to podiatry practice.
- To learn about the protocols for podiatric teleconferencing.
- To evaluate the benefits of this approach to diagnosis and assessment in podiatry practice.
- To understand the limitations and pitfalls and how these can be avoided within this system.

The primary perceived benefit to the NHS through gaining knowledge of this system was that of efficiency improvement, through the implementation of teleconferencing. By examining conditions remotely, it was envisaged that the professional could reduce time travelling to patients and as a result of this, could see greater patient numbers. An additional potential benefit was that this approach had been reported to offer improved convenience to patients (Corcoran, 2007). While this work has been developed by a podiatry service, it was believed that other related disciplines could benefit from these techniques and any equipment obtained for this purpose could therefore be shared across services to mutual advantage.

A number of local benefits through the implementation of teleconferencing were also anticipated for the awardees host PCT, as follows:

- Potential for increasing podiatry assessment numbers without incurring additional costs
- Reduced hospital admissions through early assessment
- Improved patient satisfaction
- Later adoption of the approach in other PCT-based services
- Job enrichment for podiatry staff involved in implementation
- Beneficial innovation for forthcoming Charter Mark (quality) assessment

Methodology

The visit to the Hong Kong podiatry service used two main techniques to gain the understandings required of teleconferencing in podiatry, namely:

- Semi-structured interviews with key players (staff involved with the development and day to day use of system both as operators and users of the system and carers translating on behalf of patient-users of the system)
- Field observations of teleconferencing sessions (at both operators and receivers terminals)

The data collected by the above methods was later transcribed and subjected to thematic analysis in order to produce the findings, which follow.

Findings

The visit to Hong Kong took place on 26th July – 2nd August 2008 as planned, in and around Sha Tin, where the teleconferencing system was being operated. During the visit, the following findings were elicited:

The history of teleconferencing in Hong Kong

Initial commencement in geriatric medicine In 1997/8, a problem was being experienced in which elderly patients were attending accident and emergency (A and E) departments with very minor problems because of the lack of availability of GP's to visit residential homes in which these patients resided. As a result of this, accident and emergency departments couldn't cope with the demands being placed on their services. The local geriatric services had resourcing issues and were unable to cover the nursing homes on a regular basis, thereby compounding this problem further. This problem became worse, because the A and E departments could not solve the problems of the attending elderly patients, leading to repeat attendances by those patients seeking help:

“we called it the revolving door”

In looking for solutions to this problem, the consultant in charge of geriatric medicine learned about the availability of video conferencing equipment, which could be used to enable “virtual” meetings to take place between individuals at a distance and perceived a use in reaching those patients who required such services. Charitable funds were found with which to purchase the necessary equipment and in 1998, the teleconferencing work commenced. After the initial purchase of the necessary equipment, a period of 1-2 months was required to commence this service. Teleconferencing was initially operated via an ISDN line and later converted to Broadband as this became available. Two teleconferencing machines were obtained – one at Sha Tin hospital (the operators end) and the other at the Guang Dong Care and Attention Home (the users end). Staff from many disciplines were invited to use the equipment and report on what they found could be achieved, what the limitations were and even what they found could definitely not be done with the equipment.

Start-up in podiatry As benefits of using the system were perceived, attempts were made to convince others of the value of this technology within health care. One such service was the podiatry service in Hong Kong. Severe manpower constraints were being experienced by the podiatry service, which had a mere 17-20 podiatrists for the whole population of Hong Kong (7 million). In the cluster in which teleconferencing was to be based, one podiatrist had a population of 1.3 million to cover, of which 12% (approximately 120,000) were aged 65 years and over and were potentially high users of podiatry services. This created extreme difficulties of meeting demand for foot care:

“I couldn't go to an elderly home every time somebody thought they had a foot problem”

The podiatry service was initially asked whether they had any use for the teleconferencing technology and as a result, the service head looked at publications on the use of

teleconferencing in the related field of dermatology, where good success was being reported. Through this, various areas in which teleconferencing could be of use to podiatry were defined and the system was subsequently introduced into the podiatry service. The podiatric use of teleconferencing began with a study in 2003, which ran for 6-9 months and measured the effectiveness and acceptability of teleconferencing (in podiatry). 100 patients were studied with 50 face to face visits and 50 teleconferencing taking place. In the study, the patients receiving a teleconferencing assessment were followed up within 24 hours with a face to face visit, to check the findings. The system was found to be both effective, cost effective and acceptable to the patients involved.

Subsequently Teleconferencing in Hong Kong has now been in place for over 10 years. It was reported as having improved greatly with the advent of Broadband in terms of smooth running and that the technology available now is much more advanced than that available 10 years ago. The system is currently used on a weekly basis by the geriatric doctors, however is just used on an ad hoc basis by the podiatry service, because manpower changes lead to a different priorities within the service. The system is recognised as beneficial across many areas of health care and the teams involved in its' use in Hong Kong have also won an outstanding team award for its' implementation there.

Uses elsewhere It was reported that teleconferencing has also been used in New Zealand, specifically in teledermatology and that there has also been some interest in teleconferencing in podiatry in Australia, where geographical spread is a major issue, requiring approaches such as the flying doctor service to meet the needs of patients in some areas. It was also reported that there is a group in France, who use a very basic telemedicine system, in which still digital photography is used to take images of conditions, which could be forwarded to the specialist (such as the podiatrist) for a distant diagnostic opinion

The uses of teleconferencing in Hong Kong

Teleconferencing was being put to a wide range of uses in Hong Kong and it was said that teleconferencing means different things to different people. It was also suggested that there are “*endless*” possibilities for telemedicine, implying that the potential has yet to be fully realised. The areas for which teleconferencing is already used in Hong Kong are listed in Table A. Stress was placed on the value of the teleconferencing equipment being used by as many different disciplines who are involved in health care as possible, which was said to justify the initial expenditure and optimise the value of holding the equipment to the organisation:

“My message is that if your hospital has this machine, you should encourage more parties to use it. If it is only for podiatry, you will need to work it really hard to justify spending the money, whereas if you get other departments involved, this will help the hospital administrators to justify the initial expenditure”.

Table A: Uses of teleconferencing in Hong Kong

General communication
Videoconferencing
Case conferences
Meetings
Communication
Urgent news/items
Diagnostic Assistance
E mail photo assessment
Direction of Treatment
Ambulance
Neurosurgery
Give staff care instructions (e.g. checking of pulse, follow up care requirements)
Arranging immediate/urgent follow up
Patient management modifications (e.g. medication changes)
Patient assessment
Diagnosis/Examination of patients
Neurological tests (e.g. monofilament)
Circulatory assessment (e.g. Doppler, A-B indices, colour change assessment)
Gait analysis
Footwear examination (including wear features and evaluation of internal debris)
Urgent assessment
Face to face consultation
Triage/screening
Education/training
Foot health education
Staff teaching (e.g. circulatory and neurological assessment)
Self care (e.g. in stroke rehabilitation, management of diabetes)
Patient exercise/training sessions
Multidisciplinary use
Geriatric use
Resource management
Substitute for the need for transport (especially in the frail elderly)
Sites of use
Residential homes
Community centres for old people.
Day centres
Hospitals

Groups said to potentially benefit from access to teleconferencing equipment included geriatricians, nursing staff, physiotherapists, occupational therapists, podiatrists speech therapists, psychiatrists and psycho-geriatricians. Note was made of the equipment being used to improve access to relatively unusual specialities, such as neurosurgeons, which aren't available in every hospital. Here, the example was given of neurosurgeons being consulted through the teleconferencing technology, when dealing with a difficult case, so that guidance could be given as to whether or not the patient would need to be sent to hospital, or whether they could be dealt with more locally.

Other examples were given of teleconferencing equipment being placed in ambulances, where consultants can talk the ambulance staff through what to do on their way to hospital, in an emergency. An important difference observed between podiatric examinations and medical consultations using the teleconferencing equipment was that podiatrists deal predominantly with physical manifestations which are observable and which need to be elicited through the medium of the equipment. The overall purpose of the equipment to podiatrists is to provide the facility to be able to view such conditions in detail at distant locations wherever they may be, thereby enabling the podiatrist to reach more of the population than otherwise possible. Because of podiatrists' particular requirements, it was essential that the equipment used would enable the feet to be examined in close up detail and here a specialised document camera was required. During the observation sessions, podiatrists were seen to examine and correctly diagnose problems within the interdigital area of patients toes, of the nails of the feet and to observe very fine detailed problems, such as small sites of necrosis on the foot, which would later require more detailed face to face examination.

Particular value was placed on the ability of teleconferencing systems to allow the urgent assessment of patients within a climate of extreme staff shortages. Here' where a residential home thought that a patient may be unfit for transfer to another site for examination, or where there were other issues of concern, then could phone and request an urgent assessment of that patient via teleconferencing. Where the need for an urgent follow-up, through a visit by the relevant professional (e.g. podiatrist), or for hospitalisation, this could be arranged immediately with the intervention commencing earlier than would otherwise be possible.

Teleconferencing equipment and facilities utilised

While consideration had initially been given to building a bespoke teleconferencing facility, consultation with an engineering department suggested that this would be difficult and would not produce any advantages over the commercial technologies freely available on the market. The only problems with the equipment have been of a minor technical nature and have related to the fact that the equipment is now over 10 years old. It was suggested that the purchase of new equipment would prevent any of the minor technical problems being experienced and because of improvements in technology, would bring about additional improvements in relation to image definition.

Core equipment requirements For podiatric purposes, the following equipment would be required for the basic functions involved in teleconferencing:

- A Broadband internet connection and/or a telephone line
- The actual teleconferencing system
- At the user-end, a camera and a document camera. The cameras should be capable of moving through a 90 degree range in order to change the view of the foot being examined
- At the user-end, a light unit
- A TV set
- A telephone
- A PC connected to the system (to allow the storage, reference and possible transmission of digital images, such as digital photographs)
- A printer

Two teleconferencing units were required – one for the operators and one for the users stations. The document camera, with its' higher resolution was stated to be essential for podiatry use, because of the need for podiatrists to consider small skin lesions in fine detail

Optional equipment availability Various peripheral items of equipment are available, which could be used to assist with the diagnostic process. It is now possible to connect Doppler, cardiac and blood pressure monitors, stethoscopes and endoscopy tools to the teleconferencing equipment, many of which would be of value in the podiatry examination process.

It was also possible to use other facilities, to assist with the general teleconferencing process as required. Specific examples given were the use of language line, where language difficulties were encountered and Skype telephones, allowing free telephone calls to be made, if required, although it was noted that the sound quality with Skype was not as good as with a conventional telephone. Additional items of equipment that were seen to be of use were a footstool for the patients' foot to rest on and a wheelchair to improve patient throughput.

Equipment cost In Hong Kong, the cost of an equipment unit (without document camera) was said to be £6-8,000 (50-100,000 HK Dollars). As an absolute minimum, two units would be required – one for the operator and one for the user site.

Implementation of teleconferencing

Implementation Implementation was stated to be a relatively simple task and even with the benefit of hindsight, those interviewed believed that they would take exactly the same approach, if implementing teleconferencing again. It was said to have taken two months to introduce teleconferencing once funds had been secured and once installed, the initial stage

was that of getting used to the equipment and making sure that both operators and users knew what to do. At the user end, an initial reluctance to use the equipment was encountered, but supportive training programmes were instigated and once staff became convinced that the equipment was easy to use, this ceased to be an issue. It was also found that each discipline had different uses for the equipment and as such, each discipline had to explore its' own potential use and limitations. It was also noted that the homes where teleconferencing was to be used needed to be selected carefully. Some homes were not believed to be capable of looking after the equipment properly in terms of security and protection from accidental damage and these were avoided when selecting a user site for teleconferencing. It was seen as important to have a designated treatment room in which to house the equipment, in which the practitioner would also see the patient when conducting an on-site visit. The service commenced with volunteer patients in the first instance and was also used initially for examination of the foot in diabetic complication screening.

Ethical considerations No ethical problems were encountered in teleconferencing as practiced in Hong Kong, although it was reported that there had been previous debate on this subject. The medico legal aspects of teleconferencing were reported to have been debated in-depth in Australia, during which many relevant bodies were consulted and the final view was said to have been that there were no ethical problems associated with teleconferencing in this context. It was stated that patients have the right to refuse to be seen with teleconferencing equipment and therefore have choice in whether to participate or not.

How to use podiatric teleconferencing once installed

Protocol considerations For the podiatric use of teleconferencing, initially, it is important to devise systematic protocols for the visual assessment of patients. This would be to ensure that nothing is missed in the assessment process. It was said that this would come naturally to those working with the equipment on a regular basis. Although not used in Hong Kong, it was believed that it would be possible to define the conditions that could and could not be seen using telemedicine. In the USA, conditions that medical doctors could be re-imbursed for in telemedicine have been defined by insurance companies and it was thought that there could be some merit in producing similar definitions linked to good practice protocols. It was repeatedly stated that one of the most important considerations in using the equipment, particularly in podiatry practice is to be able to recognise when something cannot be determined accurately using telemedicine and therefore when a face to face assessment would be required instead

Appointment systems Routine sessions are operated on a scheduled basis, in which the sessions involved are pre-arranged with patients being pre-booked as per any other clinic. The session is started with a telephone call to the home to advise that the operator is ready to commence the session and to request that the teleconferencing facility is switched on at the user-end. Although non-scheduled consultations are discouraged for the routine patients, it is also possible to have semi-urgent consultations - for example if someone on the geriatric physicians case list has developed a low fever, with chest involvement, the nurse on site may

wish to obtain a judgement as to whether or not the patient needs to go to the emergency department. Once the contact has been made from the home, a doctor at the operators end can undertake the semi-urgent consultation and arrange any necessary follow-up care, without the patient having needed to leave the home. As part of the protocol, such semi-urgent calls would be followed up with a telephone call from the operators end to verify that all is well with the patient. If a problem with a patient occurs between appointments, it is also possible for the practitioner involved to visit the patient directly in order to investigate the problem face to face with the patient. It was also recommended that teleconferencing could appropriately be alternated with visits to the residential home involved, to make sure that any problems that could only be picked up in the face to face situation aren't missed.

Appointment scheduling The geriatric physician sessions are typically scheduled regularly throughout the year, although these are seen as the minimum anticipated input using teleconferencing. The podiatry service now uses teleconferencing on an ad hoc basis because of further manpower constraints and changed working priorities. Physical examinations using teleconferencing take longer than the questioning required in the consultation process, therefore podiatry appointments take longer. The geriatric physician would generally take no longer than five minutes for a straight forward consultation, although the time would vary depending on whether the appointment was with a new or old patient to the system. Timed observations during a working session indicated that most patients were seen within two to four minutes.

Conversely, in the podiatry sessions, because of the physical examinations required, the average consultation time was known to be eight minutes. This still represented a considerably less time than the face to face on site examination, which took on average 30 minutes. There are, however some differences between face to face and teleconferencing examinations in that the teleconferencing examination would not involve hands on treatment and at the time of evaluation, equipment such as Doppler was not available as an add-on to the teleconferencing process, however could be used on site in the face to face setting. Although the assessment of new patients was not observed during the visit, this was stated to take up to 30 minutes of the podiatrists time.

Referrals In terms of referral for podiatry care, it is left to the staff in the elderly home, to refer a patient that they perceive has a foot problem, or potential foot problem. For the podiatry service, there is no further selection of patients as everyone with a foot problem who resides in the home could be seen as required.

Equipment operation Once the equipment has been turned on at both ends ready for use, it automatically sets itself for the session. The physical operation of the equipment, including the camera is controlled at the operators end, with staff at the user-end only having a passive role to play in relation to the equipment. At the operators end, two people are required – one practitioner undertaking the questioning of the patient/carers and the other doing electronic data entry. The patients clinical records will also be held/checked at the operators end.

For the podiatry use of equipment, experience has shown that details of the foot are more discernible when a white background is utilised. This consideration is not a requirement for the work of the geriatric physician, or other groups, who just require a general and less detailed image of the patient. At the same time, lighting adjustment was also very important and during the one of the observation sessions, this was seen to have a marked effect on image clarity. For gait analysis, it had been found that this was best undertaken with the camera as the patient was leaving the room.

Similarly, experience of working with the camera had led to greater understanding of how to work the camera optimally. The document camera is capable of a very close up view of the foot (within $\frac{3}{4}$ inch) and if required, it is possible to place a ruler by the side of the image for scale. This can be used in such a way as to set up the camera, scale and image in exactly the same position as the previous session in order allow comparison of these images, and monitoring of a lesion for signs of improvement or deterioration. It was known that it is best to move the camera as opposed to moving the patient for an improved view of the patients foot and that if a camera has linked images, it is not possible to focus on the leading (front) image. Similarly, it was found that shiny gloves will interfere with the camera image, therefore the recommendation was that assistants would need to gloves with a non-shiny finish so as not to impair the operators screen view.

Support roles Staff at the user-end are invaluable to the process and should be trained in how to do this type of work in order to optimise the approach. It was recommended that either one or two staff would be required at the user end and that it would be beneficial if that person has developed experience of working with the equipment and the specialist group involved (e.g. podiatrist) in order to maintain an awareness of what the practitioner is needing or even thinking about at each stage of the examination. It was stated that for podiatrists, an experienced foot care assistant (FCA) would be ideal, with teleconferencing allowing the required level of supervision for this grade of staff. In Hong Kong, nurses are predominantly used in this role. It was also explained that staff at the user-end will need some level of technical understanding of the equipment, or failing that, a checklist of the common problems encountered and what to do about these.

There is a wide range of activities that assistants can assist with at the user-end. This would commence with the preparation of patients in advance so that they are ready both physically and mentally for the session to take place. They may also assist in bringing the patient in front of the screen for the session (e.g. in a wheelchair) as required. Once the session commences, staff can present the patients history and comment on their current overall condition if required as well as presenting vital signs (body temperature, pulse rate, blood pressure and respiratory rate) and body weight for consideration, if required. Once familiar with the assessment process, they can assist with the systematic examination of the patient and could also help to check some conditions which aren't immediately discernible to the operator on screen (such as a loose toenail)

Documentation and record keeping As in any clinical work, it is essential that accurate and comprehensive records are kept. While it was said to not be necessary to record the whole session, this could be undertaken if required and it was stated that documentation of the session on the PC would represent best practice in this area. Electronic notes should be made at the end of each consultation and this would then allow the full patients history to be checked on the clinical management system at the start of the consultation

Security considerations There are some obvious security and privacy considerations with teleconferencing use, which need to be accounted for. These include data protection considerations and the need to use teleconferencing in a secure environment, where there is no possibility of audible access from outside the consultation. If any records are taken away from the process, these would need to be secured in an appropriate fashion.

Educational uses In addition to the clinical consultation of examination, the equipment was being used for the purposes of diabetic education. These classes were operated by nurses or research assistants, who would typically group together 10 diabetic patients and give them a series of educational classes a period of approximately eight weeks. Each week, the patients would attend the centre and connect with the staff via the teleconferencing system, when an important topic would be covered of relevance to their condition.

It was again stressed that the teleconferencing facility was for multi-disciplinary applications and that as such, would be best shared across all disciplines with a potential use for the equipment.

Client groups served

While teleconferencing can be used with many diverse groups, in Hong Kong, the focus was on the elderly. This was predominantly the frail elderly population, living in elderly homes and who would find difficulty being transported to external clinics. Teleconferencing provided this group with an alternative means of being cared for in their own (residential) homes. The facility was also being used in community centres for older people, although this group was reported as being more able-bodied. Other patient groups served by teleconferencing included patients with communication problems, where a nurse with a good understanding of the patients condition and needs would sit side by side with the patient and communicate on their behalf. The system was also being used successfully with psychiatric patients – specifically those who are demented or psychotic, who may be unable or unwilling to go to see a psychiatrist, yet would be comfortable participating in a non face to face teleconferencing consultation. It was stressed that those who would be capable of attending a clinic appointment should do so as opposed to as opposed to participating in the teleconferencing programme.

Level of use of the teleconferencing facility

At the time of the visit, the facility was being used predominantly by the geriatric physicians and on an ad hoc basis by the podiatrists, with requests being made from the home involved to see patients who had particular concerns regarding their foot health. The facility was based in one residential home with 260 beds. Physician sessions were scheduled for one particular day of the week and in one session, the physician reported seeing up to 20 patients, but more typically, 14/15. Two such sessions were held each week and it was estimated that approximately 1500 consultations were given using teleconferencing during the year. The physicians also reported that their teleconferencing usage had reduced, but only as a result of a new GP home visiting service being implemented. The podiatrists estimated that when used, 33% more patients could be seen using teleconferencing than in the face to face situation.

Positive aspects of teleconferencing

Many benefits and other positive aspects of teleconferencing were reported. These can be sub-divided into the following areas:

- Technological aspects
- Patient benefits
- Positive resource impact
- Staff benefits
- New methods of working
- Governance

Technological aspects It was widely reported that the equipment was easy and reliable to use. The sound and image quality were both good and satisfaction surveys suggested that the patients were satisfied with both these factors. The document camera was particularly singled out for its' image clarity and this camera was also reported to have a very good zoom function.

Patient benefits A wide range of patient benefits were reported. Firstly, that while teleconferencing has not replaced face to face consultations, the teleconferencing facility has allowed the services involved to reach more patients under their care:

“It allows us more penetration to the people who need the care. I’m not saying that telemedicine has replaced usual care, but it just gives a bit more flexibility for you to speak in an hour or so and you serve more people”

Linked to this, the teleconferencing has improved access for patients to the services involved. The patients and in some cases, their accompanying carers no longer need to travel for their care. In achieving this, treatment doesn't intrude as much into their time and social lives and they can also be saved the cost of transport. Importantly, where the frail elderly are concerned, they do not suffer the physical discomfort through having to make a relatively

long journey for their care and for all groups, the facility is more convenient than the alternatives. Studies undertaken with the teleconferencing facility have previously shown that over 90% of patients were happy with a teleconferencing consultation and that in over 80% of podiatry cases, it was an appropriate means of evaluating the patients condition. Major objections to a teleconference consultation have never been received and to the contrary, patients were reported to enjoy the process and to find it interesting.

Positive resource impact Teleconferencing approaches were reported to have made a beneficial impact in terms of resource savings. Where used, the significant cost of transport to hospital would not be required and by attending to the patients at distance and in one place, the practitioners time would also be used more productively. Where teleconferencing is not used, public service home staff would need to escort the patients to hospital and this in turn reduces the capacity of the staff left in the home, so such homes have welcomed teleconferencing as it helps their manpower situation in turn. Looking at the hospital clinical sessions, teleconferencing also has a beneficial effect on decreasing the numbers attending these clinics, thereby creating clinical space for other patients.

Staff benefits Health service staff using teleconferencing also reported benefits to themselves. The system was described as being both convenient and acceptable to staff, who were reported as being comfortable using the equipment and who enjoyed the convenience and the saving of travel time associated with teleconferencing.

“There is a time saving, and obviously there is the travelling time saved, too and it is just very convenient”

It was also reported by staff that they found the live interview and patient feedback aspects of teleconferencing to be valuable and gave the system added value over the simple use of digital photographs in distant diagnoses. The staff also found teleconferencing to be very helpful for group therapy sessions that they were involved in, with those patients involved in the group regularly using this as an opportunity to report their experiences and to express ideas for further development of the process.

Governance aspects A number of positive benefits of teleconferencing in the context of governance were apparent. It was stated that teleconferencing provided an equal level of care to patients with problems to that offered by traditional approaches, without compromise. It was also noted that while delivering care equal to traditional approaches, the teleconferencing facility also allowed early intervention through semi-urgent usage when patients had developed problems of potential concern. Where problems had developed, the teleconferencing facility also allowed monitoring of the condition through the ability to record images for comparison at subsequent re-assessment appointments. A final governance benefit was the ability to be able to deal with patients safely when outbreaks with the potential for cross infection had occurred in the home involved, which in turn helped to limit the spread of the outbreak.

Limitations A number of limitations of using teleconferencing as a diagnostic tool were identified. From a physicians perspective, it was noted that with the equipment currently in use, it was not possible to listen to a patients' chest directly, where a breathless patient is being examined. It was stated that it is important to realise what the limitations of teleconferencing are so that mistakes are not made and face to face consultations for physical examination purposes are appropriately made when believed to be required:

“but you have to know your limitations, so when something is not right, you have to say look that’s not right and I must see it”

It was suggested that it was important to know the patient before using the teleconferencing facility with them and that the assessment of new patients with the system could be difficult. This was because there was greater likelihood of missing something where there was limited familiarity, than when the patients' situation was already known and understood. The suggestion was made that the lack of familiarity with a patient would not be a contra-indication, but would instead require greater caution.

On the podiatry side, again some diagnostic limitations were noted. It was stated by respondents and also observed that where patients have limited toe movement, it can be impossible to view the interdigital area with the camera. Similarly, shoe fitting could be difficult to assess with the system. Dementia patients would be difficult to work with in terms of compliance and it was stated that the use of teleconferencing with such patients often needed to be abandoned because of cooperation problems with this patient group as opposed to a direct refusal to participate. It was also noted that where a patient is unable to keep still, it was not possible for the camera to focus, thereby negating its' usefulness. Comment was also made on lesions appearing slightly different on camera, leading to the potential for misdiagnosis without caution:

“sometimes you can see a lesion that you are not exactly sure if it is an eschar or a cover covering over a wound or if that is just a bit of callosity, so you need to be wary of the fact that things may not always appear exactly as they are”

Similarly, the document camera produced greatly magnified images and the podiatrists needed to become familiar with this peculiarity in order to diagnose correctly:

“sometimes it takes you a while to get used to dealing with images that are much larger than you would ordinarily see in a clinical situation. So a tiny fleck of dry skin may appear to be something entirely different, but once you get used to the equipment, you realise that those are magnified images and it’s alright”

A final limitation was that it is not possible to treat the patient with teleconferencing, although it would be possible to advise others as to how to initiate treatment, as long as this fell within that individuals' scope of practice.

Despite the diagnostic limitations for podiatrists, previous study undertaken by the service suggested that 80% of conditions examined with the teleconferencing equipment could be diagnosed without face to face assessment. It was also found that for the 20% that could not be diagnosed in this way, the podiatrist could identify the fact that the condition could not be diagnosed and subsequently arrange for a face to face assessment. Stress was placed on understanding the imitations of the equipment and when it would be necessary to examine the patient directly.

Negative aspects of teleconferencing

A number of minor problems associated with teleconferencing were identified through observation and interview processes as follows:

Technological problems Some minor technological problems had been experienced with the teleconferencing equipment. These could be described exclusively as technical interruptions through factors such as ageing equipment, weather disruption and through using old phone line connection systems as opposed to the new Broadband facility. There could also be issues relating to movements in camera operation, until the operator has gained familiarity with the finer aspects of working the equipment

Efficiency problems A number of efficiency problems were both reported and observed with the equipment. Here, time can be wasted, while waiting for staff at the user end, sessions can be cancelled at the last minute and difficulties can also be encountered in the practical task of bringing all the patients together who are booked in to the session. Similarly, the technical interruptions noted above inevitably waste time as staff wait for the connections to be restored.

Limited use Note was also made that despite the proven value of the equipment, its' use was still relatively limited, with the podiatry service still just using the equipment on an ad hoc basis due to changed circumstances.

Staff resistance Initial resistance from staff at both operator and user terminals was reported. This was related to problems of "technophobia" and it was noted that because this was 10 years ago, when technology was less frequently encountered, this may not be a problem when implementing the system nowadays. While it was reported that some patients initially had minor concerns relating to the different process and whether or not they could be heard via the system, this problem was not as overt.

Lack of face to face contact Another issue raised was that relating to the fact that teleconferencing does not involve face to face contact and this may be accompanied by inherent difficulties. It was said that some patients are not comfortable with the non-face to face situations and that others have difficulty perceiving that a doctor or other health

professional is present at the other end of the teleconferencing facility. It was also suggested that although teleconferencing works well, the ideal situation would be face to face.

Reimbursement arrangements While this would not be a current issue in relation to public sector provision in the UK, it was pointed out that clear arrangements for re-imburement of the service provided with teleconferencing have not been resolved satisfactorily. It was suggested that this may be particularly problematic, where payment was being made for services provided by other countries (as is possible with teleconferencing). One suggestion was made that some form of on-line log-in payment arrangement may be appropriate

Environmental factors The potential for the environment to adversely influence the teleconferencing process was noted, particularly in relation to the need to maintain steady temperatures in the room, where the frail elderly were involved.

Evaluation

A number of evaluations have been made of the teleconferencing system since implementation. These have included the following:

- Patient/Client Satisfaction surveys
- Evaluation of patients foot health knowledge
- System efficiency comparison
- Routine monitoring
- Monitoring of patient care

Through the evaluation process, it was determined that patients were satisfied with the system and that the sound and vision aspects of the system were acceptable. When foot health education had been delivered through the teleconferencing facility, pre and post-education questionnaires demonstrated that foot health knowledge was good and had improved as a result of the educational session. In terms of efficiency, it was shown that the system was an efficient way of delivering services, with demonstrable time savings. The average podiatry consultation time using the system was eight as opposed to 30 minutes, although podiatric hands-on assessment and treatment was not involved in the teleconferencing appointment. The number of sessions that take place every year is regularly monitored to verify that these match the stated intention. Through this, the quality of diagnosis, management and treatment provided through teleconferencing was found to be acceptable.

It was suggested that with additional time, the evidence supporting teleconferencing could have been strengthened through the instigation of research in the form of a randomised controlled trial, as performed in other countries involved in teleconferencing. At the same time, it was stated that the system was already seems as credible, therefore such work, while interesting may no longer be necessary.

Future potential

Finally, key informants noted that there was great potential to explore further uses for teleconferencing. The suggestion was that any new users to the system should experiment with teleconferencing to see what could and could not be done with an open-minded, innovative approach. It was believed that the use of teleconferencing for gait analysis should be appropriate for development and also in the field of medico-legal work, where image files need to be transferred from place to place for in depth assessment. This takes usually takes time, when using the postal system and teleconferencing facilities could allow an instantaneous initial response. In relation to dealing with patients who cannot keep still, it was suggested that recent technological developments on “shake-free” cameras may be available to assist with this issue.

Conclusions

A number of learning objectives had been stated prior to the visit. From the above considerations, the following conclusions were made against these objectives:

To learn how to implement and utilise the teleconferencing system in relation to podiatry practice.

- Once obtained, Teleconferencing equipment should be utilised by as many different disciplines as possible, to justify the initial expenditure.
- Podiatric use differs from many other disciplines in that podiatrists deal predominantly with physical manifestations which need to be elicited through the medium of the equipment. It is therefore essential that for podiatric use, the equipment should include a specialised document camera. Various peripheral items of equipment are available, and some of these (e.g. Doppler, cardiac and blood pressure monitors) would be of value in podiatrists' use of the equipment.
- It takes approximately two months to implement a teleconferencing facility. Here, supportive training programmes should be instigated in order to overcome reluctance and build up staff confidence when using the system.
- Each discipline will have different uses for the equipment and these potential use and limitations should be explored.
- Homes where teleconferencing is to be used needed to be selected carefully with compliance, facilities and governance issues (e.g. security) in mind.

To learn about the protocols for podiatric teleconferencing.

- For the podiatric use of teleconferencing, it is important to devise systematic protocols for the visual assessment of patients at an early stage.
- Routine sessions should be scheduled as would any other pre-booked clinic.
- Session should begin with a telephone call to the home to advise that the operator is ready to commence.

- Semi-urgent consultations should be with follow-up care being arranged as required. Such consultations should always be followed up with a telephone call to verify that all is well with the patient.
- The physical examinations which are an essential part of podiatry assessment take longer than other forms of consultation, therefore longer appointment times should be arranged – typically of eight minutes.
- Staff in the elderly home should have the responsibility of referring any patients to the podiatry service where they are believed to have a foot problem, or potential foot problem. Teleconferencing appointments should be alternated with visits to the residential home, to ensure that any problems that could only be picked up in the face to face situation aren't missed.
Two people are required at the operators end – one practitioner questioning the patient/carers and the other doing electronic data entry.
- Patient clinical records should be held/checked at the operators end.
Podiatrists will require the use of a white background when examining patients' feet with the equipment.
Scales can be placed adjacent to the feature of interest on the foot to allow monitoring of a lesion for signs of improvement or deterioration.
- The camera as opposed to the patient should be moved, where different angles of view are required
- The use of shiny gloves amongst assistants is contra-indicated as this will interfere with the camera image.
- The use of up to two specially trained assistants with a level of technical understanding of the equipment involved is essential at the user-end.
- The assistants duties would include the preparation and mobilisation of patients, presentation of the patients history, help with communication, examination of the patient and assisting the diagnostic process by describing conditions in detail where these aren't immediately discernible to the operator.
- As in any clinical work, it is essential that accurate and comprehensive records are kept with best practice suggesting that electronic records of the session should be kept.
- Data protection considerations should be built into the protocols and the equipment should be used in a secure environment without the possibility of audible access from outside the consultation.
- Records taken outside the process should be secured in an appropriate fashion.

To evaluate the benefits of this approach to diagnosis and assessment in podiatry practice.

The following benefits of teleconferencing were elicited through the visit:

- The equipment was easy and reliable to use, with good sound and image quality.
- There were high levels of patient satisfaction with the system, with over 90% of patients being happy with teleconferencing consultations.
- The high image clarity and zoom function of the document camera were invaluable for podiatry use of the equipment.

- While teleconferencing has not replaced face to face consultations, it has allowed services to reach more patients under their care:
- Teleconferencing has improved access for patients to the services involved.
- Patients and carers no longer need to travel for their care where this is problematic.
- Treatment doesn't intrude as much into patients time and social lives.
- Patients can be saved the cost of transport.
- Frail elderly do not suffer the physical discomfort of making relatively long journeys for their The facility is more convenient than the alternatives.
- In over 80% of podiatry cases, it is an appropriate means of evaluating the patients condition. No major objections to teleconference consultations have ever been received.
- Patients enjoy the process and to find it interesting.
- Teleconferencing approaches have a beneficial impact in terms of resource savings.
- Through attending to patients at distance and in one place, the practitioners time is used more productively.
- The use of teleconferencing helps the staff manpower situation in homes.
- Teleconferencing can decrease the numbers of patients attending outside clinics, thereby creating clinical space for other patients.
- Staff are comfortable with teleconferencing and find the system to be convenient and acceptable.
- Staff find that the live interview and patient feedback aspects of teleconferencing give the system added value over the simple use of digital photographs in distant diagnoses.
- Staff find that teleconferencing is helpful for group therapy sessions where patients use this as an opportunity to report experiences and to express ideas for further development.
- Teleconferencing provides an equal level of care to traditional approaches without compromise.
- Teleconferencing allows early intervention through semi-urgent usage as required.
- Teleconferencing allows patients to be dealt with safely when outbreaks with the potential for cross infection occurred, in turn helping to limit the spread of the outbreak.

To understand the limitations and pitfalls and how these can be avoided within this system.

A number of limitations and potential issues of using teleconferencing as a diagnostic tool were identified as follows:

- It is important to realise the limitations of teleconferencing so that mistakes are not made.
- From a physicians perspective, it is not possible to listen to a patients' chest directly, where a breathless patient is being examined.

- It is important to know the patient before using the teleconferencing facility with them as the assessment of new patients with the system can be difficult and will require greater caution.
- For podiatrists, there are some diagnostic limitations (including the assessment of interdigital areas where there is limited toe movement, work with dementia patients and patients unable to keep still).
- Some podiatry lesions can appear slightly different on camera, through document cameras producing greatly magnified images, leading to the potential for misdiagnosis.
- It is not possible to treat the patient with teleconferencing, with others being required to initiate treatment if necessary.
- 20% of podiatric conditions encountered can not be diagnosed with teleconferencing, and required a face to face assessment instead.
- The limitations of the teleconferencing equipment need to be understood by the operator.
- Minor technological problems (service interruptions) can be experienced with the equipment.
- The camera operation can be difficult until the operator has gained familiarity with the equipment.
- Efficiency problems can occur resulting in wasted time and cancellations.
- It can be difficult bringing patients together who are booked in to the session.
- Despite the proven value of the equipment, its' use is still relatively limited in podiatry.
- Initial resistance from staff can be expected “technophobia”
- Some patients can have initially concerns over using the process when new.
- There can be inherent difficulties with the lack of immediate face to face contact
- Patients can have difficulty in perceiving that a doctor or other health professional is present at the other end of the teleconferencing facility.
- Clear arrangements for re-imburement of the teleconferencing service have not been resolved satisfactorily.
- There is potential for the environment to adversely influence the teleconferencing process, particularly in relation to room temperature temperature in the room.

A summary of the key lessons for both the Fellow’s employer and the wider NHS.

Key lessons for the Fellows employer (Sheffield PCT)¹ and the wider NHS as determined by the visit are as follows:

¹ As a result of the visit, a capital bid has been prepared for submission, in order to obtain funding to allow this facility to be commenced within Sheffield PCT

- Teleconferencing can be implemented quickly – within two months
- There are clear benefits which can be derived from the introduction of teleconferencing, for patients, staff and organisations alike.
- Efficiency improvements are possible through the use of teleconferencing.
- Teleconferencing systems need to be set up carefully, with particular attention being paid to the sites selected for use, training and preparation of the operators and users and the creation of operating protocols.
- Use should not be limited to one professional group, but should be shared across all groups with the potential to benefit from the facility.
- For podiatry use, additional items (e.g, a document camera) are required
- Despite the benefits of teleconferencing, some face to face interventions with patients will still be required.
- Limitations should be understood well before use, in order to prevent diagnostic errors.
- Technical problems are few and appear to relate to older-generation equipment.
- Through the early interventions allowed by teleconferencing, reductions in hospital admission may be possible.

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