Opinion

Telehealth in COPD

What is telehealth?

Telehealth is the use of information and communication technologies, often in combination with remote sensing devices, to promote health and support self management in case of deterioration. Initially heralded as a means of providing care in remote areas, more recently it has been seen as a method of avoiding costly hospital admissions in an ageing population.

Why telehealth in COPD?

Used in many long term conditions, telehealth for chronic obstructive pulmonary disease (COPD) is considered to be particularly appropriate. Exacerbations of COPD account for 1 in 8 of all medical admissions with around 220,000 admissions/year in the UK, representing over 1,000,000 bed days.[1] Exacerbations are associated with significant mortality, poor prognosis and reduced health-related quality of life.[2] Prevention, early detection and appropriate treatment of exacerbations is an important aspect of disease management.[3]

How might telehealth improve outcomes?

We know that some patients do not access treatment promptly. Reasons for this include difficulty in distinguishing 'bad days' from genuine exacerbations, not wanting to bother 'hard pressed' clinicians, difficulty getting an appointment or a home visit if they are not well enough to attend the surgery, and sometimes because they fear admission to hospital.[4]

Telehealth in COPD has the potential to improve access to timely care and support by:
- enabling clinicians to identify early exacerbations through continuous monitoring
- legitimising patients' decisions to access care/self-care by providing physiological and symptom score 'evidence' of deterioration.

Earlier treatment of exacerbations should reduce hospital admissions.

What types of telehealth are available?
- Simple telephone access to a clinician
- Videophone
- Mobile network with symptoms and physiological data entered manually or by direct connection (either wired or Bluetooth) to measuring devices
- Personal computer with onboard programme (some have touch screens with voice prompts) and peripheral connections

- Communications may be based on telephone landlines, mobile technology or internet, or cable internet, or direct satellite communication for remote areas.

Peripheral equipment

Most current systems make use of a combination of symptom checklists and physiological measures, for example pulse oximetry,

Entering symptoms using a touch screen computer

spirometry, temperature. It is important to consider the usefulness of different measures for individual patients
- Symptom checklists may be linked to algorithms to determine a likelihood of exacerbation.
- Spirometry can be difficult and sometimes exhausting to perform and even with supervision it is not always satisfactorily performed. The (small) fall in lung function during an exacerbation is too late to be predictive.
- Oximetry is much simpler, though it is essential that patients are rested before taking a measurement, and have warm fingers without nail-polish. The evidence base for its use in continuous monitoring is limited, but analysis of data from ongoing trials will be able to explore the relationship between deteriorating pulse oximetry and serious deterioration in COPD.
- Technological developments which will enable measurement of respiration rate offer interesting new possibilities.

Part of the problem is that there is no gold standard by which exacerbations are measured. Symptom questionnaires, are often based on the NICE definition of exacerbation,[5] or Map of Medicine care pathways.[6] Occasionally this scoring is ad hoc with no scientific basis, though, others have used the experience of patient held diaries to derive a score thought to be predictive of an exacerbation.[7]

Monitoring systems

Monitoring may be based on automatic feedback based on symptom report or physiological monitoring, or daily monitoring by a call centre or specialist nurse or physiotherapist or a combinations of these.

What do we know?

There is as yet, no substantive evidence from randomised trials in COPD although some large randomised trials are shortly to report. There have been a large number of descriptive and uncontrolled studies and some small randomised trials which show promising reductions in re-admission rates, and trends towards reduced hospital bed stays which fall just short of significance.[8,9]

What we do know is that qualitative work exploring telehealthcare in COPD from the patient and carer perspective is positive.[10]

Patient views
- There is a strong perception of improved access to care and a feeling of reassurance that someone is overseeing their care.
- Concerns that the technology might engender increased dependence on the healthcare team and reduce self-care do not appear to have materialised for the majority of people who use the service.
- Patients say that the routine use of diaries and taking of physiological measures has increased their knowledge of their condition and their self-efficacy and allowed them to self-manage their condition more confidently.
- Negative views largely reflect occasional technological failure or, less commonly, perceived inadequate speed of response to worrying readings or symptoms.

Clinicians and service planners

Clinical staff and service planners have a more guarded attitude to the introduction of telehealthcare.
- While generally welcoming, to some it is seen as a 'disruptive technology' with little evidence base, which necessitates a complete reorganisation of care pathways to provide dedicated people to monitor care and respond to perceived need.
- They are worried that the lowering of the access bar and the potential for 'false alerts' will inevitably lead to increased workload.
- Some are concerned about excessive medicalisation of patients.
- Some clinicians are worried about safety of interpreting symptoms in the absence of physical examination.
- There are also concerns about the relia-

bility and the meaning of physiological measures and symptom diaries collected routinely in telehealthcare.

- Service planners hope that the telehealth supported care pathways will cost-effectively improve COPD management.

Certainly in pilot work in Lothian and in other studies, telehealth led to an increase in the identification of exacerbations and an increase in the prescription of steroids and antibiotics.[10] These phenomena in themselves may have longer term effects which have yet to be measured.

What we don't know

There remains a question mark over the ability of telehealthcare to prevent deaths, admissions and to reduce the number of patient days in hospital. Systematic reviews of the evidence consistently indicate the poor quality or under-powering of studies and call for adequately powered randomised controlled trials.[11]

Additionally good quality economic evaluations are rare.[12] Too often reports of potential savings rely on the optimistic guess-work of telehealth enthusiasts based on before-and-after studies and worst-case assumptions of the performance of usual care.

One recurrent problem has been that in many trials telehealth is only one component of a complex intervention which may include the additional provision of specialist nurses or other clinicians and it has therefore been difficult to know if telehealth per se has added any value. Fortunately two large pragmatic randomised controlled trials of different of models of COPD telehealth are currently taking place in the UK which should help to address the evidence gap. The Whole System Demonstrator Project taking place in the south of England is scheduled to report in late Spring 2011,[13] and the Telescot trial in Scotland which has randomised 250 patients at high risk of readmission and will report in Spring 2012.[14] Both have economic evaluations.

Additional use: Telemonitoring in rehabilitation

The evidence base for group rehabilitation in COPD is strong, but not all patients are willing or able to get to groups. There is potential for using telehealth to demonstrate exercises and to monitor the activity of patients using video to observe the prescribed exercises. There is the potential in the future to use actimetry and position sensing devices to observe actual movement and provide feedback on adherence to personalised programme goals either individually or in virtual groups. Ongoing studies are exploring these ideas.

Implementing telehealth

Telehealth has failed to become mainstream in the same way as telemonitoring in social care which at its simplest level is almost universally incorporated in normal care. Costs

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Top tips

- A dedicated programme manager is essential. Relying on people to do this in addition to their normal work is seldom successful.
- Be clear in advance who your patient target should be (e.g. at high risk of readmission) and how you are going to identify them.
- Run an education programme to promote the benefits of telehealth to all staff and to raise the profile of the project among clinicians.
- Provide honest explanations to staff that there will inevitably be a temporary increase in workload as they learn to manage new systems alongside old ones. Make plans to mitigate this.
- Provide protected time for monitoring and responding to telehealth readings: this task will not worked squeezed in ad hoc between other obligations.
- Agree changes in professional roles brought about by telehealth in advance and not 'on the hoof'.
- Plan training for staff and for those who will subsequently train patients, shortly before going live.
- When choosing equipment talk with colleagues in different areas who have used the equipment, preferably at scale. Visit sites to see it in operation. Ideally the equipment should be simple and robust.
- Trial the equipment yourself on a small scale before making a large purchase.
- Make sure there is a clear pathway for IT /equipment installation and patient training. Agree responsibilities with equipment manufacturers, communications installers and the health service.
- Identify one point of call for both clinical and technical support for staff and patients.
- Decide what will be measured both for patients and as outcome data

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and enthusiasm for technology need to be balanced against evidence of effectiveness. There is a risk that the passion of enthusiasts who have successfully implemented on a small scale, and slick presentations of the potential benefits of the technology may lead to poorly planned implementation.

The most important consideration when implementing telehealth for COPD is the need to reconfigure services to accommodate monitoring of patients and a system for responding to exacerbations when they are detected. This aspect is often ignored and it is the main reason for implementation failure.

One of the greatest barriers to getting clinicians on board is to convince them that this is likely to help their patients and a good use of their time. In the absence of new resources, they have to believe that that something they are currently doing should be stopped to free up time for the new service. The results of forthcoming randomised trials will provide this evidence.

Conclusion

The role for telehealth in COPD has not been established, but there are indications that it may both improve care and reduce resource use. If the ongoing trials confirm benefit, the challenge facing the health service will be to implement it at scale. In such implementations as much attention is required to the supportive clinical and technological infrastructure as to the qualities of the technology itself.

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