

Scottish School of Primary Care

GP Clusters

Briefing

Paper 6



Improving the management of long term conditions: the role of telehealthcare

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Collaborative Quality Improvement in General Practice Clusters

This paper is the sixth in a series that relates to areas of quality and safety on which general practice clusters could usefully focus improvement activity. Each paper summarises research, guidelines and other evidence about areas of care which can be improved, and improvement methods and interventions.

Improving the management of long-term conditions: the role of telehealthcare

Telehealthcare is the the provision of health services at a distance using a range of technologies. These technologies range from simple telephone management to video-consulting and real-time monitoring of symptoms and physiological data. Telehealthcare has been hailed as a potential solution to managing the increasing numbers of people with long-term conditions. There is a growing evidence based on randomised controlled trials (RCTs) which suggest that for some conditions (hypertension, diabetes and congestive heart failure (CHF)) telehealthcare shows considerable promise, at least in terms of improved outcomes, but for others such as chronic obstructive pulmonary disease (COPD) outcomes have been more disappointing. This paper discusses the evidence base for quality improvement in the use of telehealthcare in long-term conditions and discusses its likely future role in primary care.

The problem

Currently 17 million people in the UK suffer from some form of long term condition. Most have more than one. This is set to increase. Even if resources could be found to increase the numbers of doctors and nurses in primary care (and it is more likely that this will fall) it is clear that current methods of managing these conditions are no longer going to be sufficient. Self-management has been promoted as a potential solution to this, but the evidence for the effectiveness of self-management alone is not strong. For example, there is some evidence from trials that self-management of high blood pressure (HBP) may be effective in the short term, but not when more rigorous outcomes such as ambulatory blood pressure monitoring are applied¹. The use of asthma self-management plans is associated with fewer hospital admissions but are often not offered or adhered to in practice². In type 2 diabetes (DM) self-monitoring alone has been found to be associated with increased anxiety and no improvement in HBA1C³. Patients left to self-monitor lack confidence in knowing how to respond to abnormal readings and felt abandoned by clinicians⁴. This has led to the suggestion that self-monitoring supervised at a distance using telehealthcare may be the solution. Evidence from randomised controlled trials (RCT) has been slowly building over the years, much of it from Scotland, which has confirmed the efficacy of tele-

healthcare in the management of some conditions (HBP, DM, and to an extent congestive heart failure (CCF)) but not in others (chronic obstructive pulmonary disease (COPD), asthma). However, demonstrating cost-effectiveness has been more problematic and relies on modelling based on assumptions of better outcomes rather than immediate reductions in workload. This paper summarises the evidence for the most common long-term conditions in which telehealthcare has been applied (COPD, HBP, CCF, DM, Asthma) and identifies the challenges still to be overcome.

Can the management of long-term conditions be improved by telehealthcare?

Chronic Obstructive Pulmonary Disorder (COPD)

COPD is one of the leading causes of hospital admission mainly because of exacerbations of the condition. Early identification of exacerbations and timely treatment can prevent severe deterioration and hospital admission⁵. Daily telemetric monitoring of symptoms, pulse oximetry and, in some cases, spirometry has been used to help identify these early exacerbations. Previous systematic reviews which relied on relatively poor quality studies had concluded that telehealthcare may be effective⁶. However, many of these studies were very complex and included additional nursing and medical support in their interventions which made it difficult to identify whether the telehealthcare component led to any change that had been detected⁷. The most recent systematic review of 29 studies shows variation in outcomes but that large, high quality studies demonstrated no improvement in outcomes.⁸ A recent RCT conducted in Scotland⁹ set out to separate these components and demonstrated no impact of telehealthcare on time to admission or total admission time, but it was associated with many 'false positive alerts' which lead to an increase in workload. Analysis of the telemetric data showed that the algorithm in use was poorly predictive of serious exacerbations and research is now focussing on improving these algorithms.¹⁰ A 'light-touch' variation on telemonitoring encourages the patient to take and transmit readings but leaves the patient who self-monitors to call the clinician only if problems arise. The clinician can then make use of the collected data to advise the patient. Observational studies seem to suggest this is successful in terms of reducing workload but a trial is required to verify this¹¹.

High Blood Pressure (HBP)

Hypertension management is one of the commonest reasons for attending general practice. In Scotland, 1.2 million appointments are taken up for BP management alone (with many more appointments where BP is measured)¹². Home measured BPs are more predictive of outcomes than those carried out in the surgery and are less prone to 'white-coat' effects. While self-monitoring of blood pressure, on its own, is associated with a short-term reduction in blood pressure, self-monitoring with clinician oversight using telemonitoring is more effective.¹³



A large number of RCTs exploring telehealthcare management of HBP have been undertaken, including one in Scotland which showed a 4.3mm reduction in systolic ambulatory blood pressure⁽¹⁴⁾. There is increasing evidence for the effectiveness of telemonitoring for HBP. A recent meta-analysis of 24 RCTs and 8292 patients,⁽¹³⁾ including the Scottish study above, showed that in actively monitored patients there was a mean 6.9mm reduction in systolic BP over the course of the year. Such a reduction would result in a >20% lowering in the incidence of stroke and 15% reduction in myocardial infarction if sustained for 5 years. However, all but one of the studies was for one year or less and many involved only one fifth of those eligible to take part. It is not known if the effect would be persistent nor, if rolled out as a service, that it could be mainstreamed with similar outcomes. As HBP is a symptomless condition, and the incidence of cardiovascular events relatively infrequent during the course of a clinical trial, usual cost-effectiveness calculations to calculate quality adjusted life years (QALYs) are problematic. However, the mean societal and clinical costs in the first 12 months after a stroke have been estimated at £45,409 and £24,003 respectively,⁽¹⁵⁾ underlining the potential gains from lowering BP. A recent health economic analysis, applying modelling of potential health gains using data from the TASMING 4 randomised controlled trial, showed that telemonitoring was likely to be cost-effective at a cost of £17,424 per quality-adjusted life year gained.⁽¹⁶⁾ A recent RCT of telemonitoring for hypertension from Canada,⁽¹⁷⁾ also concluded that telemonitoring is cost-effective with costs per QALY coming in at C\$1929.

Diabetes mellitus

Diabetes mellitus is a major cause of death and disability and, with the rise in obesity, is becoming much more common. Just over a quarter of a million people in Scotland have been diagnosed with diabetes⁽¹⁸⁾. Around 88% of diabetes is type 2 and managed mainly in primary care. A meta-analysis of self-management alone in 2552 participants was associated with what was considered a statistically significant but clinically insignificant 2.3mmol/mol reduction in HbA1C⁽¹⁹⁾. However, a recent meta-analysis of 38 randomised controlled trials of telemedicine among 6855 people with diabetes⁽²⁰⁾ (including one Scottish Study⁽²¹⁾) reported a significant decline in HbA1c level in interventions compared with control groups when biological data were sent weekly combined with quick feedback. This resulted in 1.8 times as many people in the intervention group achieving improved glycaemic control (HbA1C <7%) than in the control group, when feedback was given daily or immediately (RR 1.83, 95% CI 1.35 to 2.47).⁽²⁰⁾ There was also significant reduction in systolic BP (weighted mean difference -1.33 mm Hg) and body mass index (weighted mean difference -0.25 kg/m²). As with HBP, telemonitoring studies in diabetes were not prolonged and it is unclear if this effect would be sustained over time or if implemented at scale if it would be taken up by patients and practices. Large scale implementations of telehealthcare in diabetes are needed to determine this.

Congestive Cardiac Failure (CCF)

CCF is one of the commonest reasons for hospital re-admission in Scotland. Several symptoms (increased breathlessness, fatigue, ankle swelling and disturbed sleep) and physiological signs (rise in weight, pulse rate and lower blood pressure) can help predict worsening failure. Early intervention may prevent deterioration and hospitalisation and telehealthcare has been seen as a means to facilitate early detection. Telemonitoring of CCF has mainly been carried out by specialist CHF nurses rather than by primary care staff. A large number of trials have been carried out with varying results. The most systematic review⁽²²⁾ which included 26 trials and 4923 patients showed a significant reduction in all cause mortality in 12 studies at 180 days (40% reduction in the odds (OR: 0.6 p<0.01)), but in the 6 studies which continued for 365 days the reduction became insignificant (OR 0.85; p=0.461). Telemonitoring did not have a significant impact on the odds of all-cause hospitalization at 180 days (OR: 0.97; p=0.902) or 90 days (OR: 0.81; p=0.472) and was associated with an increase in emergency room visits (OR 1.51p<0.05). While telemonitoring may confer a short term benefit, perhaps in terms of a period of intensive monitoring post-discharge, evidence suggest no benefit of long-term monitoring.

Asthma

In a systematic review, McLean and colleagues analysed a wide range of telehealthcare interventions for asthma in 27 trials.⁽²³⁾ Meta-analysis showed no significant improvement in emergency department use or hospitalisation at 3 months, but in a subgroup of four smaller studies, a significant reduction in hospitalisations compared to usual care at 12 months. No benefit was conferred with respect to reported symptoms. However, in many of the studies the control groups were given enhanced face-to-face care making it challenging to show the benefits of telemonitoring. The authors concluded that telehealthcare was unlikely to confer benefits in mild-moderate asthma but that those at higher risk of hospitalisation may benefit and that considerably more research was needed to investigate the cost effectiveness of telehealthcare-centred models of care. Another more limited Cochrane review exploring two more recent papers on the use of asthma apps found contradictory results and concluded that evidence was insufficient to recommend the use of mobile apps for managing asthma⁽²⁴⁾



Core elements for improvement

The biggest challenge facing telehealthcare is the evidence that it works at scale. What can be made to work for a selected group of patients within a RCT may be different when applied more generally. It is difficult to persuade health service personnel to change the way they work unless there are clear advantages to them or their patients. While the RCTs in HBP and diabetes provide strong evidence of effect, at least in the research setting, the introduction of any new system comes with a time cost, one which hard pressed NHS staff may feel they cannot contribute. Introduction of telehealthcare must therefore be well supported including training and extra time to initiate new ideas. Further work needs to be done in COPD and perhaps also in CCF to improve algorithms so that improved outcomes do not come at the expense of greatly increased workloads for front-line staff. Research in these areas is currently underway in Scotland.

Implementation in real-life NHS practice

Clinicians should start implementing telehealth with conditions for which there is a strong evidence base with simple and inexpensive technology. HBP and diabetes being the most obvious contenders. Such implementations need to be assessed in terms of uptake and impact on workload and clinical outcomes using routinely acquired data. Likewise implementation of telehealthcare of CCF needs to be carefully assessed. Telehealthcare systems need to be integrated within current ways of working and recent work in Scotland has linked telehealth reporting systems in HBP to Docman for regular reports with beneficial outcomes, similar to those in RCTs, with no increase in workload. This should be extendable to other conditions and other platforms such as My Diabetes My Way. Currently, it is hard to justify the use of telehealthcare for COPD or asthma outside of research programmes. Given the major contribution these conditions make to primary care and hospital workload further research into improved algorithms and monitoring systems are justified.

Implication for collaborative quality improvement in general practice clusters

The number of patients suffering from long term conditions in Scotland is set to double in the next 10-15 years. It is impossible to continue to look after them as we have done up until now and supported self-monitoring may manage these problems more efficiently.

General practice clusters should consider encouraging members to undertake telehealth in at least one condition (the easiest and best researched condition is HBP, but diabetes could also be considered). There are a variety of projects currently supported by the Scottish Government TEC fund (e.g. Scale-Up BP Lothian) which offer the potential to work collaboratively at relatively low cost.

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