

INTRODUCTION

The recent roll-out of COVID Oximetry and virtual ward services across the NHS in England has occurred at a staggering pace. In February 2021, >27 000 high-risk patients with COVID-19 have been treated at home since the first national standard operating procedure was introduced in November 2020 (further information available from authors).¹ Observational evidence relating to the effectiveness and value of these local services has started to emerge, with larger national evaluations of the service currently ongoing.² As services look to become sustainable in the long term and the prevalence of COVID-19 is relatively low, we will soon be presented with an opportunity to decide which elements of these services we wish to amplify and which we should discard. As a result, NHS England is increasingly looking at how it can support automated remote patient monitoring at the patient home through integrated digital platforms for high-prevalence, ambulatory-sensitive conditions such as hypertension, chronic obstructive pulmonary disease (COPD), heart failure, and diabetes. This is moving beyond the usual modes of care delivery such as office-based care for these conditions. This has led to much discussion about whether oximetry and virtual wards should evolve into a single integrated NHS@home remote patient monitoring service.³ Here we look at whether the enablers achieved through COVID Oximetry @home and virtual wards will be sufficient to overcome some of the historical barriers to introducing telemonitoring services and achieve a coherent, deliverable vision of NHS@home (Figure 1).

OVERCOMING PREVIOUS BARRIERS TO CHANGE

Despite findings from a number of randomised trials,^{4,5} telemonitoring was not universally adopted within the NHS pre-COVID. Lack of a coherent organising vision, with different stakeholder assumptions and values, has also hampered the introduction of services historically.⁴ Other key barriers included technologically challenged staff, resistance to change, cost implications such as issues with financial reimbursement, and the age and level of education of the patients using the service, along with issues of confidentiality and privacy.⁴ After initially adopting such technologies, some providers have even chosen to disinvest, with their

decision driven by negative results from some clinical trials. The cost implications and difficulty in sourcing systems that meet their needs have also played a role.⁶ We are now beginning to see many of these barriers potentially overcome as a result of COVID-19, and a more coherent vision of what NHS@home might look like has started to emerge. For example, we now see far less resistance to the use of technology by clinicians, with the remote consultation rate approaching 90%. Extensive staff training has been undertaken in many regions to support remote monitoring and much of the previous resistance to change has been overcome, and new data-sharing agreements and infrastructure have been put in place.⁷

CLINICALLY EFFECTIVE AND SAFE?

In the rush to develop a strategy for an NHS@home service, it remains vital that we look critically at existing evidence of what works well at scale and what does not in terms of clinical outcomes, patient safety, and cost-effectiveness for different ambulatory-sensitive conditions. This can be challenging given the heterogeneity of populations, interventions, comparators, and outcomes used in telemonitoring trials. When one considers those high-quality trials, the evidence base for effectiveness from clinical trials telemonitoring for hypertension has been demonstrated to improve mean systolic blood pressure.⁸ Heart failure telemonitoring has been shown to reduce all-cause mortality and be cost-effective in selected populations. In contrast, telemonitoring in patients with COPD has yielded mixed results, with conflicting results over the outcomes of reducing hospital admissions, quality of life, and mortality.^{5,9} For patients who have had type 2 diabetes for >1 year who are not using insulin, the

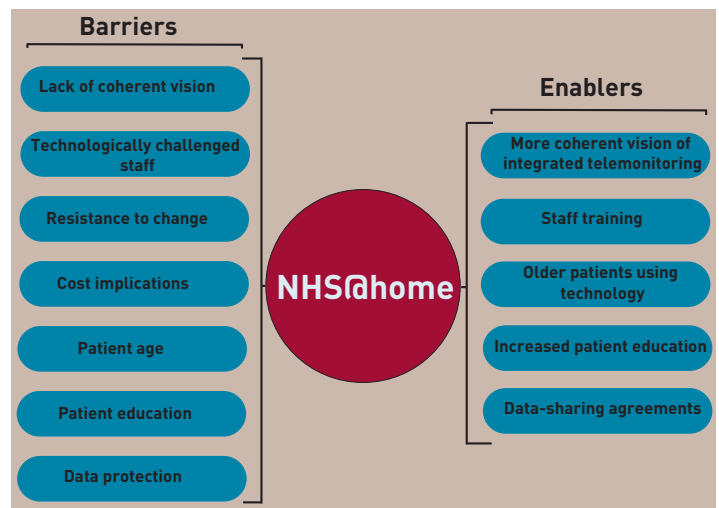


Figure 1: Historical barriers and current enablers to delivering NHS@home. Source: adapted from Kruse et al.⁴

overall effect of monitoring on glycaemic control is small up to 6 months and subsides after 12 months, with insufficient evidence of benefit on long-term cardiovascular outcomes and mortality.¹⁰

This suggests that, for many ambulatory-sensitive conditions, a stratified approach may be required to identify those patients who are most likely to benefit, with a clear definition of what the intended benefit is. It is likely that a phased introduction of the different disease areas will be required, with priority given to those areas with the strongest evidence of cost-effectiveness. Some home-monitoring technologies are classified as medical devices since they are intended for use in the mitigation, treatment, or prevention of disease. Yet patient safety considerations are often absent from the evaluative literature, and it is not clear whether adverse events did not occur or whether there was a lack of reporting.¹¹ The widespread rapid adoption of COVID Oximetry monitoring and subsequent fall in incidence of COVID-19 means that it is increasingly challenging to undertake a large, high-quality randomised trial to evaluate the intervention. This makes assessment of patient safety outcomes beyond that of the observational evidence challenging.

WHAT WORKS AT SCALE?

Looking at what works at scale beyond COVID Oximetry, there is good evidence that telemonitoring for hypertension can be implemented into routine primary care with little impact on clinician workload. Reductions

Box 1. Key points

- The recent successful roll-out of COVID Oximetry and virtual ward services at scale has led to the opportunity to develop an integrated NHS@home monitoring service.
- Historical barriers to telemonitoring such as lack of coherent vision, technologically challenged staff, resistance to change, and inadequate patient education have the potential to be overcome.
- The cost-effectiveness, patient safety, workability at scale, and impact on health inequalities of telemonitoring for long-term conditions in a new NHS@home service would need to be carefully considered if we are to improve patient outcomes, achieve higher levels of efficiency, and extract value from health delivery systems.

in blood pressure are comparable with those seen in large, high-quality UK trials.¹² Self-monitoring has in part been further demonstrated through the introduction of 22 000 blood pressure monitors for shielded patients during the pandemic.¹³ A number of different strategies have been adopted to perform home monitoring in heart failure and COPD in some parts of the NHS, such as remote monitoring through local heart failure and COPD community teams, many with some success in terms of reducing unplanned admissions in selected patient groups.⁵ In terms of the published evidence, many of the trials for heart failure and COPD monitoring are underpowered, intensively delivered, or with poor recruitment, raising questions about the external validity in terms of its clinical effectiveness and impact on workload at scale.⁵ Despite numerous pilot studies, the uptake of telemonitoring technologies for type 2 diabetes in the UK has been limited given that the National Institute for Health and Care Excellence currently recommends not to routinely offer self-monitoring of blood glucose for adults with type 2 diabetes, with a few limited exceptions where the patient is on insulin or at risk of hypoglycaemia.¹⁴

EQUITABLE?

Self-monitoring technology has historically been unequally distributed in that those who suffer from fewer disadvantages have better access to new technology.¹⁵ The availability of blood pressure monitors historically followed a social gradient, although in more recent years this has reduced, with educational attainment showing stronger and more associations with the use of devices than personal income.¹⁶ A fair distribution of access and resources must follow any introduction of NHS@home in order to mitigate any inverse care law that may be in operation.¹⁷ Potential solutions may include closer attention to the personal, socioeconomic, and environmental conditions in which people will use the service, using digital nudging to activate existing associations between environmental cues and behaviours, and to personalise the support for health literacy and health

behaviour.¹⁵ Evaluation of the distribution of oximeters is ongoing; however, given that the provision of oximeters follows notification of a positive COVID-19 test result, it is likely to follow disparities noted through NHS Test and Trace unless these are mitigated.

CONCLUSION

The delivery of the oximetry and virtual ward services through primary and secondary care presents an unprecedented opportunity to shape integrated care across the NHS. As the current momentum is used to incorporate more telemonitoring services, a vision for NHS@home is beginning to emerge. The key challenge will be to identify from the often muddled existing evidence which patients will benefit and for what outcomes. NHS@home will need to do more than simply act

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as a central hub for telemonitoring services. It will need to improve patients' experiences, achieve higher levels of efficiency, and extract value from health delivery systems if it is to deliver truly integrated care. (See Box 1 for key points).

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Provenance

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Competing interests

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