Remote monitoring for long-term physical health conditions: An Evidence and Gap Map

Monitoring a patient remotely allows healthcare professionals to understand what is happening to their health between visits and respond to changes in a patient's condition[1]. As an innovative use of technology, remote monitoring could help meet changing demand for health services resulting from an aging population and increasing rates of noncommunicable diseases[1,2]. It could also contribute to the development of a more sustainable healthcare system.

This is a summary of a project which produced an Evidence and Gap Map (EGM) on the effectiveness, acceptability, and implementation of remote monitoring for long-term physical health conditions. EGMs draw together all the available evidence on a topic, highlighting for which populations or intervention types there is either a lot, or lack, of research. By mapping evidence for different types of remote monitoring, this EGM is intended to support the design and delivery of interventions, and to help prioritise future research.

It found that:

♦ Evidence is focused on remote monitoring of people with a few specific conditions such as heart disease and diabetes, with a lack of research on less common conditions e.g. epilepsy;

♦ There are reviews on the effectiveness of remote monitoring for physical and mental health, and health service use, but few which look at the views of carers and healthcare professionals on its acceptability and implementation; and

♦ Reviews need to include more detailed descriptions of included remote monitoring interventions.

Remote monitoring: the monitoring of a patient (including self-monitoring), allowing healthcare professionals to assess and manage a patient's condition remotely - without the need for the patient to be seen face-to-face

Exeter HS&DR Evidence Synthesis Centre

We are one of three research groups in the UK commissioned by the National Institute of Health Research HS&DR (Health Services & Delivery Research Programme) to conduct syntheses of evidence about the organisation and delivery of healthcare (Project number 16/47/22). The views expressed are those of the authors and not necessarily those of the NHS, the NIHR or the Department of Health and Social Care.
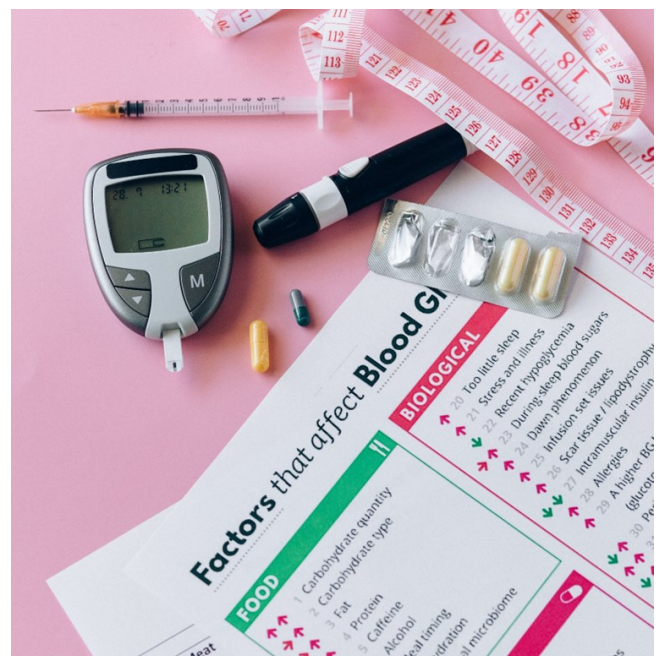
Why did we do this review?

The use of remote monitoring has been driven by the need to deliver health services efficiently. It could allow staff to use their time more effectively e.g. by reducing time spent travelling[3], and lead to fewer face-to-face appointments, therefore reducing costs[4].

Remote monitoring also offers many potential benefits to patients. Detecting changes in a patient's condition early means interventions can be made e.g. changes to medication[5]. Monitoring gives patients an opportunity to learn about their health condition and become more engaged in making decisions about their healthcare[6].

However, interventions vary widely, including:

♦ The technology used to measure health e.g. whether this automatically uploads data;

♦ The frequency of contact with healthcare professionals; and

♦ The type and content of feedback.

This variation creates challenges for those who are designing or delivering remote monitoring interventions, including policymakers and practitioners. Being able to find and understand evidence relevant to the type of remote monitoring which is being planned or delivered should aid decision-making.

Our aim was to map all the recent, high quality evidence on the use of remote monitoring for long-term physical health conditions, looking at both its effectiveness, and the acceptability and implementation of interventions.
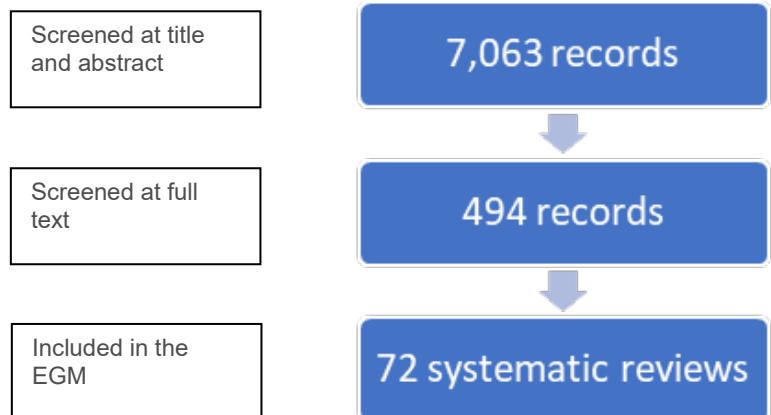
How did we make this EGM?

Finding the literature: We searched ten bibliographic databases for systematic reviews. We also searched the citations and reference lists of included reviews and registries of review protocols.

Eligibility criteria: Systematic reviews were included in the map. Included reviews:

• Focused on adult populations with a long-term physical health condition(s).

• Focused on any type of remote monitoring intervention, as long as data was passed to a healthcare professional.

• Contained studies conducted in high income countries.

• Were published in English from 2018 onwards.

Screened at title and abstract	7,063 records
Screened at full text	494 records
Included in the EGM	72 systematic reviews

Study selection, data extraction and assessment of study quality: Studies were screened independently by two re-viewers for inclusion. Data extraction and assessment of study quality were then carried out by one reviewer and checked by another. Disagreements were resolved through discussion. We used a standard tool, AMSTAR 2, to assess study quality.

Data were entered into EPPI-Reviewer 4 software and used to construct a web-based interactive map.

What did we find?

Of the 72 reviews investigating remote monitoring in adults with a long-term physical condition included in the map, 61 focus on effectiveness and 24 on how to implement remote monitoring, including whether it is acceptable to patients, carers and healthcare professionals.

Most reviews were assessed to be of low or critically low quality. Most reviews were rated of lower quality as they did not have a pre-registered protocol.

There were several areas of focus:

♦ Most reviews included studies from North America and Europe, with 38 including studies from the UK;

♦ The most common health conditions were heart disease, diabetes, and lung conditions;

♦ Nurses were the healthcare professional most often involved in interventions;

♦ Most feedback was by telephone and contained motivational/educational elements; and

♦ Reviews focused on whether remote monitoring affected physical and mental health, and health service use.

There were also gaps in the evidence:

♦ There was no or little evidence for some health conditions e.g. epilepsy; and

♦ Few reviews contained studies on the acceptability and implementation of remote monitoring for carers and healthcare professionals.

There was a lack of detail in the descriptions of the remote monitoring interventions in the reviews e.g. the type of healthcare professional involved was not reported consistently, or the content of feedback. There was also a lack of consistent reporting on factors (e.g. age, gender, and digital literacy) that could affect effectiveness of remote monitoring interventions.

The interactive EGM can be accessed HERE online.

The picture below shows the map which has a typical EGM format: the rows give details of the remote monitoring intervention and the columns show what outcomes were measured by the study.

Each cell shows the studies giving evidence on that particular combination of intervention and outcome, with the different colours of the squares in the cell indicating the quality of the studies. For each study, we have provided an abstract or summary and a link to the original source.

Filters can also be applied to the map, meaning the map only displays evidence for the selected filter. These filters include population categories and type of review.

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This is an evidence and gap map of systematic reviews. The rows show intervention categories and the columns indicate outcome categories. Both can be maximised or minimised by clicking the small arrows in the middle row. The cells in the table contain tiles, the number of these indicates the number of reviews in the cell. Different colours represent the study quality; if you hover over the map, you can see the meaning of each colour (key also available in left hand bottom corner of page). The full report, detailed map instructions, and a glossary are available.

What are the implications of this EGM?

Systematic reviews of the effectiveness, acceptability and implementation of remote monitoring for adults with long-term physical health conditions could provide evidence to support the provision of interventions.

There were several areas of evidence which could be particularly useful in informing the design and delivery of interventions:

♦ The effectiveness of remote monitoring for common health conditions such as heart disease, diabetes, and lung disease e.g. COPD;

♦ For measuring aspects of health status related to these conditions e.g. blood pressure, heart rate; and

♦ Using common devices such as heart rate monitors or blood pressure monitors.

There is a lack of research in some areas where further evidence could support the provision of remote monitoring, including:

♦ Evidence on other conditions such as dementia or epilepsy;

♦ The views of carers and healthcare professionals on factors which would improve the acceptability of monitoring and aid its implementation.

These gaps indicate a need for more studies. In some cases, this will be primary research, such as randomised controlled trials, to evaluate existing remote monitoring interventions. Where evidence exists, systematic reviews are needed to synthesis this research.

Studies should describe the details of remote monitoring interventions more clearly. A lack of clear reporting made it difficult to tell how similar interventions were in different reviews. Some information on participants e.g. age, digital literacy, was poorly reported yet has implications for effectiveness and health equity.

For this EGM, we had to exclude studies of interventions with multiple components (e.g. education and monitoring), so may have missed some relevant evidence. Whilst more than half of included reviews have serious methodological issues, they may still contain high quality studies.

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Please use the QR code to view the project report online:

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