



FOCUS ON RESEARCH

Exploring the feasibility of using remote respiratory monitoring to detect and manage exacerbations of chronic obstructive pulmonary disease.

Researchers

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Aim

Chronic Obstructive Pulmonary Disease (COPD) is a major cause of hospitalisation. Early detection of worsening of symptoms (exacerbations) may allow timely treatment and help people stay out of hospital. Telemonitoring is a system where people record their symptoms and take physiological measures at home. The measurements are automatically transmitted to their clinician who can advise the patient or change treatment. However, telemonitoring systems based on symptoms, oxygen levels and pulse rate have been disappointing in terms of reliably detecting exacerbations and improving outcomes.

Breathlessness is a sign of worsening of COPD. In this study we wished to find out if monitoring respiratory rate is potentially useful in detecting early deterioration that could lead to a hospital admission.

Project Outline/Methodology

The current 'gold standard' method for measuring respiratory rate is very cumbersome for patients to use. We compared five newly available respiratory rate monitors with the current method in 20 people with different degrees of COPD to find out how accurate they were. We then asked patients to wear the two most accurate ones in their home for two weeks to find out how their respiratory rate varied when they were resting and how it related to their oxygen levels, pulse rate and symptoms of breathlessness. We then asked people who had an exacerbation (worsening) of COPD to use the better of these devices to measure their resting respiratory rate to see if we could detect a gradual improvement as they got better. We hoped that this might indicate the possibility that in future we could detect a rise in respiratory rate in people who were becoming more ill. In addition we interviewed patients and clinicians about their experience of using the devices.

Key Results

Of the five devices we tested only two were sufficiently accurate in people with COPD to allow further testing. When we asked 20 people to try them out at home there were problems with fitting the devices and keeping them attached. We also found that the resting respiratory rate varied greatly from day-to-day and from person-to-person, so much so

that it would take around one month of readings to establish the baseline resting rate for an individual.

Based on patient preference, and reliability we selected a device for the final phase of the study. We attempted to recruit people who had been admitted to hospital with an exacerbation of COPD or who were being looked after the Community Respiratory Team. Many of those approached felt too ill to wear the device. We recruited 19 of whom 10 provide more than 20 readings. When we followed the course of the patients' recovery over three weeks we were able to demonstrate a small drop in the average respiratory rate (around 2 breaths per minute) for the whole group as they got better. However, individually the background variation was too great to distinguish this clearly in all but a few patients. We found that as patients recovered (judged by a rise in oxygen levels and a fall in pulse rate) respiratory rate fell, however the association was weak. In addition it was clear that patients would consider wearing the devices only for short periods and possibly not when they felt very ill.

Conclusions

Although in people with COPD currently available respiratory rate monitors are sufficiently accurate, and it is possible to detect average changes in respiratory rate with illness, individual and day-to-day variation in resting respiratory rate is so great that early identification of COPD exacerbations based on this is likely to be difficult. This would probably result in many time consuming false alerts.

What does this study add to the field?

This is the first study of its kind in people with COPD who are mobile. It shows that respiratory rate measurement is unlikely to improve the early diagnosis of COPD exacerbations.

Implications for Practice or Policy

This study shows that currently available respiratory rate monitors should not be added to telemonitoring systems in COPD.

Where to next?

It is not clear why the resting rate was so variable but some patients found it hard to sit still for long enough to get resting readings. We collected data on activity and hope that further analysis of these data may result in a more useful measure by combining activity and respiratory rate.

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