

# The use of a bedside radar device in cystic fibrosis to detect changes in breathing rate during respiratory exacerbation

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| <b>Submission date</b><br>06/04/2023   | <b>Recruitment status</b><br>No longer recruiting | <input type="checkbox"/> Prospectively registered<br><input type="checkbox"/> Protocol                       |
| <b>Registration date</b><br>15/05/2023 | <b>Overall study status</b><br>Ongoing            | <input type="checkbox"/> Statistical analysis plan<br><input type="checkbox"/> Results                       |
| <b>Last Edited</b><br>20/11/2024       | <b>Condition category</b><br>Respiratory          | <input type="checkbox"/> Individual participant data<br><input type="checkbox"/> Record updated in last year |

## Plain English summary of protocol

### Background and study aims

The aim of this study is to explore if the Circadia C100 Contactless Respiratory Monitoring System detects changes in respiratory rate during inpatient treatment for pulmonary exacerbation (chest infection) in adult patients with cystic fibrosis.

In a previous study (Project Breathe) in people who have Cystic Fibrosis we have shown that home monitoring (for example, lung function, weight, oxygen levels) can predict, using artificial intelligence, when a pulmonary exacerbation is developing before patients are aware of symptoms. We can therefore start treatment sooner and potentially reduce long term lung damage.

The Circadia Contactless Respiratory Monitor is a non-contact device that uses radar technology to monitor respiration, motion, and sleep. The basis for the technology is that ventilation causes mechanical displacement of the chest and abdomen. A radar sensor can thus be used to monitor a person's respiratory rate and respiration patterns by tracking such motion. Because respiratory rate is measured continuously, respiratory rate variation can also be determined, as can the rate of change over time.

If the system successfully detects changes in respiratory rate, we will then request ethical approval to do a larger study. This will be to evaluate if overnight contactless respiratory monitoring in the home setting improves an Artificial Intelligence derived predictive algorithm for pulmonary exacerbation in adults with cystic fibrosis.

### Who can participate?

Adults who are 18 years old or over, who have a diagnosis of cystic fibrosis and are able to perform home monitoring. Participants must be able to provide written informed consent, being admitted to Royal Papworth Hospital to receive treatment for a pulmonary exacerbation and already using the Project Breathe remote monitoring kit.

What does the study involve

When a participant is admitted to hospital for the treatment of a pulmonary exacerbation the bedside radar device will be set up in their room. It sits on the bedside table and continuously records breathing. Participants will have routine observations (including respiratory rate) monitored by the ward nursing team as per standard of care. Patients will also be asked to score their level of breathlessness during the admission using the modified Borg scale.

What are the potential benefits and risks of taking part?

There are no potential immediate benefits to taking part however, if the study proves successful it has the potential to improve the early diagnosis of pulmonary exacerbations at home. There are no known risks to taking part.

Where is the study run from?

Royal Papworth NHS Foundation Trust in Cambridge, UK.

When is the study starting and how long is it expected to run for?

March 2021 to May 2026

Who is funding the study?

Cystic Fibrosis Trust and LifeArc (UK)

Who is the main contact?

Dr Charles Haworth, [charles.haworth@nhs.net](mailto:charles.haworth@nhs.net)

## Contact information

### Type(s)

Principal investigator

### Contact name

Dr Charles Haworth

### Contact details

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## Additional identifiers

### Clinical Trials Information System (CTIS)

Nil known

### Integrated Research Application System (IRAS)

294760

### ClinicalTrials.gov (NCT)

Nil known

**Protocol serial number**

CPMS 48560, IRAS 294760

## Study information

**Scientific Title**

Continuous contactless respiratory monitoring in cystic fibrosis

**Acronym**

CCRM in CF

**Study objectives**

Does the Circadia C100 Contactless Respiratory Monitoring System show a change in respiratory rate in adult patients with cystic fibrosis (CF) during inpatient treatment for a pulmonary exacerbation?

**Ethics approval required**

Old ethics approval format

**Ethics approval(s)**

Approved 23/03/2021, West of Scotland REC 1 (West of Scotland Research Ethics Service, Ward 11, Dykebar Hospital, Grahamston Road, Paisley, PA2 7DE, UK; +44 (0)141 3140211; WoSREC1@ggc.scot.nhs.uk), ref: 21/WS/0025

**Study design**

Single centre prospective observational cohort study

**Primary study design**

Observational

**Study type(s)**

Other

**Health condition(s) or problem(s) studied**

Detection of change in respiratory rate in adult patients with cystic fibrosis during inpatient treatment for a pulmonary exacerbation.

**Interventions**

Following study consent, participants will have respiratory rate and related respiratory metrics (including respiratory rate variability, duration of inhalation and exhalation, ratio between respiration and pause events, respiratory patterns) recorded by the Circadia C100 Contactless Respiratory Monitor while in bed for the duration of the admission. Participants will have routine observations (including respiratory rate) monitored by the ward nursing team as per standard of care. Participants will also be asked to score the level of breathlessness during the admission using the modified Borg scale.

**Intervention Type**

Device

**Phase**

Not Applicable

**Drug/device/biological/vaccine name(s)**

Circadia C100 Contactless Respiratory Monitor

**Primary outcome(s)**

Change in mean respiration rate (breaths per minute) during admission day 1 to day 14. The ward nurses will measure respiration rate by counting how many times the participants chest rises in a minute. This information will then be documented in the medical notes.

**Key secondary outcome(s)**

Change in respiratory rate variability using breaths per minute over day 1 to 14. The ward nurses will measure respiration rate by counting how many times the participants chest rises in a minute. This information will then be documented in the medical notes.

**Completion date**

31/05/2026

**Eligibility****Key inclusion criteria**

1. Clinical diagnosis of Cystic Fibrosis and confirmed by genetic testing
2. Age  $\geq$  18 years of age at time of consent
3. Able to provide written informed consent
4. Admitted to Royal Papworth Hospital to receive treatment for a pulmonary exacerbation
5. Already using the Project Breathe remote monitoring kit

**Participant type(s)**

Patient

**Healthy volunteers allowed**

No

**Age group**

Adult

**Lower age limit**

18 years

**Sex**

All

**Total final enrolment**

8

**Key exclusion criteria**

1. Patients unable to provide written informed consent
2. Lung transplant recipients

**Date of first enrolment**

19/07/2022

**Date of final enrolment**

25/01/2023

## Locations

**Countries of recruitment**

United Kingdom

England

**Study participating centre**

**Royal Papworth Hospital NHS Foundation Trust**

Papworth Road

Cambridge Biomedical Campus

Cambridge

United Kingdom

CB2 0AY

## Sponsor information

**Organisation**

Royal Papworth NHS Foundation Trust

## Funder(s)

**Funder type**

Charity

**Funder Name**

Cystic Fibrosis Trust

**Alternative Name(s)**

Cystic Fibrosis, cystic fibrosis (CF), CF

**Funding Body Type**

Private sector organisation

**Funding Body Subtype**

Trusts, charities, foundations (both public and private)

**Location**

United Kingdom

**Funder Name**

LifeArc

**Alternative Name(s)****Funding Body Type**

Private sector organisation

**Funding Body Subtype**

Other non-profit organizations

**Location**

United Kingdom

## Results and Publications

**Individual participant data (IPD) sharing plan**

The datasets generated and/or data analysed during the current study are not expected to be made available until the end of all of the home monitoring studies that are currently underway /planned by this group.

**IPD sharing plan summary**

Other

**Study outputs**

| Output type                          | Details | Date created | Date added | Peer reviewed? | Patient-facing? |
|--------------------------------------|---------|--------------|------------|----------------|-----------------|
| <a href="#">HRA research summary</a> |         |              | 28/06/2023 | No             | No              |