

# Accuracy of ChARM automated respiratory rate counter in detecting fast breathing pneumonia in children

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<b>Registration date</b> 19/09/2024	<b>Overall study status</b> Completed	<input type="checkbox"/> Statistical analysis plan <input checked="" type="checkbox"/> Results
<b>Last Edited</b> 22/09/2025	<b>Condition category</b> Respiratory	<input type="checkbox"/> Individual participant data

## Plain English summary of protocol

### Background and study aims

According to the WHO Integrated Management of Childhood Illness (IMCI) guidelines, the diagnosis of pneumonia is primarily based on fast breathing. Identifying fast breathing is challenging, often leading to misdiagnosis of pneumonia and inappropriate treatment. Some improved pneumonia diagnostics (e.g., ChARM) can automatically count respiratory rate (RR) and identify fast breathing. This study aims to evaluate the performance of ChARM in counting RR in terms of accuracy and time to count RR.

### Who can participate?

Children under 5 years of age presenting at the participating health facilities with suspected pneumonia (e.g., cough and/or difficulty breathing)

### What does the study involve?

The children's RR will be measured using the ChARM device, and simultaneous chest movements will be video recorded. The video recordings were then sent to an expert panel for video RR interpretation. The accuracy of the ChARM device in counting RR will be assessed by comparing it to the expert panel's interpretation, which serves as the reference standard.

### What are the possible benefits and risks of participating?

There were no direct benefits from participating in this study, but the results may help improve the diagnosis of pneumonia in children in the future. No risks were anticipated from participation in this study.

### Where is the study run from?

The study is run by the Projahnmo Research Foundation, a non-governmental organization (NGO) based in Bangladesh.

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

July 2021 to April 2023

Who is funding the study?

The NIHR Global Health Research Unit on Respiratory Health (RESPIRE) at the University of Edinburgh funded the study

Who is the main contact?

Dr Ahad Mahmud Khan, Associate Scientist, Projahnmo Research Foundation, akhan@prfbd.org, ahad\_mahmud@hotmail.com

## Contact information

### Type(s)

Public, Scientific, Principal investigator

### Contact name

Dr Ahad Mahmud Khan

### ORCID ID

<https://orcid.org/0000-0002-4347-0825>

### Contact details

Projahnmo Research Foundation, Floor 7, House: 97A, Road: 25, Block # A, Banani  
Dhaka

Bangladesh

1213

+8801710574858

akhan@prfbd.org

### Type(s)

Public

### Contact name

Dr Ahad Mahmud Khan

### Contact details

Projahnmo Research Foundation, Floor 7, House: 97A, Road: 25, Block # A, Banani  
Dhaka

Bangladesh

1213

+8801710574858

ahad\_mahmud@hotmail.com

## Additional identifiers

### Clinical Trials Information System (CTIS)

Nil known

### Protocol serial number

Nil known

# Study information

## Scientific Title

Accuracy of ChARM automated respiratory rate counter in detecting fast breathing pneumonia in children

## Acronym

CHARM-RR

## Study objectives

The ChARM automated respiratory rate counter demonstrates comparable accuracy in detecting fast breathing pneumonia in children when compared to the reference standard of a video expert panel

## Ethics approval required

Ethics approval required

## Ethics approval(s)

1. approved 18/07/2021, Bangladesh Medical Research Council (BMRC) (BMRC Bhaban, Mohakhali, Dhaka, 1212, Bangladesh; +8802-222298396; info@bmrcbd.org), ref: 39315022021
2. approved 29/11/2021, Edinburgh Medical School Research Ethics Committee (EMREC) (The University of Edinburgh, College of Medicine and Veterinary Medicine, Teviot Place, Edinburgh, EH8 9AG, United Kingdom; +44 (0)131 650 1000; emrec@ed.ac.uk), ref: 21-EMREC-040

## Study design

Multicenter observational cross-sectional study

## Primary study design

Observational

## Study type(s)

Diagnostic

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

Diagnosis of fast breathing pneumonia in children

## Interventions

Identification of fast-breathing pneumonia using the ChARM automated respiratory counter with a video expert panel as the reference standard.

The children's respiratory rate will be measured using the ChARM device, and simultaneous chest movements will be video recorded. The duration of observation is approximately 30 minutes. This will be done once, with no follow-up. The video recordings will then be sent to an expert panel for interpretation of the respiratory rate.

## Intervention Type

Device

## Phase

Not Applicable

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

Children's Automated Respiration Monitor (ChARM)

**Primary outcome(s)**

The accuracy of ChARM in classifying fast breathing measured by comparing fast breathing detected by ChARM at enrollment with fast breathing assessed by the expert video panel.

**Key secondary outcome(s)**

The time taken by ChARM to count the respiratory rate was measured using a stopwatch or ARI timer at enrollment

**Completion date**

30/04/2023

## **Eligibility**

**Key inclusion criteria**

1. Infants under two months presenting with any illness
2. Children aged 2-59 months presenting with cough and/or difficulty breathing

**Participant type(s)**

Patient

**Healthy volunteers allowed**

No

**Age group**

Child

**Lower age limit**

0 months

**Upper age limit**

59 months

**Sex**

All

**Total final enrolment**

339

**Key exclusion criteria**

1. Children presenting with any danger sign
2. Parents who refused to provide consent

**Date of first enrolment**

06/12/2021

**Date of final enrolment**

31/12/2022

**Locations****Countries of recruitment**

Bangladesh

**Study participating centre****Institute of Child and Mother Health**

Matuail

Dhaka

Bangladesh

1362

**Study participating centre****Zakiganj Upazila Health Complex**

Zakiganj

Sylhet

Bangladesh

3190

**Study participating centre****Suprakandi Community Clinic**

Zakiganj

Sylhet

Bangladesh

3190

**Study participating centre****Bhuyar Bazar Community Clinic**

Zakiganj

Sylhet

Bangladesh

3190

**Study participating centre****Bakarshal Community Clinic**

Zakiganj

Sylhet  
Bangladesh  
3190

## Sponsor information

### Organisation

University of Edinburgh

### ROR

<https://ror.org/01nrxf90>

## Funder(s)

### Funder type

Government

### Funder Name

NIHR Global Health Research Unit on Respiratory Health (RESPIRE) at The University of Edinburgh

## Results and Publications

### Individual participant data (IPD) sharing plan

The datasets generated during and/or analysed during the current study will be stored in the DataStore repository at the University of Edinburgh, UK (<https://library.ed.ac.uk/research-support/research-data-service>).

### IPD sharing plan summary

Stored in publicly available repository

### Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
<a href="#">Results article</a>		21/08/2025	22/09/2025	Yes	No
<a href="#">Protocol article</a>		15/11/2022	19/09/2024	Yes	No
<a href="#">Participant information sheet</a>	PIS and consent form version 3.0	03/11/2023	19/09/2024	No	Yes
<a href="#">Thesis results</a>		25/10/2023	17/09/2024	No	No