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Humidified nasal high flow to improve clinical outcomes following severe exacerbations of chronic obstructive pulmonary disease

Submission date
18/02/2019

Recruitment status
No longer recruiting

Registration date
19/02/2019

Overall study status
Completed

Last Edited
07/01/2025

Condition category
Respiratory

[X] Prospectively registered
[_] Protocol
[_] Statistical analysis plan
[X] Results
[_] Individual participant data

Plain English summary of protocol

Background and study aims
Chronic Obstructive Pulmonary Disease (COPD) is a common lung disease, affecting 1.2 million people in the UK. COPD patients suffer with episodes of worsening breathing symptoms called exacerbations. Exacerbations occur more often as the disease progresses and are a leading cause of emergency hospitalisation. Patients recovering from exacerbations are at high risk of deteriorating, with one quarter readmitted to hospital within 30 days. COPD thus imposes immense burdens on the National Health Service and patients. This study will investigate the effects of using humidified nasal high-flow (HNHF) during recovery from severe COPD exacerbations. HNHF delivers warmed, humidified air under flows of up to 60 litres per minute through a nasal interface. This has been shown to improve clinical outcomes, including exacerbation frequency, hospitalisations, breathlessness and quality of life amongst COPD patients with respiratory failure. It is thought to achieve this by improving secretion clearance and providing positive airways pressure which supports the breathing system.

Who can participate?
Patients admitted to St Thomas' Hospital, London with COPD exacerbations

What does the study involve?
Before discharge, participants are randomly allocated to receive either usual care alone or usual care plus a HNHF device, which they are trained to use for a regular period daily. Usual care includes inhalers, steroids and may include antibiotics. Participants are followed up for 30 days after hospital discharge using weekly assessments, daily symptom diaries and wrist-worn watch-like devices that detect physical activity. This enables evaluation of the clinical effects of HNHF on re-exacerbations, readmissions, breathlessness, physical activity and quality of life. Device usage is also measured. Participants who receive devices are interviewed to explore their experiences. After the 30-day home follow-up period, a sub-group of participants undergoes detailed breathing tests during and after exercise to explore the effects of HNHF on the respiratory system.

What are the possible benefits and risks of participating?
It is known that HNHF reduces frequency of hospital admissions and exacerbations and improves symptoms and quality of life in stable COPD patients. This study investigates whether it also has these beneficial effects in COPD patients recovering from severe exacerbations. There are no reported adverse side effects of using the device.

Where is the study run from?
Guy's and St Thomas' NHS Foundation Trust (UK)

When is the study starting and how long is it expected to run for?
September 2018 to August 2021

Who is funding the study?
National Institute for Health Research (NIHR) (UK)

Who is the main contact?
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Contact information

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Scientific

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Additional identifiers

EudraCT/CTIS number
Nil known

IRAS number

ClinicalTrials.gov number
NCT03899558

Secondary identifying numbers
CPMS 40985

Study information

Scientific Title
The role of nasal high-flow to reduce 30-day hospital readmissions following severe exacerbations of chronic obstructive pulmonary disease: a mixed-methods feasibility study

Acronym
NHF Post-AECOPD

Study objectives
The primary objective is to estimate the effects of humidified nasal high flow on clinical outcomes that are important to patients and healthcare services (30-day hospital readmission, re-exacerbation, breathlessness, health-related quality of life and physical activity), explore patients' experiences of using the device and understand the effects it has on the breathing system during physical exertion.

Ethics approval required
Old ethics approval format

Ethics approval(s)
Approved 20/03/2019, London – Harrow Research Ethics Committee, Bristol HRA Centre, Level 3, Block B Whitefriars, Lewins Mead, Bristol, BS1 2NT, Tel: +44 (0)2071048056, Email: nrescommittee.london-harrow@nhs.net, ref: 19/LO/0194

Study design
Randomized controlled trial

Primary study design
Interventional

Secondary study design
Randomised controlled trial

Study setting(s)
Hospital

Study type(s)
Treatment

Participant information sheet
Not available in web format, please use the contact details to request a patient information sheet

Health condition(s) or problem(s) studied
Chronic obstructive pulmonary disease

Interventions
Patients admitted to St Thomas' Hospital, London with COPD exacerbations will be recruited. Prior to discharge, participants will be randomised to receive either usual care alone or usual care plus a nasal high-flow (NHF) device, which they will be trained to use for a regular period daily. Usual care includes inhalers, and steroids and may include antibiotics.

Participants will be followed up for 30 days after hospital discharge using weekly assessments, daily symptom diaries and wrist-worn watch-like devices that detect physical activity. This will enable evaluation of the clinical effects of NHF on re-exacerbations, readmissions, breathlessness, physical activity and quality of life. Device usage will also be quantified. Participants who receive devices will be interviewed to explore their experiences. After the 30-day home follow-up period, a sub-group of participants will undergo detailed breathing tests during and after exercise to explore the effects of NHF on the respiratory system.

Intervention Type
Device

Pharmaceutical study type(s)
Not Applicable

Phase
Not Applicable

Drug/device/biological/vaccine name(s)
Nasal high-flow (NHF) device

Primary outcome measure
Estimate of the standard deviation for and possible effect size of 30-day hospital readmission to inform the design of a Phase III multicentre RCT: measured using symptom diaries and medical records at weeks 1, 2, 3, 4 following hospital discharge

Secondary outcome measures
Current secondary outcome measures as of 22/03/2019:
Feasibility:
1. Recruitment rate of eligible patients, measured using the number of eligible patients

consenting to participate in the study during the period of recruitment.
2. Adherence with completion of outcome measures, measured by reviewing adherence to the study protocol following completion of individual participants' study completion
3. Participant's NHF device usage, measured from the device following individual participants' study completion

Clinical: obtaining estimates of standard deviations and possible effect size of:
1. Admission and non-admission re-exacerbation, measured using symptom diaries at weeks 1, 2, 3, 4
2. Breathlessness, measured daily using symptom diaries, modified Borg and VAS scores for 30 days following hospital discharge and weekly Multidimensional Dyspnoea Profile (MDP) in weeks 1, 2, 3, 4
3. Physical activity, measured continuously using wrist-worn physical activity monitors for the 30-day follow-up period
4. Health-related quality of life, measured using COPD Assessment Test and Clinical COPD Questionnaire at admission, discharge and weekly at weeks 1, 2, 3, 4
5. Lung function, measured using weekly measurements of spirometry at weeks 1, 2, 3, 4

Acceptability of NHF, assessed using qualitative evaluation – a semi-structured interview at week 4

Proof-of-concept sub-study:
1. Inspiratory capacity, measured during incremental exercise testing
2. Breathlessness, measured using mBorg score and MDP before, during and after exercise testing
3. Neural respiratory drive, measured continuously using electromyography during exercise testing
4. Pulmonary mechanics, including pulmonary pressures and flow, measured continuously using a pressure transducer and pneumotachograph during exercise testing
4. Time to recover from maximal breathlessness, measured with a timer, as time from maximal mBorg score to pre-exercise baseline score

Previous secondary outcome measures:
Feasibility:
1, Recruitment rate of eligible patients, measured using the number of eligible patients consenting to participate in the study during the period of recruitment.
2. Adherence with completion of outcome measures, measured by reviewing adherence to the study protocol (completion of all measured variables) following completion of individual participants' study completion
3. Participant's NHF device usage, measured directly from the device following individual participants' study completion

Clinical: obtaining estimates of standard deviations and possible effect size of:
1. Non-admission re-exacerbation, measured using symptom diaries at weeks 1, 2, 3, 4
2. Breathlessness, measured daily using symptom diaries, modified Borg and VAS scores for 30 days following hospital discharge and weekly Multidimensional Dyspnoea Profile (MDP) in weeks 1, 2, 3, 4
3. Physical activity, measured continuously using wrist-worn physical activity monitors for the 30-day follow-up period
4. Health-related quality of life, measured using COPD Assessment Test, Clinical COPD Questionnaire at admission, discharge and weekly at weeks 1, 2, 3, 4
5. Lung function, measured using weekly measurements of spirometry at weeks 1, 2, 3, 4

Acceptability of NHF, assessed using qualitative evaluation – a semi-structured interview at week 4

Proof-of-concept sub-study:
1. Peak exercise capacity, measured using peak work during maximal exercise testing
2. Breathlessness, measured during mBorg score and MDP during exercise testing
3. Neural respiratory drive, measured continuously using electromyography during exercise testing
4. Time to recover from maximal breathlessness, measured with a timer, time from maximal mBorg score to pre-exercise baseline score

Overall study start date
01/09/2018

Completion date
01/08/2021

Eligibility

Key inclusion criteria
1. Emergency hospital admission with a primary diagnosis of AECOPD
2. Aged 40-80 years
3. > = 10 pack year smoking history
4. Body mass index < = 35kg/m2
5. Cognitively and linguistically able to follow English instructions, provide informed consent and complete the study protocol
6. To be discharged home following the hospitalisation in a home environment deemed safe by the investigator to perform home assessments
7. Patient lives in the catchment area served by the Integrated Respiratory Team at Guy's and St Thomas' NHS Foundation Trust

Participant type(s)
Patient

Age group
Adult

Sex
Both

Target number of participants
Planned Sample Size: 80; UK Sample Size: 80

Total final enrolment
18

Key exclusion criteria
1. Chest radiograph shows pneumothorax
2. Requirement for acute NIV during index hospitalisation or established on home PAP
3. Significant chronic respiratory failure ($PaCO_2$ > 7.0)

4. Clinically significant obstructive sleep apnoea requiring treatment
5. Allergies to latex, metals or local anaesthetic
6. Broken or inflamed skin at the second intercostal space parasternal chest wall areas
7. Psychological or social factors that would impair compliance with the study protocol
8. Any major non-COPD chronic co-morbidity that may contribute significantly to risk of readmission, including (but not limited to) severe heart failure (left ventricular ejection fraction < 30%), malignancy (active treatment or palliation), end stage renal failure and significant neuromuscular disease
9. Planned travel away from home in the 30-day post-discharge period

Date of first enrolment
01/04/2019

Date of final enrolment
24/03/2021

Locations

Countries of recruitment
England

United Kingdom

Study participating centre
Guy’s and St Thomas’ NHS Foundation Trust
St Thomas’ Hospital
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Sponsor information

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Sponsor type
Hospital/treatment centre

ROR
https://ror.org/00j161312

Funder(s)

Funder type
Government

Funder Name
NIHR Academy; Grant Codes: DRF-2018-11-ST2-037

Results and Publications

Publication and dissemination plan
The results of this study will be published in a high-impact factor peer-reviewed journal and will be presented at international conferences. A lay results summary will be provided to study participants upon study completion. The trialists do not plan to provide additional study documents.

Intention to publish date
01/01/2023

Individual participant data (IPD) sharing plan
The datasets generated and/or analysed during the current study during this study will be included in the subsequent results publication.

IPD sharing plan summary
Published as a supplement to the results publication

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
HRA research summary			28/06/2023	No	No
Results article		06/01/2025	07/01/2025	Yes	No