A randomised controlled trial and cost-effectiveness analysis of high-frequency oscillatory ventilation against conventional artificial ventilation for adults with acute respiratory distress syndrome. The OSCAR (OSCillation in ARDS) study

Ranjit Lall,[1] Patrick Hamilton,[2] Duncan Young,[3,4*] Claire Hulme,[2] Peter Hall,[2] Sanjoy Shah,[5] Iain MacKenzie,[6] William Tunnicliffe,[6] Kathy Rowan,[7] Brian Cuthbertson,[8] Chris McCabe[2] and Sallie Lamb[1] on behalf of the OSCAR collaborators[†]

[1]Warwick Clinical Trials Unit, University of Warwick, Warwick, UK
[2]University of Leeds, Leeds, UK
[3]John Radcliffe Hospital, Oxford, UK
[4]University of Oxford, Oxford, UK
[5]Bristol Royal Infirmary, Bristol, UK
[6]Queen Elizabeth Hospital, Birmingham, UK
[7]Intensive Care National Audit & Research Centre, London, UK
[8]Sunnybrook Health Sciences Centre, Toronto, ON, Canada

*Corresponding author
†The list of collaborators is in *Appendix 5*

Declared competing interests of authors: Dr Young was a Health Technology Assessment programme commissioning board member during the study and is currently a consultant advisor for the National Institute for Health Research Efficacy and Mechanism Evaluation programme. Professor Hulme is a Health Technology Assessment commissioning board member. Professor Lamb chairs the Health Technology Assessment Clinical Evaluation and Trials Board.

Published March 2015
DOI: 10.3310/hta19230

Plain English summary

The OSCAR (OSCillation in ARDS) study

Health Technology Assessment 2015; Vol. 19: No. 23
DOI: 10.3310/hta19230

NIHR Journals Library www.journalslibrary.nihr.ac.uk

Plain English summary

The acute respiratory distress syndrome (ARDS) is a term covering most acute, severe, lung conditions that cause a reduction in the blood oxygen level. Most patients with ARDS need a period of treatment on an artificial ventilator (breathing machine) if they are to survive.

While initially life-saving, artificial ventilation using standard ventilator settings can further injure the patient's lungs and perpetuate, rather than cure, the lung inflammation that is the hallmark of ARDS. It is believed that 1 in 12 ventilated patients with ARDS may die as a result of the effects of artificial ventilation rather than the ARDS itself.

High-frequency oscillatory ventilation (HFOV) is a form of artificial ventilation where very small breaths are given very frequently (up to 10 times a second) while the patients' lungs are kept in a partly inflated state. This is believed to reduce the mechanical trauma to the lungs that causes the continued inflammation. The OSCAR (OSCillation in ARDS) study was set up to see if HFOV improved survival in patients with ARDS.

A total of 795 patients were randomised to either HFOV or conventional artificial ventilation. One hundred and sixty-six of 398 patients (41.7%) in the HFOV group and 163 of 397 patients (41.1%) in the conventional ventilation group died within 30 days. HFOV did not reduce the hospital stay of the survivors, but did increase the use of sedative and muscle-relaxant drugs during artificial ventilation.

The cost to the NHS of treating patients with ARDS for the time in hospital and the first year after their illness was higher in the HFOV patients, at £44,550, compared with £40,129 in those patients on conventional ventilation. Adding in the cost of patient and carers' expenses and the loss of earnings, the total cost to society was £50,583 in the HFOV group compared with £45,568 in the conventional ventilation patients.

In the first year after their illness, patients reported their quality of life at 30% of maximum in the HFOV group, compared with 25% in the conventional ventilation group. The computed cost to society of giving one patient a year of full-quality life was £88,790. Treatments at this price are not usually considered cost-effective.

In conclusion, we were unable to find any benefit or harm to the patients from the use of HFOV in adult patients with ARDS. We suggest that this mode of ventilation not be used for routine care. At the same time as this study was reported in the medical literature, a Canadian research team published the OSCILLATE study of HFOV [Ferguson ND, Cook DJ, Guyatt GH, Mehta S, Hand L, Austin P, *et al.* High-frequency oscillation in early acute respiratory distress syndrome. *N Engl J Med* 2013;**368**(9):795–805] which demonstrated an increased number of deaths in the HFOV group (47% vs. 35% in the control group). Overall we believe there may be better techniques to prevent lung damage during in patients with ARDS and suggest research funding is directed at these rather than at continued studies of HFOV.

© Queen's Printer and Controller of HMSO 2015. This work was produced by Lall *et al.* under the terms of a commissioning contract issued by the Secretary of State for Health. This issue may be freely reproduced for the purposes of private research and study and extracts (or indeed, the full report) may be included in professional journals provided that suitable acknowledgement is made and the reproduction is not associated with any form of advertising. Applications for commercial reproduction should be addressed to: NIHR Journals Library, National Institute for Health Research, Evaluation, Trials and Studies Coordinating Centre, Alpha House, University of Southampton Science Park, Southampton SO16 7NS, UK.

Health Technology Assessment

HTA/HTA TAR

ISSN 1366-5278 (Print)

ISSN 2046-4924 (Online)

Impact factor: 5.116

Health Technology Assessment is indexed in MEDLINE, CINAHL, EMBASE, The Cochrane Library and the ISI Science Citation Index and is assessed for inclusion in the Database of Abstracts of Reviews of Effects.

This journal is a member of and subscribes to the principles of the Committee on Publication Ethics (COPE) (www.publicationethics.org/).

Editorial contact: nihredit@southampton.ac.uk

The full HTA archive is freely available to view online at www.journalslibrary.nihr.ac.uk/hta. Print-on-demand copies can be purchased from the report pages of the NIHR Journals Library website: www.journalslibrary.nihr.ac.uk

Criteria for inclusion in the *Health Technology Assessment* journal

Reports are published in *Health Technology Assessment* (HTA) if (1) they have resulted from work for the HTA programme, and (2) they are of a sufficiently high scientific quality as assessed by the reviewers and editors.

Reviews in *Health Technology Assessment* are termed 'systematic' when the account of the search appraisal and synthesis methods (to minimise biases and random errors) would, in theory, permit the replication of the review by others.

HTA programme

The HTA programme, part of the National Institute for Health Research (NIHR), was set up in 1993. It produces high-quality research information on the effectiveness, costs and broader impact of health technologies for those who use, manage and provide care in the NHS. 'Health technologies' are broadly defined as all interventions used to promote health, prevent and treat disease, and improve rehabilitation and long-term care.

The journal is indexed in NHS Evidence via its abstracts included in MEDLINE and its Technology Assessment Reports inform National Institute for Health and Care Excellence (NICE) guidance. HTA research is also an important source of evidence for National Screening Committee (NSC) policy decisions.

For more information about the HTA programme please visit the website: http://www.nets.nihr.ac.uk/programmes/hta

This report

The research reported in this issue of the journal was funded by the HTA programme as project number 06/04/01. The contractual start date was in June 2007. The draft report began editorial review in May 2013 and was accepted for publication in February 2014. The authors have been wholly responsible for all data collection, analysis and interpretation, and for writing up their work. The HTA editors and publisher have tried to ensure the accuracy of the authors' report and would like to thank the reviewers for their constructive comments on the draft document. However, they do not accept liability for damages or losses arising from material published in this report.

This report presents independent research funded by the National Institute for Health Research (NIHR). The views and opinions expressed by authors in this publication are those of the authors and do not necessarily reflect those of the NHS, the NIHR, NETSCC, the HTA programme or the Department of Health. If there are verbatim quotations included in this publication the views and opinions expressed by the interviewees are those of the interviewees and do not necessarily reflect those of the authors, those of the NHS, the NIHR, NETSCC, the HTA programme or the Department of Health.

© Queen's Printer and Controller of HMSO 2015. This work was produced by Lall *et al.* under the terms of a commissioning contract issued by the Secretary of State for Health. This issue may be freely reproduced for the purposes of private research and study and extracts (or indeed, the full report) may be included in professional journals provided that suitable acknowledgement is made and the reproduction is not associated with any form of advertising. Applications for commercial reproduction should be addressed to: NIHR Journals Library, National Institute for Health Research, Evaluation, Trials and Studies Coordinating Centre, Alpha House, University of Southampton Science Park, Southampton SO16 7NS, UK.

Published by the NIHR Journals Library (www.journalslibrary.nihr.ac.uk), produced by Prepress Projects Ltd, Perth, Scotland (www.prepress-projects.co.uk).

Editor-in-Chief of *Health Technology Assessment* and NIHR Journals Library

Professor Tom Walley Director, NIHR Evaluation, Trials and Studies and Director of the HTA Programme, UK

NIHR Journals Library Editors

Professor Ken Stein Chair of HTA Editorial Board and Professor of Public Health, University of Exeter Medical School, UK

Professor Andree Le May Chair of NIHR Journals Library Editorial Group (EME, HS&DR, PGfAR, PHR journals)

Dr Martin Ashton-Key Consultant in Public Health Medicine/Consultant Advisor, NETSCC, UK

Professor Matthias Beck Chair in Public Sector Management and Subject Leader (Management Group), Queen's University Management School, Queen's University Belfast, UK

Professor Aileen Clarke Professor of Public Health and Health Services Research, Warwick Medical School, University of Warwick, UK

Dr Tessa Crilly Director, Crystal Blue Consulting Ltd, UK

Dr Peter Davidson Director of NETSCC, HTA, UK

Ms Tara Lamont Scientific Advisor, NETSCC, UK

Professor Elaine McColl Director, Newcastle Clinical Trials Unit, Institute of Health and Society, Newcastle University, UK

Professor William McGuire Professor of Child Health, Hull York Medical School, University of York, UK

Professor Geoffrey Meads Professor of Health Sciences Research, Faculty of Education, University of Winchester, UK

Professor John Powell Consultant Clinical Adviser, National Institute for Health and Care Excellence (NICE), UK

Professor James Raftery Professor of Health Technology Assessment, Wessex Institute, Faculty of Medicine, University of Southampton, UK

Dr Rob Riemsma Reviews Manager, Kleijnen Systematic Reviews Ltd, UK

Professor Helen Roberts Professor of Child Health Research, UCL Institute of Child Health, UK

Professor Helen Snooks Professor of Health Services Research, Institute of Life Science, College of Medicine, Swansea University, UK

Please visit the website for a list of members of the NIHR Journals Library Board:
www.journalslibrary.nihr.ac.uk/about/editors

Editorial contact: nihredit@southampton.ac.uk