

# A national quality improvement programme to improve survival after emergency abdominal surgery: the EPOCH stepped-wedge cluster RCT

Carol J Peden,<sup>1</sup> Tim Stephens,<sup>2</sup> Graham Martin,<sup>3</sup>  
Brennan C Kahan,<sup>4</sup> Ann Thomson,<sup>4</sup> Kirsty Everingham,<sup>2</sup>  
David Kocman,<sup>3</sup> Jose Lourtie,<sup>5</sup> Sharon Drake,<sup>5</sup>  
Alan Girling,<sup>6</sup> Richard Lilford,<sup>7</sup> Kate Rivett,<sup>8</sup>  
Duncan Wells,<sup>9</sup> Ravi Mahajan,<sup>10</sup> Peter Holt,<sup>11</sup>  
Fan Yang,<sup>12</sup> Simon Walker,<sup>12</sup> Gerry Richardson,<sup>12</sup>  
Sally Kerry,<sup>4</sup> Iain Anderson,<sup>13</sup> Dave Murray,<sup>14</sup>  
David Cromwell,<sup>15</sup> Mandeep Phull,<sup>2,16</sup>  
Mike PW Grocott,<sup>17,18</sup> Julian Bion<sup>19</sup>  
and Rupert M Pearse<sup>2\*</sup> on behalf of the EPOCH  
trial group<sup>†</sup>

<sup>1</sup>Keck School of Medicine, University of Southern California, Los Angeles, CA, USA

<sup>2</sup>William Harvey Research Institute, Queen Mary University of London, London, UK

<sup>3</sup>Health Sciences, University of Leicester, Leicester, UK

<sup>4</sup>Pragmatic Clinical Trials Unit, Queen Mary University of London, London, UK

<sup>5</sup>Royal College of Anaesthetists, London, UK

<sup>6</sup>Institute of Applied Health Research, University of Birmingham, Birmingham, UK

<sup>7</sup>Warwick Medical School, University of Warwick, Coventry, UK

<sup>8</sup>Patient representative, London, UK

<sup>9</sup>Patient representative, Buckinghamshire, UK

<sup>10</sup>Faculty of Medicine & Health Sciences, University of Nottingham, Nottingham, UK

<sup>11</sup>Molecular and Clinical Sciences Research Institute, St George's University of London, London, UK

<sup>12</sup>Centre for Health Economics, University of York, York, UK

<sup>13</sup>Salford Royal Hospital NHS Foundation Trust, Manchester, UK

<sup>14</sup>South Tees Hospitals NHS Foundation Trust, Middlesbrough, UK

<sup>15</sup>London School of Hygiene and Tropical Medicine, London, UK

<sup>16</sup>Department of Anaesthesia and Intensive Care, Queen's Hospital, Romford, UK

<sup>17</sup>National Institute for Health Research Biomedical Research Centre, University Hospital Southampton NHS Foundation Trust, Southampton, UK

<sup>18</sup>Anaesthesia and Critical Care Research Unit, University of Southampton, Southampton, UK

<sup>19</sup>Institute of Clinical Sciences, University of Birmingham, Birmingham, UK

\*Corresponding author [pearse@qmul.ac.uk](mailto:pearse@qmul.ac.uk)

†Trial group membership listed in *Appendix 1*

**Declared competing interests of authors:** Carol J Peden has performed consultancy work for Merck & Co./Merck Sharp & Dohme (Kenilworth, NJ, USA) and for the Institute for Healthcare Improvement (Boston, MA, USA). Graham Martin reports grants from the National Institute for Health Research (NIHR) and personal fees from the BMJ Publishing Group Ltd (London, UK) and is a member of the Health Technology Assessment (HTA) National Stakeholder Advisory Group. Dave Murray reports personal fees from the National Emergency Laparotomy Audit (NELA). David Cromwell reports grants from NELA and is a member of the NELA project team, which provided data and assistance to the project. Mike PW Grocott is a NIHR Clinical Research Network Specialty Lead for Anaesthesia Perioperative Medicine and Pain; the chairperson of the National Institute of Academic Anaesthesia Board; the president of the Critical Care Medicine Section, Royal Society of Medicine; a board member of Evidence Based Perioperative Medicine (EBPOM) UK (London, UK), EBPOM USA (Bannockburn, IL, USA) and EBPOM International; and a board member of Medinspire Ltd (Bridgnorth, UK). Rupert M Pearse holds research grants, has given lectures and/or has performed consultancy work for B.Braun Medical Ltd (Sheffield, UK), GlaxoSmithKline plc (London, UK), Intersurgical Ltd (Wokingham, UK) and Edwards Lifesciences (Irvine, CA, USA). Rupert M Pearse also holds a grant for the submitted work and a NIHR Research Professorship and is a NIHR HTA General Board member.

**Published September 2019**

DOI: 10.3310/hsdr07320

## Plain English summary

### The EPOCH RCT

Health Services and Delivery Research 2019; Vol. 7: No. 32

DOI: 10.3310/hsdr07320

NIHR Journals Library [www.journalslibrary.nihr.ac.uk](http://www.journalslibrary.nihr.ac.uk)

# Plain English summary

## Background

Emergency abdominal surgery can result in poor outcomes for patients. Around 30,000 patients have this surgery each year in the NHS and 1 in 10 will die within 30 days. There are wide variations in care between hospitals, and researchers have already studied the effect of quality improvement (QI) programmes to encourage the use of routine treatments known to help these patients. These studies suggest improved patient survival, but most used poor-quality research designs, which could produce misleading results.

## What we did

We studied whether or not a large national QI programme for patients undergoing emergency abdominal surgery would improve survival. Our research was designed to resolve problems that may have previously caused misleading results. This involved placing hospitals into small groups, or clusters, and launching the QI programme every 5 weeks in one cluster selected at random. We also interviewed and observed staff participating in the study to understand how the programme worked and used an economic analysis to establish whether or not the programme offered value for money.

## What we found

We included 15,873 patients aged  $\geq 40$  years in 93 NHS hospitals. Medical teams engaged positively with the QI programme, but had limited time and resources to implement all the suggested changes. As a result, there were only small changes in patient care and the QI programme did not improve survival. There were wide variations between hospitals in which aspects of patient care teams tried to change. Our analysis of the associated costs suggested that the programme may not be cost-effective, although this was subject to considerable uncertainty.

## What this research tells us

Despite the early success of small projects, we found no survival benefit from a national QI programme for patients undergoing emergency abdominal surgery. Our research suggests that insufficient staff time may have been a critical factor, but there are other possible reasons. Similar programmes will succeed only if staff have the time and resources needed to deliver them.



# Health Services and Delivery Research

ISSN 2050-4349 (Print)

ISSN 2050-4357 (Online)

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

Editorial contact: [journals.library@nihr.ac.uk](mailto:journals.library@nihr.ac.uk)

The full HS&DR archive is freely available to view online at [www.journalslibrary.nihr.ac.uk/hsdr](http://www.journalslibrary.nihr.ac.uk/hsdr). Print-on-demand copies can be purchased from the report pages of the NIHR Journals Library website: [www.journalslibrary.nihr.ac.uk](http://www.journalslibrary.nihr.ac.uk)

## Criteria for inclusion in the *Health Services and Delivery Research* journal

Reports are published in *Health Services and Delivery Research* (HS&DR) if (1) they have resulted from work for the HS&DR programme, and (2) they are of a sufficiently high scientific quality as assessed by the reviewers and editors.

## HS&DR programme

The HS&DR programme funds research to produce evidence to impact on the quality, accessibility and organisation of health and social care services. This includes evaluations of how the NHS and social care might improve delivery of services.

For more information about the HS&DR programme please visit the website at <https://www.nihr.ac.uk/explore-nihr/funding-programmes/health-services-and-delivery-research.htm>

## This report

The research reported in this issue of the journal was funded by the HS&DR programme or one of its preceding programmes as project number 12/5005/10. The contractual start date was in December 2013. The final report began editorial review in August 2018 and was accepted for publication in May 2019. The authors have been wholly responsible for all data collection, analysis and interpretation, and for writing up their work. The HS&DR editors and production house have tried to ensure the accuracy of the authors' report and would like to thank the reviewers for their constructive comments on the final report 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 HS&DR programme or the Department of Health and Social Care. 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 HS&DR programme or the Department of Health and Social Care.

**© Queen's Printer and Controller of HMSO 2019. This work was produced by Peden *et al.* under the terms of a commissioning contract issued by the Secretary of State for Health and Social Care. 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](http://www.journalslibrary.nihr.ac.uk)), produced by Prepress Projects Ltd, Perth, Scotland ([www.prepress-projects.co.uk](http://www.prepress-projects.co.uk)).

## NIHR Journals Library Editor-in-Chief

**Professor Ken Stein** Professor of Public Health, University of Exeter Medical School, UK

## NIHR Journals Library Editors

**Professor John Powell** Chair of HTA and EME Editorial Board and Editor-in-Chief of HTA and EME journals. Consultant Clinical Adviser, National Institute for Health and Care Excellence (NICE), UK, and Honorary Professor, University of Manchester, and Senior Clinical Researcher and Associate Professor, Nuffield Department of Primary Care Health Sciences, University of Oxford, UK

**Professor Andrée Le May** Chair of NIHR Journals Library Editorial Group (HS&DR, PGfAR, PHR journals) and Editor-in-Chief of HS&DR, PGfAR, PHR journals

**Professor Matthias Beck** Professor of Management, Cork University Business School, Department of Management and Marketing, University College Cork, Ireland

**Dr Tessa Crilly** Director, Crystal Blue Consulting Ltd, UK

**Dr Eugenia Cronin** Senior Scientific Advisor, Wessex Institute, UK

**Dr Peter Davidson** Consultant Advisor, Wessex Institute, University of Southampton, UK

**Ms Tara Lamont** Director, NIHR Dissemination Centre, UK

**Dr Catriona McDaid** Senior Research Fellow, York Trials Unit, Department of Health Sciences, University of York, UK

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

**Professor Geoffrey Meads** Professor of Wellbeing Research, University of Winchester, UK

**Professor John Norrie** Chair in Medical Statistics, University of Edinburgh, 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 Great Ormond Street Institute of Child Health, UK

**Professor Jonathan Ross** Professor of Sexual Health and HIV, University Hospital Birmingham, UK

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

**Professor Ken Stein** Professor of Public Health, University of Exeter Medical School, UK

**Professor Jim Thornton** Professor of Obstetrics and Gynaecology, Faculty of Medicine and Health Sciences, University of Nottingham, UK

**Professor Martin Underwood** Warwick Clinical Trials Unit, Warwick Medical School, University of Warwick, UK

Please visit the website for a list of editors: [www.journalslibrary.nihr.ac.uk/about/editors](http://www.journalslibrary.nihr.ac.uk/about/editors)

**Editorial contact:** [journals.library@nihr.ac.uk](mailto:journals.library@nihr.ac.uk)