Care bundles to reduce re-admissions for patients with chronic obstructive pulmonary disease: a mixed-methods study

Katherine Morton,1 Emily Sanderson,1,2 Padraig Dixon,1 Anna King,1 Sue Jenkins,3 Stephanie J MacNeill,1,2 Alison Shaw,1 Chris Metcalfe,1,2 Melanie Chalder,1 William Hollingworth,1 Jonathan Benger,4 James Calvert5 and Sarah Purdy1*

1Bristol Medical School, University of Bristol, Bristol, UK
2Bristol Randomised Trials Collaboration, University of Bristol, Bristol, UK
3Sue Jenkins Consulting, Bristol, UK
4Faculty of Health and Applied Sciences, University of the West of England, Bristol, UK
5Southmead Hospital, North Bristol NHS Trust, Bristol, UK

*Corresponding author sarah.purdy@bristol.ac.uk

Declared competing interests of authors: Sarah Purdy is a general practitioner, and Jonathan Benger and James Calvert are hospital consultants working in the fields of emergency care and respiratory medicine, respectively. All have endeavoured to ensure that their input to the research has not been biased by their own clinical practice. James Calvert worked with colleagues at the British Thoracic Society to design and evaluate care bundles as an intervention to improve outcomes in a number of different respiratory conditions including chronic obstructive pulmonary disease, pneumonia and asthma. Sarah Purdy is a member of the National Institute for Health Research (NIHR) Health Services and Delivery Research Researcher-led Panel, from 2017 to date. William Hollingworth is a member of the NIHR Health Technology Assessment Clinical Trials Board. Sue Jenkins runs an independent consultancy for public and charitable sector clients, providing strategy and organisation development, leadership coaching and facilitation. Melanie Chalder reports a Medical Research Council Proximity to Discovery award outside the submitted work.

Published June 2019
DOI: 10.3310/hsdr07210

Scientific summary

Care bundles to reduce re-admissions for patients with COPD
Health Services and Delivery Research 2019; Vol. 7: No. 21
DOI: 10.3310/hsdr07210

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

Introduction

Chronic obstructive pulmonary disease (COPD) is one of the most common respiratory diseases in the UK. It is estimated that the prevalence of people with COPD in the UK is > 3 million, of whom only about one-third have been diagnosed. It accounts for 10% of hospital medical admissions (> 90,000 annually) in the UK. One-third of these patients are re-admitted to hospital within 28 days of discharge, and mortality rates in hospitals vary considerably across the country. One strategy that has shown potential to improve clinical outcomes is the use of care bundles. Care bundles are sets of evidence-based interventions, elements of which are known to optimise clinical outcomes. Admission and discharge care bundles for COPD were developed by the British Thoracic Society (BTS) in association with NHS Improvement, combining evidence-based processes of care in defined packages.

Objectives

The aim of the study was to evaluate the impact of admission and discharge care bundles for patients admitted to hospital with COPD on re-admission rates, mortality, length of stay, patient and carer experience, process and costs of care. The objectives were to:

- determine the impact of implementing COPD care bundles on the proportion of patients re-admitted to hospital within 28 days of discharge
- assess the impact of COPD care bundles on in-hospital mortality, length of stay and total number of bed-days
- monitor re-admission and mortality rates in the 90 days following discharge
- assess the impact of care bundles on patient and carer experience
- describe in detail the local context and process of implementation of care bundles for COPD across a range of case study sites, including information on the setting (location and relationship with other services), current practice/policies, workforce impact (training, workload, number and range of staff involved, skill-mix and expertise), clinician–patient decision-making at admission and discharge, post-discharge care and patient/carer experience of care
- compare the process of care for patients receiving COPD care bundles with usual care for COPD, identifying enablers and inhibitors to the provision of best-quality care, using quantitative and qualitative methods
- compare resource utilisation and costs of care in intervention and comparator sites.

Literature review

Prior to the start of the study, there was some evidence from single pilot sites in the UK that the implementation of inpatient care pathways can improve clinical outcomes such as mortality, hospital re-admission rates and hospital length of stay. However, more recent studies have shown a mixed picture, with some suggestion from randomised controlled trials that care bundles reduce hospital re-admissions but have no impact on long-term mortality or quality of life. Implementing quality improvement (QI) initiatives, such as care bundles, can be very challenging in the NHS context.

There is evidence from qualitative studies that suggests that the transition from hospital to home can be particularly challenging in terms of a lack of support for both patients and carers. Community services focusing on pulmonary rehabilitation and smoking cessation can help patients cope with both the physical and the psychosocial aspects of COPD.
Methods and design

This mixed-methods evaluation used a controlled before-and-after design to examine the effect of, and costs associated with, implementing care bundles for patients admitted to hospital with an acute exacerbation of COPD, compared with usual care for COPD. It quantitatively measured a range of patient and organisational outcomes for two groups of hospitals: those that delivered care using COPD care bundles and those that delivered care without using COPD care bundles. Where provided, patients received care bundles following admission, prior to discharge or at both points in their care pathway. The primary outcome was re-admission to hospital within 28 days of discharge. The study also examined a range of secondary outcomes, including length of stay, total number of bed-days, in-hospital mortality, 90-day mortality and costs of care. A series of nested qualitative case studies explored the context and process of care, as well as the impact of COPD bundles on staff, patients and carers.

Quantitative assessment

Thirty-one sites (19 sites implementing COPD care bundles and 12 comparison sites) provided pre- and post-index date data for analysis. The sites reflected a range of hospitals that, pre index date, differed in relation to the number of COPD patients admitted and in relation to 28-day COPD re-admission rates. Using aggregate monthly (i.e. level 1) data, implementation and comparator sites were compared to assess whether or not changes post index date differed between these two sets of sites. The outcomes considered in this analysis were the number of COPD admissions, 28-day COPD re-admission rate, 28-day overall re-admission rate, 90-day COPD re-admission rate, the number of ED attendances for COPD, length of stay and total number of bed-days. In analyses adjusting for the number of COPD admissions, overall 28-day re-admission rate and in-hospital mortality rate pre index date, no evidence was found of differences between implementation and comparator sites.

Seven implementation and seven comparator sites additionally provided individual-level (i.e. level 2) data for the same study period. This allowed for adjustment by patient characteristics, such as age, sex, ethnicity, area-level socioeconomic deprivation and comorbidities. For the primary outcome of 28-day COPD re-admission rate, we found no evidence that the admission rates changed post index date in either the implementation or the comparator sites, and there was no evidence that the changes differed between these two groups. Adjustment for patient-level confounders did not influence these results. Similar trends were observed for 90-day COPD re-admission rates and 90-day mortality. In the case of 28-day all-cause re-admissions, there was a trend for a reduction post index date in the implementation sites. However, in analyses adjusting for confounders, the confidence intervals included the null and there was no evidence that this reduction differed from the change in the comparator sites. We also observed a reduction post index date in the length of stay in implementation sites, although this did not differ from changes in the comparator sites. Comparator sites showed reductions in in-hospital mortality rates, although there was no evidence that this change differed from that observed in the implementation sites. The number of ED attendances after an initial emergency admission for COPD increased post index date in the comparator sites, but it dropped in the implementation sites, and the difference observed between these groups reached statistical significance.

To understand how sites delivered COPD care post index date, each site providing level 2 data was asked to refer to the case notes of a random sample of patients and to record the delivery of individual COPD bundle elements as well as whether or not the site recorded the patient as having received the bundle. Although the delivery of multiple bundle elements was more common in implementation sites than in comparator sites, fewer than half of patients in implementation sites received the intended combination of
five bundle elements. The average number of admission bundle elements received was 2.2 in comparator sites and 2.6 in implementation sites. The average number of discharge bundle elements delivered was 1.8 in comparator sites and 2.8 in implementation sites. The provision of a discharge pack of emergency medications was widely delivered in implementation sites (73.6%) compared with comparator sites (26.4%). It is possible that this difference is associated with the greater reduction in ED attendances in the implementation group.

Cost-effectiveness

For level 1 sites, we undertook a descriptive analysis of hospital-level costs before and after the introduction of care bundles at 30 hospital sites. For level 2 sites, we estimated the cost-effectiveness of care bundles using patient-level data on up to 12,532 individuals from 14 hospitals. Cost-effectiveness for the level 2 analysis was measured as a function of the ratio of incremental hospital costs (inpatient, outpatient, critical care and emergency care) and incremental 90-day survival. We complemented this analysis with qualitative information from patients attending level 2 sites who were observed and interviewed as part of the level 3 analysis.

There was no obvious pattern of differential movement in level 1 costs following the introduction of care bundles. Analysis of level 2 data indicated that COPD care bundles were associated with lower secondary care costs, but there was no evidence from adjusted cost-effectiveness models that they improved outcomes. Patient observation and patient interviews with a small sample of individuals conducted as part of the level 3 analysis did not reveal any gross differences in resource use between site types. Overall, the results from each level of analysis suggest that care bundles may not be cost-effective under a secondary care perspective for this patient group.

Qualitative work

The study drew on qualitative methods of semistructured interviews and non-participant observation to evaluate the role of COPD care bundles in patient care at admission and discharge. Interviews were conducted with patients, carers and staff, and patient care was observed across the pathway for COPD patient care. Using data collected over a 2-week period at each implementation and comparator site, a number of conclusions were drawn from the qualitative data.

Staff perceptions of care bundles were largely positive for standardising working practices and patient care, supporting a clear care pathway for patients, facilitating communication between different teams and individuals responsible for patient care, and identifying necessary support required by patients following discharge from hospital. Care bundles were also perceived by staff as a means for embedding reliable and sustainable QI. Staff highlighted the need for managerial support, resourcing and regular education and training to facilitate this QI. Monitoring was also necessary to measure the effectiveness of implementation. Drawing on observation data, it was clear that greater attention was focused on the discharge bundle at implementation sites. Admission is more complex to manage and is not necessarily in the hands of the respiratory team; therefore, it is more complex to implement and monitor quality improvement strategies for COPD care at admission than at discharge. Qualitative analysis also highlighted the need for patient and carer support at the point of discharge, as well as timely follow-up post discharge from either primary or secondary care teams. The data also highlighted the pressure around patient numbers, resourcing and staffing in the current context of the NHS, which can mean that it is not always possible for patients to receive as thorough care, particularly in relation to follow-up, as acute and community staff would prefer.
Conclusions

Care bundles are valued by health-care professionals, but the challenges of implementation and the effect of the adoption of core elements within comparator sites meant that this study did not show that they make a difference to patient experience, future admissions or mortality. They do appear to be associated with a reduced number of subsequent emergency department attendances at implementation sites compared with comparator sites. However, the introduction of care bundles is unlikely to be cost-effective for the selected patient group.

Trial registration

This trial is registered as ISRCTN13022442.

Funding

Funding for this study was provided by the Health Services and Delivery Research programme of the National Institute for Health Research.
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 or programmes which preceded 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 Health Services and Delivery Research (HS&DR) programme, part of the National Institute for Health Research (NIHR), was established to fund a broad range of research. It combines the strengths and contributions of two previous NIHR research programmes: the Health Services Research (HSR) programme and the Service Delivery and Organisation (SDO) programme, which were merged in January 2012.

The HS&DR programme aims to produce rigorous and relevant evidence on the quality, access and organisation of health services including costs and outcomes, as well as research on implementation. The programme will enhance the strategic focus on research that matters to the NHS and is keen to support ambitious evaluative research to improve health services.

For more information about the HS&DR programme please visit the website: http://www.nets.nihr.ac.uk/programmes/hsdr

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 12/130/53. The contractual start date was in May 2014. The final report began editorial review in October 2017 and was accepted for publication in May 2018. 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 Morton 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), produced by Prepress Projects Ltd, Perth, Scotland (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

Editorial contact: journals.library@nihr.ac.uk