

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

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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.

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Scientific summary

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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.

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