



## RESEARCH UPDATE

# Designing and implementing a COPD discharge care bundle

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## ABSTRACT

National surveys have revealed significant differences in patient outcomes following admission to hospital with acute exacerbation of COPD which are likely to be due to variations in care. We developed a care bundle, comprising a short list of evidence-based practices to be implemented prior to discharge for all patients admitted with this condition, based on a review of national guidelines and other relevant literature, expert opinion and patient consultation. Implementation was then piloted using action research methodologies with patient input. Actively involving staff was vital to ensure that the changes introduced were understood and the process followed. Implementation of a care bundle has the potential to produce a dramatic improvement in compliance with optimum health care practice.

## BACKGROUND TO THE PROJECT

Chronic obstructive pulmonary disease (COPD) is a common condition<sup>1</sup> with acute exacerbations of COPD (AECOPD) or 'lung attacks' causing 12% of acute admissions and being responsible for more than one million bed days per annum in the UK. About a third of patients are readmitted within 90 days of discharge.<sup>2</sup> Significant variations in outcomes and provision of care have been noted, implying a role for a systematic quality improvement approach.<sup>2-3</sup> We therefore wished to develop and pilot the implementation of a COPD discharge care bundle—a list of five to six evidence-based practices that should be delivered to all patients.<sup>4</sup> A care bundle does not specify the entirety of care that should be delivered, but is rather a group of items that administered together should be delivered to all individuals.

## DEVELOPING THE CARE BUNDLE

Item selection was based on national and international guidelines, a systematic literature review and input from a multidisciplinary project team described in more detail in the online supplementary material. The project team undertook a process mapping exercise to map the patient pathway from admission to discharge and follow-up. A survey, undertaken to identify elements that were important to patients, identified feelings of isolation and a lack of support postdischarge and prioritised regaining physical function. To ensure coherence

within the wider health community, the bundle was discussed at meetings of the Inner Northwest London Care Community integrated service improvement programme for COPD.

Bundle items selected were (figure 1; see online supplementary material for more details):

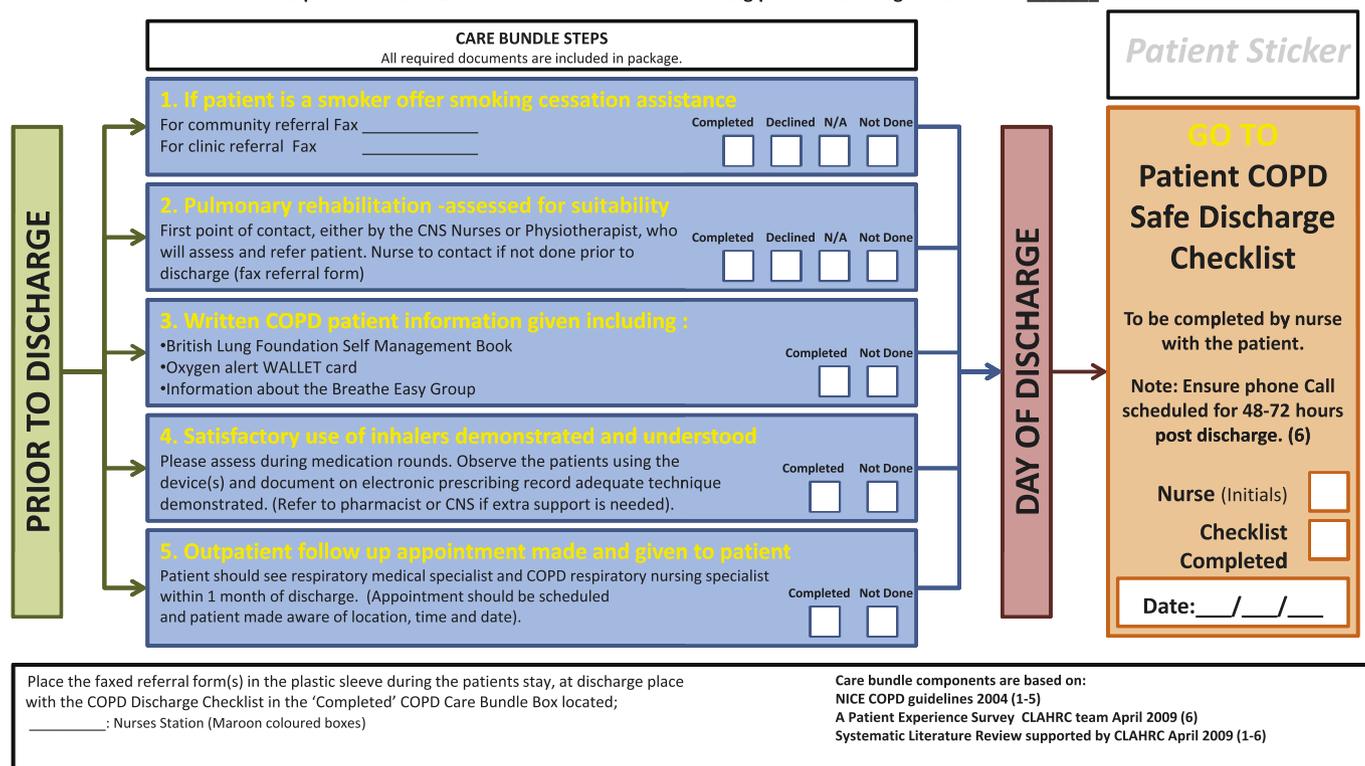
1. Notify the respiratory clinical nurse specialist of all admissions
2. If the patient is a smoker, offer smoking cessation assistance
3. Refer for assessment for pulmonary rehabilitation
4. Give written information about COPD including British Lung Foundation (BLF) self-management booklet, oxygen alert card and information about patient support groups (BLF Breathe Easy Group)
5. Demonstrate satisfactory use of inhalers
6. Follow-up appointment to be made with a specialist prior to discharge.

The care bundle pack included all the relevant referral forms/fax numbers. Referrals could be made by ward nurses, physiotherapists, clinical nurse specialists or doctors. Patients completed a 'safe discharge checklist' (online appendix 1), which would be countersigned by the nurse responsible for their discharge, providing an opportunity to address any omissions and to reinforce ward nurses' knowledge of the bundle items. Thus, for example, if at the end of several days in hospital a patient's inhaler technique had not been reviewed (despite their having used their inhalers on multiple occasions), identification of this omission would motivate the discharge nurse to ensure that this was not neglected in future. The safe discharge checklist also included a section to be completed about what to do if the patient felt they were not improving and needed further medical input once they were at home.

Patients were also offered a brief phone call 48–72 h postdischarge to check whether they were improving. If not, community input could be expedited. A script was developed with standard questions such as 'Since discharge are you same/better/worse?'; 'Is your breathing keeping you awake at night?'; 'Do you have a written self-management plan?'; 'Do you know what your follow-up plan is?' (online appendix 2). The clinical nurse specialist making the call then decided whether there was an immediate cause for concern.

**Summary** – This care bundle is a group of evidence based items that should be delivered to all patients being discharged from the hospital following an Acute Exacerbation of Chronic Obstructive Pulmonary Disease (AECOPD). The care bundle aims to improve quality of care, patient experience and minimise the risk of re-hospitalisation. To ensure the bundle can apply to all we have prepared a combination of actions and documents to facilitate the discharge process.

Inform the COPD CNS of all COPD patients within **24 hours of arrival** including patients discharged . Extension \_\_\_\_\_



**Figure 1** The chronic obstructive pulmonary disease (COPD) discharge care bundle. CNS, clinical nurse specialist.

## IMPLEMENTATION

The care bundle was launched on the respiratory ward at a series of multidisciplinary meetings. A survey of ward staff during the development of the project had revealed low levels of confidence regarding inhaler technique, smoking cessation and pulmonary rehabilitation, so it was clear that staff education would be important. An initial barrier to this was that it was difficult for the staff to attend teaching sessions in a group without impeding clinical work. We developed an educational model where members of the team would spend time on the ward at a stand providing teaching about topics such as smoking cessation and inhaler technique in a 'drop in' way. Thus, during the course of a shift all the nurses on the ward had the opportunity to be educated with minimal disruption. This led to improved confidence in these areas, which was confirmed by a staff survey. Pharmacists involved in the project took the opportunity to teach on a daily basis and developed laminated pictorial charts to attach to the drug trolley to reinforce the correct inhaler techniques required.

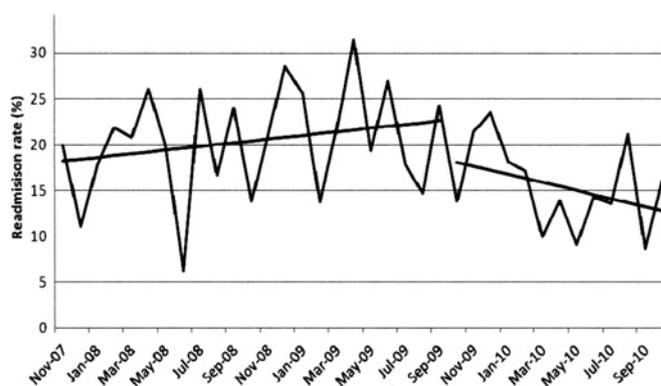
Care bundle returns were assessed at the weekly project meeting, which enabled the team to refine the administrative and other processes involved, through the use of a 'plan, do, study, act' approach. To increase engagement with the project, the ward nurses completing the safe discharge checklist were entered into a draw for a small prize.

Pulmonary rehabilitation has a key role in COPD management and there is evidence that it can reduce accident and emergency attendance and readmission if delivered immediately after discharge with AECOPD.<sup>5</sup> In order for health professionals to refer patients and to improve patient compliance, it is important that they have a clear understanding of what it entails and are

able to communicate the strength of evidence for its effectiveness. To address this, ward staff attended pulmonary rehabilitation sessions within the Hospital and physiotherapists gave informal teaching. An information leaflet for potential participants was developed with input from patients to ensure that it was written in an appropriate language and addressed typical patient concerns.

## OUTCOMES

The care bundle was initiated in 94 patients on the respiratory ward between 1 October 2009 and 30 September 2010—age 74.6 (11.2) years, 64% male, median length of stay 6 days. Compliance was compared with a random sample (n=22) from the year sampled prior to the project as part of the bundle development



**Figure 2** The 30-day readmission rates before and after the initiation of the chronic obstructive pulmonary disease discharge care bundle.

## Key learning points

Educational efforts must be maintained because of staff turnover and need to be delivered in a way that is easy for staff to access, enabling them to gain and maintain confidence. For the care bundle to be implemented effectively, all healthcare professionals involved in COPD care need to be able to engage with it.

process. There were significant improvements in compliance with reference to smoking cessation (18.2% vs 100%), pulmonary rehabilitation (13.6% vs 68%), administration of self-management plan (54.6% vs 97.9%) and review of inhaler technique (59.1% vs 91.2%). Follow-up arrangements were documented in 41% pre and 39% post initiation of the care bundle.

Of those in whom the bundle was used 25.5% were smokers. All were offered an appointment with smoking cessation services, although 11 (46%) of the smokers declined to be referred. In the year prior to the bundle, there were 31 referrals to pulmonary rehabilitation for Chelsea and Westminster patients compared with 81 in the year postinitiation—an increase of 158%.

Four (4%) patients declined to receive a follow-up phone call, 34 (36%) could not be contacted despite two calls and in 22 (23%) the call was not made because of staffing issues. A follow-up call was made successfully in 34 (33%) patients and a cause for immediate concern was identified in 3 (10%) of them. Contact details for many patients were wrong in the electronic patient record, so the safe discharge checklist was modified to include reviewing the contact details in an attempt to address this.

The 30-day readmission rate was 10.8% for patients where the bundle was used compared with 16.4% where it was not ( $n=365$ ) (95% CI for difference  $-2.1\%$  to  $13.2\%$ ). After implementation of the bundle, there was a downward trend in readmissions but segmented regression analysis showed this not to be statistically significant (figure 2). The aim of this initial study was to demonstrate improvements in process (since the

interventions themselves have an evidence base); however, the findings are encouraging and as this intervention is rolled out across further sites the data will become available for a more quantitative evaluation of the link between these process measures and outcomes. In addition, data for this analysis included all patients admitted to the Trust with AECOPD ( $n=1156$ ) over 3 years, whereas the bundle was only piloted on the respiratory ward. Although the implementation of the bundle might have improved COPD awareness generally within the Trust, looking at total readmission rates is likely to have diluted the actual impact of the bundle.

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**Competing interests** None.

**Ethics approval** The study was discussed by both the Brent Ethics Committee and the NHS Brent R&D Committee who determined that formal ethical approval was not necessary.

**Contributors** All authors were part of the project team developing the bundle. NSH wrote the first draft of the manuscript. All authors approved the final manuscript.

**Provenance and peer review** Not commissioned; externally peer reviewed.

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|             |                        |
|-------------|------------------------|
| Name: _____ | Hospital Number: _____ |
| Date: _____ | DOB: _____             |

This plan is for people who are going home after coming to hospital with a 'flare up' or 'exacerbation' of COPD (Chronic obstructive pulmonary disease)

**We want to make sure that you can manage safely at home.  
 Before you go home you should go through this list with the discharge nurse and be able to tick all of the boxes.  
 If there are any gaps, ask the nurse to help you with them.**

|   | Tick Here |
|---|-----------|
| You should feel able to use your inhalers, and other medications including steroids properly.   |           |
| The nurses have actually watched you use your inhalers, and spacer if appropriate, to make sure that you are doing it correctly.                  |           |
| The benefits of pulmonary rehabilitation have been explained to you and you have been offered the chance to take part in a course if appropriate. |           |
| If you are a smoker you should have been offered assistance to quit.  |           |
| You should know what the plan for your follow up care is.   |           |
| You should have received written information explaining about COPD.   |           |

## Once you are home

- Hopefully your condition will improve steadily. If you feel that you are getting worse or that your breathing is disturbing your sleep then get in touch with your GP or community COPD team promptly.  
 GP number: \_\_\_\_\_
- If you are on a course of antibiotics or steroids it is important to complete them even though you may feel better.
- You should have a follow up appointment within a few weeks of going home to review your care.
- Somebody from the hospital or the community team should be in touch in the first few days after you go home to see that you are getting on OK.  
 Tick if you **do not** want to receive this phone call

**My phone number is:** \_\_\_\_\_ **Preferred time to call:** \_\_\_\_\_

Health Professional (Print and Signature): \_\_\_\_\_ Patient Name: \_\_\_\_\_  
 \_\_\_\_\_ Patient Signature: \_\_\_\_\_

# Script for COPD 48-72 hour post discharge telephone contact

1. Look on EPR system before phoning in case readmitted
2. Check appointment date given at discharge

Patient Name: \_\_\_\_\_ Hospital Number: \_\_\_\_\_  
Date of Call: \_\_\_\_/\_\_\_\_/\_\_\_\_ Time of call : \_\_\_\_\_  
Duration of call: \_\_\_\_\_ minutes Patient not at home (record details): \_\_\_\_\_  
\_\_\_\_\_

**Upon Answering:** "Hello, my name is XXXXXXXXX. I'm calling from XXXXXXXXX Hospital to ask you how you have been getting on since you went home. If there are any problems I can let your GP or the community COPD team know so they can see you if necessary."

**1) Do you feel that you are getting better, staying about the same, or getting worse since you went home?**

(Circle as appropriate)

Same Better Worse

**2) Is your breathing keeping you awake at night?**

Yes  No

**3) Do you have a follow up appointment?**

Yes  No

**4) Do you have a written self management plan?**

Yes  No

**5) Are you smoking?**

Yes  No

– If yes would you like help to quit?

Any other specific problems identified?

Advice given (e.g. who to contact) ?

## Outcome

Are there causes for immediate concern? Yes  NO  (if yes fax GP and/or community COPD team)

If emergency advised contact emergency services  or done yourself .

Follow up appointment (Circle as appropriate)

Confirmed

Not yet booked

Declined

Not indicated

Caller Name: \_\_\_\_\_ Caller Signature: \_\_\_\_\_

## Designing and implementing a COPD discharge care bundle – Online supplement

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## **Context and Research Methodology**

The work described in this paper took place with patients admitted to the respiratory ward of Chelsea and Westminster NHS Foundation Trust in Central London. The NIHR Collaboration for Leadership in Applied Health Research (CLAHRC) for Northwest London is centred here. This funded research programme is an alliance of academic and healthcare organisations that aims to develop and sustain clinically driven innovative and cost-effective research based improvements to patient care and experience. A range of stakeholders in COPD care including patients, specialist and ward nurses, physiotherapy, pharmacy, physicians and smoking cessation providers were involved in the project team. The work was supported by collaboration between primary and secondary care healthcare providers through the Inner Northwest London Care Community (INWLCC) integrated service improvement program for COPD.

There are known variations in care and clinical outcomes which are not adequately explained by patient demographics.[1 2] The data from 'Crossing the Quality Chasm' shows the organisation of care influences outcomes.[3] This is supported by reviewing patient journeys and experiences which highlight complicated treatment pathways and that interfaces of care between different healthcare professionals and settings are where errors occur.[4] This project adopted an action research approach. Action research uses multiple research methods and is a combination of qualitative and quantitative approaches. Defined data sets are used and continually monitored so that participants are aware of the effect of their planned interventions

and are able to modify their approach on the basis of data in “real time”. The NIHR CLAHRC for NWL programme utilised an underpinning improvement model for improvement (Figure 1). This is often referred to as ‘rapid-cycle’ improvement (where a number of small PDSA cycles take place one after the other to test and implement sustainable improvement).[5]

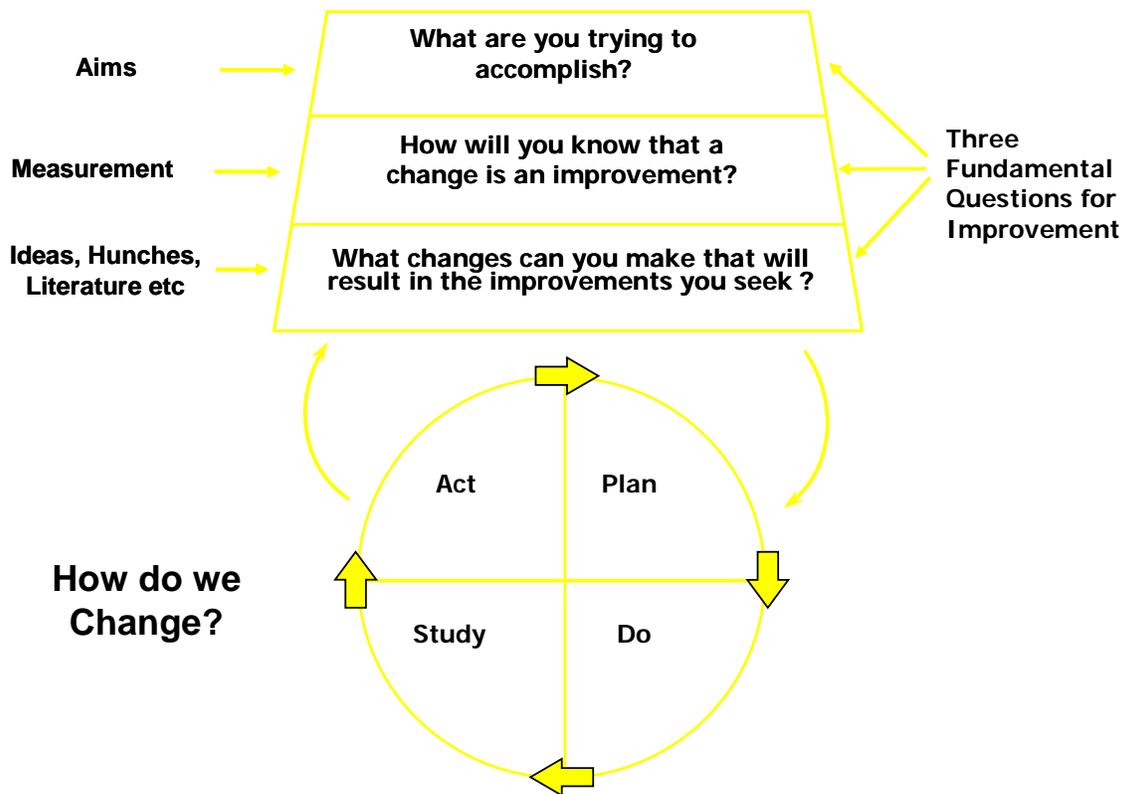


Figure 1 The Model for Improvement

### **Identifying items for the care bundle**

Acute exacerbations of COPD (AECOPD) are the cause of 12% of acute admissions and responsible for more than one million bed days per annum in the UK with about one third of patients being readmitted within 90 days of discharge.[6 7] Significant variations in outcomes and provision of care have been noted between different acute trusts implying that there might be scope to improve outcomes by standardising the delivery of optimum care.[8 9]

Selection of items for the care bundle was initially based on national and international guidelines for the management of COPD, particularly the guidance from the UK National Institute for Clinical Excellence (NICE).[10-13] However the selection also incorporated input from other stakeholders including patients to ensure that as wide as possible a perspective was used. The involvement of staff and patients in the development process was intended to produce a benefit in terms of face validity and ownership beyond arguments based simply on published evidence and thus enhance uptake and compliance. This was important because to date, although the factors in AECOPD associated with poor outcome post hospital discharge are well described (age, prior exacerbation history, hypoxia, low level of physical activity)[14], the evidence that specific interventions can *modify* them is less strong. The potential items were discussed at several meetings within the project group, including with patient representatives, at the British Lung Foundation BreatheEasy group and at INWLCC meetings, so that the final selection was informed by the literature, expert clinical opinion and patient priorities.

Although it was usual practice for the Respiratory CNS to notify the appropriate local community COPD teams, we did not include this as a bundle item because it might not have been possible to identify the appropriate team in patients from outside the local area. Since improving transitions of care was a major objective of the program this requirement for “universality” may have led us to exclude a key item from the care bundle.

The justification for each item is outlined briefly below.

*1) Notify respiratory clinical nurse specialist of all admissions.*

This was included on a pragmatic basis. Most acute hospitals employ respiratory nurse specialists whose role includes the provision of expert care and support to ward nurses in the management of respiratory patients.[13] Specialist respiratory involvement in all COPD admissions is recommended by NICE and there is some evidence that involvement of respiratory specialist care improves outcomes, so this item is likely to be operationally useful.[7 15] The bundle does not however define what the specialist nurse should do. Although specialist nurses are likely themselves to engage with one or more of the bundle items, the bundle items are intended to be deliverable by all nurses and other health professionals seeing patients admitted with AECOPD. The implementation of the care bundle is intended to drive improvements in care across the patient pathway and not simply to be an audit of specialist nursing input. An important element of the clinical nurse role is to liaise with community respiratory teams, which is likely to be key in maintaining safe and effective transition of care from hospital to home.

*2) If patient is a smoker, offer smoking cessation assistance.*

Smoking is associated with COPD exacerbations, reduced sensitivity to corticosteroids as well as a more rapid decline in lung function and smoking cessation is a highly cost effective intervention.[7 16] Smoking cessation is one of the only interventions to improve survival in COPD and was selected as a key item for implementation in the 2010 NICE COPD guidelines.[7]

*3) Refer for assessment for pulmonary rehabilitation.*

Pulmonary rehabilitation is an established therapy that improves exercise capacity and quality of life in patients with COPD both in trial populations[17] and in routine clinical practice.[18] PR can reduce hospital admissions and health care costs.[7 19-23] Low physical activity is associated with an increased risk of hospital admission in COPD[24] and exacerbations themselves lead to a dramatic reduction in physical activity[25] and health status[26] which can be prolonged, reflected in reduced time spent outdoors.[27] In addition, activity limitation is associated with a greater likelihood of relapse after discharge following ER attendance.[28] PR promotes patient education and empowerment and two studies have shown substantial benefits for early PR in terms of exercise capacity, quality of life and hospital admission.[19 29] Recovering physical function was identified as a priority by patients involved in the care bundle project.

*4) Give written information about COPD including British Lung Foundation (BLF) self management booklet, oxygen alert card and information about patient support group (BLF BreatheEasy Group).[7]*

The report of the 2008 National COPD audit found that there were “serious deficiencies in the provision of information to patients across all COPD services.”[13] There is some evidence that education programs alone can have an impact on admissions.[30] The provision of written information for patients to consult after discharge including self management advice and contact details for patient support groups was intended to address patients’ reported need for more information about their condition. Engagement with patient support groups could also help to address social isolation. Patients reported a lack of certainty about their management and in addition going through written material with patients also provides an opportunity for staff to develop and maintain their own knowledge and areas of uncertainty. There is a Grade A recommendation in the NICE COPD guidelines that patients at risk of patients at risk of having an exacerbation of COPD (which of course includes patients who have been hospitalised with an AECOPD) should be given self-management advice that encourages them to respond promptly to the symptoms of an exacerbation.[7]

Oxygen alert cards are important as morbidity due to excessive oxygen administration is a well recognised but still common problem in patients admitted with AECOPD and respiratory failure.[31]

##### *5) Demonstrate satisfactory use of inhalers.*

Incorrect inhaler use is widespread and attention to this area is recommended in the NICE COPD guidelines.[7 32] There should be multiple opportunities to review and correct inhaler technique during the course of a hospital admission and the inclusion of this item stresses the need for all ward nurses to be able to identify errors in

inhaler use and be empowered to help patients to correct their technique. Staff surveys found that confidence in this area was low.

*6) Follow up appointment to be made with specialist prior to discharge.*

The NICE COPD guidelines recommend that patients be followed up after AECOPD.[7] Having follow up arranged prior to discharge ought to reduce the feeling of a lack of support that patients identified. Since median readmission occurs at 38 days following discharge from hospital[13] the consensus position was that follow up needed to occur before this if it is to be possible to identify and/or intervene where there is deterioration.

### **Interpretation of initial outcome data**

The major purpose of the care bundle is to improve delivery of identified key elements of care that have an evidence base to support them. Having developed this we wanted to pilot its implementation using action research methodology with a rapid feedback mechanism regarding problems with implementation so that these could be addressed in real time. The principal objective was to demonstrate that the process of care could be improved, so process measures and practical issues around administration of the bundle items are the focus of the present report. An initial survey established poor compliance with the bundle items, whereas this was much improved following bundle initiation. We also tracked 30 day readmission rate since this is an important and clinically relevant outcome that may be sensitive to an overall improvement in the quality of care. Appropriate inhaler use, smoking cessation and pulmonary rehabilitation as well as better patient knowledge might all

have been expected to contribute to a reduced risk of readmission. Although the trend is for a reduction in readmission rate following bundle initiation this is not significant and cannot at this stage be used as evidence of the care bundle's effect on this particular outcome.

### ***Sample size***

Segmented (or piecewise) probit regression was used to assess the trend in readmissions both before and after the implementation of the care bundle. Piecewise regression allows multiple regression models to be fitted to data at different periods in time, so for this analysis a separate regression was run both before and after the implementation of the bundle, and the trend in readmission rates did not differ significantly between time periods. A post hoc power calculation suggests that in order to have 85% power to detect a difference of this magnitude (5.6%) this would require close to 750 receiving the bundle and 750 not receiving it. Studied prospectively, 450 patients would be required in each arm to have an 80% power of confirming a difference in one month readmission rates of 10.8% vs 16.4% - the readmission rates identified in the present study in patients where the care bundle was or was not administered.

### **Future development of the care bundle**

Following the pilot study described here, implementation of the care bundle is being rolled out to a number of other hospitals within the region. At each site the bundle items have been retained, but some differences in implementation to meet the requirements of the local health economy have been made. For example, the precise provision of post discharge phone support will vary depending on the availability of

early supported discharge programs. In addition, having been piloted on the respiratory ward at Chelsea and Westminster it will now be implemented in this and other hospital's acute admissions unit. As data from further sites becomes available the data will become available for a more quantitative evaluation of the link between these process measures and outcomes using techniques such as statistical process control to link bundle compliance with variation in outcomes such as patient satisfaction and readmission rate.

The care bundle has been adopted by NHS London as one of the items that commissioners can select as part of the Commissioning for Quality and Innovation (CQUIN) payment framework.[33]

Table E1

Care Bundle Patient characteristics

|                         |            |
|-------------------------|------------|
| Age (yrs)               | 74.6(11.2) |
| Sex (M/F)               | 60 / 34    |
| Length of stay (Median) | 6          |

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