



The National Chronic Obstructive Pulmonary Disease Resources and Outcomes Project (NCROP) Final Report

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Introduction

The National Chronic Obstructive Pulmonary Disease Resources and Outcomes Project (NCROP) is a tripartite initiative from the Royal College of Physicians, British Thoracic Society and British Lung Foundation established with a grant from the Health Foundation. The aim of the project has been to evaluate whether targeted mutual peer review of respiratory units will bring about faster change in service development than the usual mechanisms that operate within the NHS. The secondary aims of the project were to evaluate the practicalities of delivering large scale peer review of this type and to document benefits and limitations of the process. This is the summary report of the project.

Chronic Obstructive Pulmonary Disease (COPD) is a common long term disorder affecting particularly older people. It accounts for 23,500 deaths in the UK (ONS1999), 12% of all acute medical admissions and 15% of all hospital bed days (Pearson 1994). The cost to the UK economy was estimated in 2003 at £492 million per annum (Britton 2003) of which 40% is expended on hospital care. These acute episodes are serious - 14% will die and nearly a third will be readmitted within 90 days of the index admission (Roberts 2002 & 2003). Previous audits (Roberts 2001, Roberts 2003, Price 2006) have shown wide variations in the process of care and outcomes despite widespread acceptance of national standards (BTS 1997, NICE 2004). Despite sharing results with trusts and individual clinicians, feeding back at meetings, and publishing audit data, a high level of variation persists. Other national UK audits have observed

that change occurs very slowly and is not consistent across hospitals (Rudd 2001). A Cochrane review (Jamtvedt 2006) concluded that audit alone is ineffective in achieving change, but it may be the basis for establishing objectives and recommendations for change (Berk 2003).

A different mechanism for effecting health quality improvement, peer review, has been employed with some success in the Netherlands (Heaton 2000) and was adopted by the British Thoracic Society (BTS). Initially the BTS peer review system had demonstrable success (Page 1995) but was resource intensive, included all respiratory and allied services, was linked to standards/benchmarks for a number of respiratory diseases (not just COPD) and relied on voluntary participation. The true cost of carrying out the visits and follow-up work was met by the Society, and latterly subsidised by a small contribution from the Unit that was being visited. The NCROP initiative set out to investigate whether combining peer review and audit data in a more focussed and targeted manner could accelerate the rate of change in COPD services in response to national audit data.

Project design

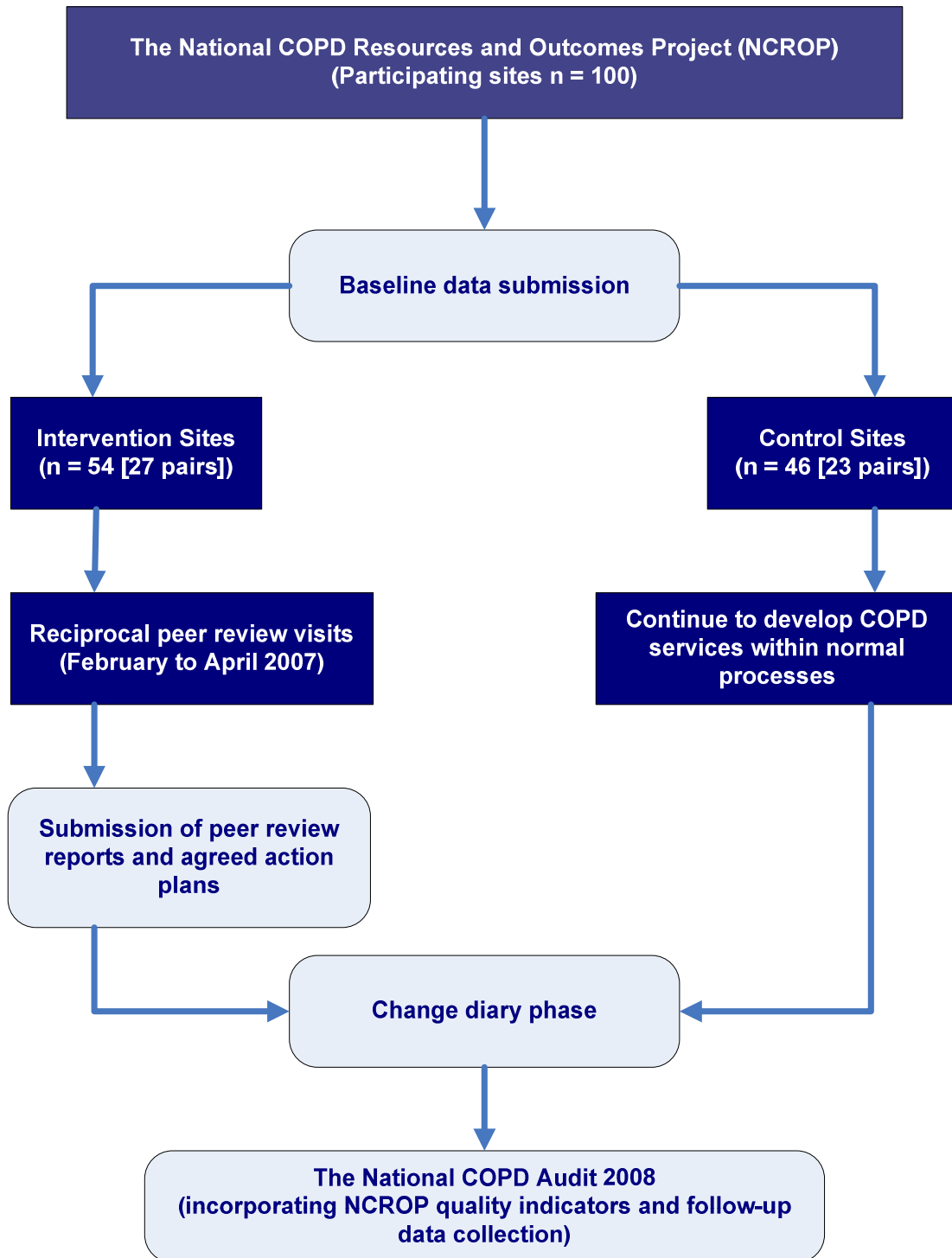
All 247 hospitals that participated in the 2003 COPD audit were invited to participate in this randomized controlled study. One hundred and six hospital units volunteered to participate. Six dropped out before the project started leaving 100 in the project. Some units consisted of a single acute hospital site whilst others consisted of more than one hospital within an acute Trust.

Hospital units were paired for peer review purposes according to whether they had more or less of a pre specified list of organisational indicators (i.e. non-invasive ventilation, pulmonary rehabilitation and early discharge scheme) obtained from data submitted to NCROP in 2005. Pairings were arranged as much as possible with differing indicators to maximize the potential for sites to learn from each other (i.e. 0/1 vs. 3 indicators, then 2 vs. 3 indicators and then all remaining sites were paired). Another parameter used to pair units was geographical distance, if possible within 2.5 hours travel time by rail or road but not located in adjacent districts. Each pair of units was randomized 3:2 to either the reciprocal peer review group or to the control group.

At the outset of the study there was an initial baseline questionnaire returned between January and April 2007 by each participating site that indicated which services were offered by the unit and whether the quality indicators for different service elements (non-invasive ventilation, pulmonary rehabilitation, early discharge scheme and long-term oxygen therapy) were met in full, partially or not at all. The primary outcomes of the project were measured by changes in these services offered and their quality by comparing 2007 baseline results with the 2008 national COPD audit (data collection period 3rd March to 16th May 2008) which incorporated the same service indicators within a broader data collection programme (Figure 1). Units from both groups were also asked to complete change diaries at intervals over the 12 month follow up period. The final diary requested information about major service changes that had occurred during the year since NCROP began and the influence of NCROP, if any, on these service developments. It also asked for any other impact that involvement in the NCROP may have had on the COPD team and on delivery of COPD services. This report therefore provides both quantitative and qualitative data as outcomes for the study.

The project was overseen by an Implementation Group with members from the three lead organisations, and a Steering Group with a membership drawn from the wider NHS and professional bodies with an interest in respiratory services.

Figure 1
The National COPD Resources and Outcomes Project (NCROP)
process map



Method for the peer review visits

The NCROP project team analysed the BTS peer review experience and redesigned the process to make the reviews as efficient as possible. Design features were:

1. The visit would only examine one aspect of care – COPD services – and so would take place on a single day.
2. Pairing units with different facilities should encourage bilateral discussion informed by a) previous 2003 audit data b) the 2007 baseline survey and c) a checklist of likely issues.
3. The reciprocal visits should take place within 2 weeks of each other – and for this project within a 12 week window.
4. Central organisation – the NCROP team based at the Royal College of Physicians would coordinate the visit dates.
5. The review team should include a lead COPD physician, a hospital respiratory departmental manager, a primary care representative (commissioner or service development manager for COPD), a COPD specialist nurse or physiotherapist, and patient representation.

The Steering Group selected 4 particular aspects of COPD care to be examined by each review, based on the strength of the literature, the variability shown in the 2003 audit and the likely importance to chronic disease management (group consensus). These were:

1. **Non invasive ventilation (NIV)** in type II respiratory failure. Randomized control trial evidence of efficacy (BTS NIV 2002, Picot 2004) but wide variance in availability and implementation in the audit.
2. **Oxygen provision out of hospital.** Strong evidence base for provision and new NHS contracting arrangements (BTS 2006).
3. **Early discharge schemes.** Good evidence base (BTS 2007) but available in a minority of UK hospitals with variable delivery formats.
4. **Pulmonary rehabilitation.** A good evidence base (BTS 2001, Lacasse 2006) but variably offered with a wide range of quality recorded across secondary and primary care.

For each of these a list of quality indicators was devised, circulated to members of the BTS, and amended in light of the comments. These quality indicators can be found at www.rcplondon.ac.uk/copd.

Peer Review Process

Peer review teams were, where possible, to consist of a lead COPD physician, a hospital respiratory departmental manager, a primary care representative, a COPD specialist nurse or physiotherapist, and a patient representative. A suggested programme for the review was provided, based on a semi-structured format developed by the Steering Group from the BTS experience. The format directed discussion towards the 4 service areas and associated quality indicators, but allowed for wider ranging discussions when appropriate. Visiting teams received a unit's self completed baseline proforma describing their service provision and attainment of the specified quality indicators beforehand. This document was to be used to direct discussions and record observations by the visiting team. A joint meeting at the end of each visit produced recommendations. The final outcome was to be a service development plan supported by all parties and to be submitted within 4 weeks of the peer review visit.

Patient representatives were given a verbal telephone briefing by the NCROP team. They were also sent a briefing sheet, directions to the hospital from their home, information about parking facilities, disabled access, explicit directions to the venue for the visit and an expenses claim

form. The NCROP team liaised with the host site to facilitate patients being met and any additional needs e.g. oxygen, being catered for. The NCROP Implementation Group offered financial reimbursement to each team to cover travelling expenses.

Findings

Fifty-four units (27 pairs) entered the intervention arm and 46 (23 pairs) the control arm. Fifty-two of the 54 peer review visits took place within the designated 12 week time frame. Two visits were delayed, one because of an outbreak of noro virus and one due to a clinical lead having a flight from overseas delayed due to bad weather. Patients were represented at twenty of the 54 visits. In a further 3 visits, patient representatives dropped out for the following reasons: unwell on the day, a recent bereavement and clash with a long awaited hospital appointment. All 54 visits included a lead COPD physician, accompanied in 49 of the visits by a respiratory nurse specialist or in 2 cases a respiratory physiotherapist. In 39 visits a hospital service manager and 30 a PCO commissioning representative were present. In addition to these core team members a number of others attended when thought relevant by the hosting clinical lead: 18 additional nurse specialists, 9 physiotherapists, 2 respiratory consultants, 1 pulmonary physiology technician. All teams finalised a signed off and agreed service development plan within 4 weeks of the visit.

During the study period units were asked to submit a total of 9 change diaries. The actual number completed and returned was a median of 2 (inter quartile range 2-4) for the intervention group and 4 (IQR 2-5) for the control group. Responses from clinical leads to explain the poor return rate were of two kinds. Firstly a perceived lack of change to document and secondly a concern relating to the time needed to complete the diary. Ninety-three of the 100 sites did provide both baseline and end of study change diaries.

Quantitative Data Derived from the 2007 Baseline Reports

Baseline results for the 100 sites indicated that 95 had non-invasive ventilation (NIV) available, 59 access to an early discharge scheme (EDS), 96 a long-term oxygen therapy assessment service and 83 a formal pulmonary rehabilitation programme. Units were asked whether they fully met, partially met or did not meet the quality standards within these service areas. The responses are summarised in Table 1 in terms of how many of these standards were met in full. In addition, individual standards were scored as 2=met in full, 1=only partially met, 0=Not met at all and within each service area these scores were added together and then the total scaled to give a 'quality' score from 0 to 100 (Table 2).

The baseline results (Table 1-3) suggest that most units could benefit from service quality improvements. The randomization process produced similar groups of hospital units in regard to how many were fully meeting quality standards for NIV, early discharge and oxygen provision service areas (Table 1), and similar groups in regard to the quality scores for these areas (Table 2). The randomization produced groups less well balanced in regard to pulmonary rehabilitation with the control group having better levels of service provision (Table 1 P=0.02, Table 2 P=0.13 Mann-Whitney test). The groups were broadly balanced for organisational structure (Table 3) though there were some chance imbalances, notably in funded specialist cessation programmes (P=0.02) and in availability of early discharge schemes (P=0.007 Fishers exact test) with control groups the better served.

Table 1: Hospital variation in *fully meeting quality standards* within 4 key COPD service areas for the 100 hospitals participating in NCROP

| Service areas | Total number of standards | NCROP 'intervention' sites (n=54) | | NCROP 'control' sites (n=46) | |
|--------------------------|---------------------------|---|------|------------------------------|------|
| | | Hospital variation in the number of standards that were fully met | | | |
| | | Median | IQR | Median | IQR |
| NIV | 12 | 6 | 4-8 | 7 | 4-9 |
| Pulmonary Rehabilitation | 11 | 7 | 6-8 | 9 | 7-10 |
| Early Discharge* | 9 | 8 | 6-8 | 8 | 7-9 |
| Oxygen provision | 14 | 9 | 6-11 | 9 | 7-12 |

* Standards for early discharge schemes only applied to those units with a scheme, i.e. 25 intervention sites and 33 control sites.

Table 2: Hospital variation in *quality standard scores* (range 0-100) within 4 key COPD service areas for the 100 hospitals participating in NCROP

| Service areas | Total number of standards | NCROP 'intervention' sites (n=54) | | NCROP 'control' sites (n=46) | |
|--------------------------|---------------------------|---|-------|------------------------------|-------|
| | | Hospital variation in the Quality scores for each service | | | |
| | | Median | IQR | Median | IQR |
| NIV | 12 | 67 | 56-75 | 71 | 54-77 |
| Pulmonary Rehabilitation | 11 | 77 | 68-86 | 86 | 75-93 |
| Early Discharge* | 9 | 89 | 83-94 | 89 | 83-97 |
| Oxygen provision | 14 | 75 | 61-84 | 71 | 61-89 |

* Standards for early discharge schemes only applied to those units with a scheme, i.e. 25 intervention sites and 33 control sites.

Table 3: Comparison of baseline organisational data for the 100 hospitals participating in NCROP

| | NCROP 'intervention' sites | | NCROP 'control' sites | |
|---|-------------------------------|-------|--------------------------|-------|
| Respiratory department in the Trust on a single site | 57% | 31/54 | 59% | 27/46 |
| Respiratory department in a dedicated areas | 58% | 31/53 | 70% | 32/46 |
| On-site palliative care | 83% | 44/53 | 80% | 37/46 |
| Onsite clinical psychology | 31% | 17/54 | 37% | 17/46 |
| Written local guidelines for management of COPD | 74% | 40/54 | 74% | 34/46 |
| Specialist respiratory ward | 87% | 46/53 | 85% | 39/46 |
| Speciality triage | 63% | 34/54 | 50% | 23/46 |
| >1 consultant post take rounds per day | 79% | 42/53 | 89% | 41/46 |
| Separate respiratory specialist on-call rota | 11% | 6/54 | 15% | 7/46 |
| HDU available to COPD patients | 67% | 36/54 | 72% | 33/46 |
| Funded smoking cessation programme in Trust | 74% | 39/53 | 50% | 23/46 |
| Formal pulmonary rehabilitation (PR) programme | 83% | 45/54 | 83% | 38/46 |
| PR programme funded by NHS | 87% | 39/45 | 89% | 34/38 |
| Access to EDS for patients with exacerbation of COPD | 48% | 25/52 | 76% | 34/45 |
| NIV available when required | 96% | 52/54 | 93% | 43/46 |
| NIV available to all patients in acute exacerbation with persistent hypercapnea | 76% | 41/54 | 76% | 34/45 |
| Written management protocols for use of NIV | 94% | 50/53 | 91% | 41/45 |
| Written management protocols for patients who fail NIV | 52% | 27/52 | 51% | 23/45 |
| Written self-management advice at discharge on responding promptly to symptoms of exacerbation | 41% | 22/54 | 39% | 18/46 |
| Local patient support group for respiratory conditions | 79% | 42/53 | 87% | 40/46 |
| Access to a palliative care service | 85% | 46/54 | 85% | 39/46 |
| Ambulatory oxygen service provided | 66% | 35/53 | 50% | 23/46 |
| Written information guides for patients/cares before discharge, about correct use of medication or oxygen | 49% | 26/53 | 52% | 23/44 |
| Local PCO engages with respiratory services | 83% | 44/53 | 89% | 41/46 |
| Respiratory interest group / network | 79% | 42/53 | 76% | 34/45 |
| Mechanism to influence local commissioning of care | 78% | 38/49 | 67% | 31/46 |
| PCO leads for respiratory care | 62% | 29/47 | 67% | 28/42 |

Quantitative Data from the 2008 National Audit

There were no statistically significant differences between the two groups for the overall change in service area quality scores between the 2007 baseline NCROP survey and the 2008 National COPD Audit (Table 4) but there were some small and statistically significant changes within some individual standards (Table 5). Some units changed from partially meeting or not meeting a standard in 2007 to meeting it in full in 2008, whilst some units changed in the opposite direction. There are 46 standards in total and it is noted that there were better changes reported for 30 of these standards in favour of the intervention group (4 NIV, 8 PR, 7 EDS, 11 LTOT) and for only 12 standards in favour of the control group (5 NIV, 3PR, 2EDS, 2 LTOT) with 4 sets of changes not favouring either group (3 NIV, 1 LTOT). For six standards there were differences between intervention and control units of statistical significance ($0.01 < P < 0.05$) or of borderline significance ($0.05 < P < 0.10$) and all of these favoured the intervention group (Table 5).

Table 4: Hospital variation in quality standard scores within 4 key COPD service areas

| Service | Intervention | | | Control | | | |
|--|--------------|------------|----|---------|-----------|----|-------------------|
| | Median | IQR | N | Median | IQR | n | |
| 2008 AUDIT | | | | | | | |
| Organisation of care | 70 | 59-77 | 51 | 72 | 62-79 | 45 | |
| NIV | 67 | 58-79 | 51 | 71 | 63-79 | 45 | |
| Pulmonary Rehabilitation | 86 | 77-91 | 51 | 86 | 73-95 | 45 | |
| Early Discharge (if EDS) | 89 | 83-89 | 25 | 89 | 72-94 | 35 | |
| Oxygen provision | 79 | 61-86 | 51 | 79 | 61-86 | 45 | |
| CHANGE (2008 MINUS NCROP 2007 BASELINE) | | | | | | | Mann-Whitney test |
| NIV | 0 | -13 to +13 | 50 | 0 | -13 to +8 | 44 | P=0.80 |
| Pulmonary Rehabilitation | 5 | 0 to +14 | 50 | 0 | -5 to +9 | 44 | P=0.14 |
| Early Discharge (if baseline EDS) | 0 | -10 to +4 | 24 | -6 | -11 to +6 | 34 | P=0.47 |
| Oxygen provision | 0 | -4 to +11 | 50 | 0 | -13 to +7 | 44 | P=0.21 |

Table 5: Changes in each quality indicator from 2007 baseline survey to 2008 National COPD Audit

Key:

F= Standard fully met

PN= Standard partially met or not met at all

F/F = Fully met in 2007 and in 2008

F/PN = Fully met 2007, Partial met / Not met at all 2008

PN/F= Partial met / Not met at all 2007, Fully met 2008

PN/PN= Partial met / Not met at all in 2007 and in 2008

| Quality Indicator | INTERVENTION | | | | CONTROL | | | |
|---|--------------|------|------|-------|---------|------|------|-------|
| | F/F | F/PN | PN/F | PN/PN | F/F | F/PN | PN/F | PN/PN |
| Non-invasive ventilation (NIV) | | | | | | | | |
| • NIV is used as the treatment of choice for persistent hypercapnic ventilatory failure during exacerbation despite optimal medical therapy. | 37 | 2 | 5 | 6 | 32 | 4 | 4 | 4 |
| • NIV is delivered in settings that are suitable for COPD patients: that is a designated area where staff have been specifically trained in NIV. E.g. ICU, HDU, Emergency Admissions Unit or a dedicated Respiratory Ward. | 32 | 5 | 5 | 7 | 30 | 2 | 7 | 5 |
| • There is a named consultant responsible for the NIV service. | 31 | 8 | 2 | 9 | 32 | 3 | 2 | 7 |
| • There is an ongoing inter-professional training programme for ALL staff involved in the care of patients established on NIV. | 18 | 11 | 6 | 14 | 18 | 5 | 4 | 16 |
| • Nurses and doctors outside of specialist respiratory wards do know how to manage patients with COPD, and are aware of the indications for and benefits of NIV. | 14 | 10 | 6 | 20 | 6 | 9 | 8 | 21 |
| • There is a written protocol that defines the monitoring of patients receiving NIV, and includes a minimum of regular clinical assessment, pulse oximetry and arterial blood gas measurements. | 37 | 6 | 4 | 2 | 35 | 4 | 2 | 3 |
| • There is a clear set of individualised written instructions for the management of each patient receiving NIV, including what to do in the event of deterioration and agreed ceilings of therapy, along with an agreed protocol between ICU and the medical team | 13 | 7 | 12 | 17 | 12 | 5 | 10 | 17 |
| • Locally adapted written protocols for the management of COPD patients requiring NIV, including weaning from NIV, are available in ALL relevant clinical areas for ALL relevant staff. | 16 | 13 | 6 | 15 | 18 | 8 | 4 | 14 |
| • A selection of nasal and full face masks, types and nasal pillows are available.* ² | 17 | 5 | 13 | 15 | 20 | 9 | 3 | 12 |
| • All areas offering NIV provide written information for patients about the indications for and patient experience of NIV. | 2 | 4 | 6 | 37 | 3 | 8 | 5 | 27 |
| • There is a written policy for providing patient information about NIV to severe COPD patients whilst in a stable state e.g. in an out-patient setting or upon discharge from hospital. | 0 | 2 | 3 | 45 | 1 | 4 | 1 | 37 |
| • There is an annual audit of the use of NIV including ALL clinical areas. This audit covers both those patients offered NIV to examine its appropriate use AND those that might have benefited for NIV but who were not provided with this therapy. | 8 | 8 | 6 | 27 | 10 | 5 | 3 | 26 |

| Pulmonary rehabilitation (PR) | | | | | | | | | |
|---|----|----|----|----|----|----|----|----|--|
| • The pulmonary rehabilitation programme is delivered by a multi-disciplinary team.* ² | 11 | 2 | 25 | 11 | 21 | 2 | 17 | 4 | |
| • There are written inclusion and exclusion criteria for the pulmonary rehabilitation programme and it is available to anyone with a diagnosis of COPD and MRC breathlessness scale of 2 - 4. | 27 | 7 | 5 | 9 | 25 | 4 | 10 | 5 | |
| • There is a designated lead clinician and a named co-coordinator for the pulmonary rehabilitation programme. | 29 | 7 | 6 | 7 | 33 | 4 | 4 | 3 | |
| • Pulmonary rehabilitation lasts a minimum of 6 weeks with exercise sessions twice a week. | 37 | 2 | 5 | 4 | 32 | 4 | 4 | 4 | |
| • There is a continuation phase, run by people trained in pulmonary rehabilitation, in the community. | 10 | 5 | 4 | 30 | 12 | 7 | 2 | 23 | |
| • The pulmonary rehabilitation programme includes education about living with COPD and ALL of the following issues: exercise, smoking cessation, diet, oxygen, social service support and benefits. | 36 | 3 | 5 | 5 | 33 | 3 | 1 | 6 | |
| • Staff that supervise the exercise component of the pulmonary rehabilitation programme are trained in resuscitation to Advanced Life Support standard and basic life support equipment is available [oxygen, bronchodilators and GTN] during these sessions.* ² | 14 | 5 | 11 | 17 | 13 | 13 | 4 | 14 | |
| • The staff / patient ratio during the exercise component of the pulmonary rehabilitation programme is at least 1:8 | 42 | 2 | 2 | 3 | 37 | 2 | 4 | 1 | |
| • The pulmonary rehabilitation programme provides written educational resources / leaflets for patients and carers. | 40 | 2 | 4 | 3 | 35 | 3 | 3 | 3 | |
| • There are annual audits of the service that includes patient numbers AND outcomes AND patient satisfaction. | 21 | 10 | 10 | 8 | 17 | 11 | 6 | 10 | |
| • Measurements such as spirometry, exercise and health status are recorded before and after pulmonary rehabilitation.* ² | 28 | 2 | 5 | 13 | 26 | 9 | 2 | 7 | |
| Early discharge scheme (EDS) | | | | | | | | | |
| • There are clear written criteria for acceptance on to the Early Discharge Scheme. | 22 | 0 | 1 | 0 | 30 | 2 | 2 | 0 | |
| • The scheme is run by individuals who are capable of working independently and includes those specifically trained in respiratory medicine. | 18 | 3 | 3 | 0 | 31 | 1 | 3 | 0 | |
| • There is a named clinician responsible for the service. | 20 | 1 | 1 | 2 | 28 | 4 | 1 | 1 | |
| • There are clear written protocols of care for the management of patients under the early discharge scheme. | 20 | 1 | 3 | 0 | 29 | 2 | 2 | 2 | |
| • Patients not accepted onto the scheme still receive a package of written smoking cessation / educational support. | 4 | 5 | 6 | 8 | 9 | 9 | 9 | 8 | |
| • All COPD patients and their carers receive written information about the early discharge scheme that describes what it is, and the support that is available well in advance of them needing the service. | 8 | 7 | 3 | 6 | 11 | 8 | 5 | 11 | |
| • The early discharge scheme has good lines of communication to manage patient care together with their GP. | 18 | 4 | 1 | 1 | 22 | 8 | 4 | 1 | |
| • There are clear clinical links between the early discharge team and various members of the primary care team. | 15 | 4 | 3 | 2 | 19 | 12 | 3 | 1 | |
| • There is continuous data collection along with both prospective and annual audits of the service to monitor its effectiveness. | 14 | 3 | 4 | 3 | 22 | 3 | 3 | 7 | |

| Long Term Oxygen Therapy (LTOT) | | | | | | | | | |
|--|----|----|---|----|----|----|---|----|--|
| • There is a hospital based Long Term Oxygen Therapy [LTOT] assessment service | 34 | 5 | 8 | 3 | 27 | 5 | 8 | 5 | |
| • There is screening in clinic of all patients with COPD to detect SaO ₂ <92%. ^{*1} | 32 | 3 | 7 | 8 | 19 | 12 | 8 | 6 | |
| • The LTOT assessment includes optimizing oxygen flow to achieve a PaO ₂ of 8kPa or greater using arterial blood gases. | 39 | 3 | 5 | 2 | 40 | 1 | 2 | 2 | |
| • The LTOT assessment uses a concentrator machine as the oxygen source. | 21 | 5 | 5 | 18 | 21 | 10 | 1 | 13 | |
| • For patients prescribed LTOT, follow-up arrangements are made as recommended by the BTS guidelines for home oxygen provision. | 17 | 10 | 4 | 18 | 22 | 4 | 4 | 15 | |
| • There is a healthcare professional contact available to deal with queries from patients and carers concerning their oxygen therapy. | 32 | 8 | 5 | 5 | 30 | 8 | 4 | 3 | |
| • Ambulatory oxygen is provided by the department for suitable patients. | 20 | 6 | 6 | 18 | 20 | 2 | 7 | 16 | |
| • There is screening for suitability for ambulatory oxygen, including SaO ₂ measurement, before referral for assessment. | 17 | 5 | 4 | 23 | 16 | 7 | 3 | 19 | |
| • For patients prescribed ambulatory oxygen, follow-up arrangements are made as recommended by the BTS guidelines for home oxygen provision. | 13 | 5 | 7 | 23 | 12 | 9 | 3 | 19 | |
| • Written information is provided to all patients receiving oxygen. ^{*2} | 21 | 7 | 8 | 13 | 22 | 13 | 7 | 3 | |
| • All hospital based oxygen prescriptions are routed through the respiratory department. | 22 | 7 | 8 | 12 | 14 | 10 | 4 | 17 | |
| • Short Burst Oxygen is provided by the department for suitable patients. | 34 | 2 | 8 | 6 | 30 | 4 | 7 | 3 | |
| • Patients are assessed for suitability before receiving Short Burst Oxygen. | 21 | 6 | 8 | 15 | 16 | 7 | 3 | 17 | |
| • Regular audits of oxygen prescribing are carried out. | 12 | 6 | 7 | 24 | 10 | 12 | 6 | 17 | |

Chi-squared test: ^{*1}: 0.01<P<0.05. ^{*2}: borderline 0.5<P<0.10. All others were P>0.20.

Qualitative Data from Change Diaries

The change diaries were analysed providing some numeric and some qualitative data. The qualitative responses were analysed using a grouped themes approach.

Ninety three fully completed pairs of baseline and final change diaries were received. Forty one (89% return rate) of these came from the control group and 52 (96% return rate) from the intervention units.

Units were asked to describe up to three important service changes that had occurred within the year of involvement with NCROP. These were then assessed as either positive or negative changes. The mean number of positive changes in the intervention group was 1.88 per unit and 1.46 in the control group.

The service changes described varied enormously from major service reforms such as standardisation of COPD care pathways across a district or health sector to much more specific and small scale changes such as revision of an NIV protocol. A number of achievements involved the appointment to new posts that included medical and nursing specialists but also administrative and other support workers. Many respondents reported that service improvements were either agreed but not yet implemented or that negotiations were on going and in the majority of cases but not all, appeared to be heading for a successful conclusion. The impression given is that service improvements may take much more than a year to fully implement from the point of inception. In two cases respondents commented on how useful the monthly change diaries had been in reminding them of how long it takes to make change and the need to work to a timetable of some kind in order to maintain momentum.

Most of the changes reported were aligned to the four areas identified in the NCROP quality indicators though service changes in the control group were more likely to vary from these four core topics. For Northern Ireland and Wales national Department of Health initiatives in COPD care dominated service change (see below for details). There was much greater variety amongst units in England and Scotland but Scotland was also notable for new managed care networks becoming established across geographical areas.

Service changes perceived as negative were reported in 19% (10 / 52) of the intervention units and in 32% (13 / 41) of the control units.

Examples of negative changes were identified as belonging to the following grouped themes.

1. Staff. For example a key member of staff leaving and not having been replaced, or a staff member on long term sick leave. Where replacement or new posts had been identified there were sometimes difficulties in recruiting to specialised posts. **2. Relationships.** At a local level particularly those with managers within the acute trust or commissioners in PCOs were referred to as difficult when communication channels were either unclear or subject to disruption. In a wider context there were frequent references to difficulties in persuading PCOs to share the same vision of services as the clinical team from the acute Trust and a lack of clinical expertise in the PCO with which to negotiate. **3. External service reconfiguration.** The NCROP took place at a time of PCO restructuring that negatively impacted on some service negotiations with business managers changing post with subsequent loss of continuity. In other cases acute Trusts were reconfigured notably in Northern Ireland. Whilst this too caused some disruption to service discussions the outcomes here were on the whole reported as positive.

Reporters were asked if NCROP had had an impact on the positive service changes described and 72% (37 / 52) of the intervention units stated yes whilst 32% (13 / 41) of controls also replied yes.

The influence of NCROP on service change was categorised as the following: **1. Raising the profile of COPD services.** The very fact that a national programme of peer review around COPD services was taking place was useful in itself. **2. Improved primary and secondary care working.** This included the value of having managers attend peer reviews to experience the service level offered in other units and to see a quality and service framework document as provided by NCROP with which to benchmark themselves. Clinicians and managers from both primary and secondary care were put together in a situation where COPD issues were to be addressed from a team perspective. **3. The value of external validation as a negotiating tool.** Both the peer review report and benchmarking against another Trust and the NCROP quality framework were used in negotiations as validation of the service plan to improve COPD provision to patients. **4. IT improvements.** In several cases the peer review and data collection had highlighted insufficient data collection support for COPD patient care and had prompted Trusts to invest in new software or administrative support. **5. As a direct consequence of a peer review recommendation.** In some specific instances a service development occurred simply because it was recommended at the peer review visit and agreed by the hosting team as part of the service development plan. **6. Learning from others.** Service developments occurred as a result of sharing good practice at the partner trust. In most of these cases the development was fairly specific such as a sharing of an NIV protocol where elements from one unit were incorporated into the protocol of another.

For those units who were part of the control group yet stated that NCROP had directly influenced service developments the reasons were given mainly under the heading of 'Raising the profile of COPD services' but also by using the NCROP quality indicators to argue for better resources within their own departments. In one case neighbouring Units who were part of the intervention arm shared learned best practice and details of resources secured at a sector meeting and that information was then passed on and used as an argument for additional resources by a unit in the control arm.

Where units responded that NCROP had not had a direct influence on the service changes they were asked if there were other positive effects such as those on team working etc. Seventeen percent (9 / 52) of the intervention group and 9% (4 / 41) of the controls replied in the affirmative.

There were numerous diverse examples given that were grouped under the following themes: **1. Increased self awareness of own service.** Here both the strengths and the weaknesses of the reviewed service were made apparent. This allowed weaknesses to be identified so that an action plan to address the issues could be developed and where strengths were identified as good practice that might be shared with the paired unit. In one case a team commented that they had not realised how much good work they had achieved until their peer review team pointed this out to them. **2. Impact on morale.** In a large number of cases it was reported that the peer review had boosted the morale of the hosting unit and had contributed to a feeling of teamwork amongst those present. To be praised for a service element was thought to be beneficial and in one case had resulted in a letter of commendation from the relevant Medical Director. **3. Linkages.** These varied but included continued contact with the paired review team that has spilled over into other areas of respiratory medicine, better contacts within a Trust with clinicians and notably palliative care and intensive care. Finally some very hopeful comments were made of new COPD forums that had been established either with a single PCO or in other cases across a number of different organisations.

Overall therefore 89% (46 / 52) of the intervention group and 41% (17 / 41) of the control group perceived some benefit from involvement in NCROP leaving 11% (6 / 52) of the intervention group and 59% (24 / 41) of the control group without perceived benefit.

In units within the peer review arm where no benefits of involvement in NCROP were reported there were not always reasons given for this but some explanations were given. For units in Northern Ireland the NCROP occurred just after the Northern Ireland Department of Health Strategic Framework for Respiratory Conditions was launched and many of the service changes reported were related directly to this government policy rather than NCROP. In Wales the Department of Health had also recently released specific funding for oxygen services where such developments occurred without direct reference to NCROP. There was one other stated reason for lack of effect of NCROP and that was conveyed by a sense of hopelessness and frustration from the respondents with comments ranging from 'high workload pressures and lack of engagement from either internal management or local PCOs frustrating their every effort' to a comment that one respondent was 'fed up with audit' and in two other cases a statement that they were already 'high performing trusts' and had little to gain from peer review. One unit stated that their pairing was inappropriate in that a large teaching unit was paired with a small district general hospital.

Summary

NCROP represents the largest ever voluntary peer review programme run in the United Kingdom. It has been completed within a short time frame and with the positive engagement of the vast majority of clinicians. Managers from acute trusts attended the majority of peer reviews and PCOs were represented in a large number but not all visits perhaps reflecting the restructuring of PCOs that occurred at the time of the project. It has been more difficult to recruit and actively involve patients in the process and more thought is required as to how best utilise their expertise in service improvement programmes of this kind.

The outcomes of the peer review process on the individual participants and on service change is mixed. Statistical analysis of the rate of change in services and development of new services shows little difference between the intervention and control groups. In fact there are a number of quality indicators that have fallen as well as improved across individual participants in both arms of NCROP. It may be that NCROP and peer review has failed to influence service or it may be that more time is required for significant service change to come about. There is evidence for both of these hypotheses from the change diaries and qualitative feedback from participants.

What is clear is that the majority of participants in the peer review group and a sizeable minority in the control group found benefit within NCROP. The former for a wide range of reasons that include the provision of a quality framework, sharing of good practice and the bringing together of commissioners and providers to the team focussed outcomes of better morale and self awareness that was achieved. For the control group a quality framework and the stimulus to review services and benchmark against agreed standards was appreciated in some but not all sites. This suggests that simply providing tools such as the NCROP quality framework may not be sufficient to engage clinicians and a proactive dissemination may be required. The examples of a national service strategy launched in Northern Ireland suggest this may well be the case and the forthcoming English strategy document is awaited with interest. However a number of negative issues were also uncovered within NCROP that included a frustration with negotiations between the acute trust and the PCO and in some instances the internal dislocation of a vision for the future between managers and clinicians. In the context of such poor relationships then any service improvement initiative is less likely to succeed.

Peer review on this scale is also not without its costs in terms of participant time and preparation and this report provides evidence on which its early effectiveness may be judged. It may be that it is too soon to measure the medium to long term benefits of participation in NCROP or to appreciate if this process represents 'value for money'. What is apparent is that there are a number of aspects of notable practice both for clinical teams and for those responsible for commissioning and providing services that can be identified as facilitating or inhibiting service change. It is also apparent that service change often occurs over prolonged periods of time and clinicians involved in the process must commit to the long term achievement of goals.

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Appendix A: Additional results tables

Table 6: Organisational data from the 2008 National COPD Audit for the intervention and control sites.

| Organisational feature of unit | NCROP 'intervention' sites | | NCROP 'control' sites | |
|---|----------------------------------|-------|--------------------------|-------|
| >1 take ward rounds by on-call Consultant per 24 hour weekday on call period * ² | 73% | 37/51 | 91% | 41/45 |
| Physician of the week scheme | 12% | 6/51 | 16% | 7/45 |
| Ward-based system | 82% | 42/51 | 80% | 36/45 |
| Speciality triage | 53% | 27/51 | 53% | 24/45 |
| Written policy on age related admission | 12% | 6/51 | 13% | 6/45 |
| Written policy on integrated admission | 33% | 17/51 | 36% | 16/45 |
| Written local guidelines for assessment of COPD | 71% | 36/51 | 69% | 31/45 |
| Written local guidelines for treatment of COPD | 78% | 40/51 | 76% | 34/45 |
| Written local guidelines for follow up of patients with COPD after discharge | 41% | 21/51 | 49% | 22/45 |
| Accident and Emergency Department | 94% | 48/51 | 98% | 44/45 |
| Admissions ward | 96% | 49/51 | 96% | 43/45 |
| Specialist respiratory ward | 88% | 45/51 | 91% | 41/45 |
| Medical HDU | 16% | 8/51 | 13% | 6/45 |
| Mixed HDU | 65% | 33/51 | 62% | 28/45 |
| Other HDU | 8% | 4/51 | 13% | 6/45 |
| No HDU | 12% | 6/51 | 11% | 5/45 |
| Early warning detection / ICU outreach for critically ill requiring ICU management | 90% | 46/51 | 82% | 37/45 |
| All COPD patients have access to a respiratory nurse | 80% | 41/51 | 80% | 36/45 |
| Invasive ventilatory support used to treat patients with exacerbations of COPD | 90% | 46/51 | 80% | 36/45 |
| Doxapram used to treat patients with exacerbations of COPD | 45% | 23/51 | 33% | 15/45 |
| Non-invasive ventilation used to treat patients with exacerbations of COPD | 100% | 51/51 | 98% | 44/45 |
| NIV Available on HDU | 73% | 37/51 | 71% | 32/45 |
| NIV Available on ICU | 67% | 34/51 | 53% | 24/45 |
| NIV Available on Respiratory Wards | 86% | 44/51 | 76% | 34/45 |
| NIV Available on General Wards | 18% | 9/51 | 7% | 3/45 |
| NIV Available: Other | 31% | 16/51 | 40% | 18/45 |
| All eligible patients have access to a formal pulmonary rehabilitation programme | 65% | 33/51 | 64% | 29/45 |
| • Physiotherapist contributes to PR programme | 92% | 47/51 | 100% | 45/45 |
| • Dietitian contributes to PR programme | 71% | 36/51 | 67% | 30/45 |
| • Social Worker contributes to PR programme | 31% | 16/51 | 33% | 15/45 |
| • Pharmacist contributes to PR programme | 45% | 23/51 | 40% | 18/45 |
| • Occupational Therapist contributes to PR programme | 61% | 31/51 | 62% | 28/45 |
| • Lung Function Technician contributes to PR programme | 20% | 10/51 | 27% | 12/45 |
| • Respiratory Nurse contributes to PR programme* ² | 78% | 40/51 | 96% | 43/45 |
| • Previous Course Participant contributes to PR programme | 35% | 18/51 | 36% | 16/45 |
| • Others contribute to PR programme * ³ | 69% | 35/51 | 49% | 22/45 |
| Patients with exacerbation of COPD have access to an early discharge scheme * ¹ | 49% | 25/51 | 78% | 35/45 |
| EDS run for admission prevention | 28% | 7/25 | 26% | 9/35 |

| | | | | |
|---|-----|-------|------|-------|
| EDS run for rapid discharge <48h | 60% | 15/25 | 54% | 19/35 |
| EDS run for rapid discharge >48h | 64% | 16/25 | 46% | 16/35 |
| EDS run for other reason | 12% | 3/25 | 9% | 3/35 |
| EDS run for 7 days * ² | 48% | 12/25 | 20% | 7/35 |
| EDS run by general nurse * ³ | 12% | 3/25 | 0% | 0/35 |
| EDS run by physiotherapist | 0% | 0/25 | 0% | 0/35 |
| EDS run by respiratory specialist nurse* ² | 76% | 19/25 | 100% | 35/35 |
| EDS run by 'other'* ³ | 12% | 3/25 | 0% | 0/35 |
| EDS patients are entered onto pulmonary rehabilitation scheme at discharge | 16% | 4/25 | 14% | 5/35 |
| EDS patients are entered onto pulmonary rehabilitation within 2 months of discharge | 28% | 7/25 | 31% | 11/35 |

Fishers test: *¹: 0.01<P<0.05 *²: 0.01<P<0.05. *³: borderline 0.5<P<0.10. All others were P>0.10

Table 7: Resources data from the 2008 National COPD Audit for the intervention and control sites

| Unit resources | NCROP 'intervention' sites | | | | NCROP 'control' sites | | | |
|--|----------------------------|--------|------------|----|-----------------------|--------|------------|----|
| | Mean | Median | IQR | N | Mean | Median | IQR | N |
| Medical emergency admissions admitted in 2007 | 10713 | 10419 | 7000-13566 | 51 | 11632 | 10758 | 7294-14949 | 45 |
| COPD emergency admissions admitted in 2007 | 798 | 550 | 383-775 | 51 | 682 | 501 | 357-882 | 45 |
| WTE Respiratory team: | | | | | | | | |
| • FY1 | 2.4 | 2 | 2-3 | 51 | 2.3 | 2 | 1-3 | 45 |
| • FY2 and /or ST1 and/or ST2 and/or SHO | 2.7 | 2 | 2-3 | 51 | 2.8 | 3 | 2-4 | 45 |
| • ST3 and above and /or SpR | 2.4 | 2 | 2-3 | 51 | 2.5 | 2 | 1.5-3 | 45 |
| • Associate Specialist | 0.2 | 0 | 0-0 | 51 | 0.1 | 0 | 0-0 | 45 |
| • Staff Grade | 0.3 | 0 | 0-0 | 51 | 0.2 | 0 | 0-0 | 45 |
| • Respiratory Consultant | 3.5 | 3 | 2-4 | 51 | 3.6 | 3 | 2-5 | 45 |
| • Respiratory Physiologist (Lung Function Technician) | 2.5 | 1.5 | 1-3 | 51 | 1.9 | 1 | 1-2.5 | 45 |
| • COPD Nurse | 1.2 | 1 | 0-2 | 51 | 1.6 | 1 | 0-2 | 45 |
| • Other Specialist Respiratory Nurses | 2.7 | 2.5 | 1.2-4 | 51 | 2.6 | 2 | 1-4 | 45 |
| • Specialist Respiratory Physiotherapist* ¹ | 1.3 | 1 | 0.5-2 | 51 | 1.8 | 1 | 1-2.3 | 45 |
| WTE sum of all above staff | 19 | 18 | 12-22 | 51 | 19 | 18 | 13-26 | 45 |
| WTE sum per 1000 COPD patients admitted 2007 | 35 | 29 | 19-49 | 51 | 39 | 34 | 24-41 | 45 |
| Respiratory consultants per 1000 COPD patients admitted 2007 | 6.1 | 5.3 | 3.6-7.8 | 51 | 7.6 | 5.8 | 3.3-7.9 | 45 |
| General operational Intensive Care Unit beds | 10 | 8 | 6-11 | 51 | 9 | 7 | 6-12 | 45 |
| General operational Intensive Care Unit beds per 1000 COPD patients admitted 2007 | 17 | 15 | 8-21 | 51 | 15 | 13 | 6-20 | 45 |
| COPD patients accepted by an early discharge scheme in the last 12 months * ¹ | 222 | 139 | 90-283 | 25 | 127 | 89 | 63-156 | 34 |
| Professionals directly involved in EDS patient care: | | | | | | | | |
| • General Practitioners | 0 | 0 | 0-0 | 25 | 0.2 | 0 | 0-0 | 35 |
| • Respiratory Consultants | 2.6 | 2 | 1-4 | 25 | 2.0 | 2 | 1-3 | 35 |
| • Respiratory Nurses * ¹ | 2.4 | 2 | 2-3.3 | 25 | 3.6 | 3 | 2-5 | 35 |
| • District Nurses | 0.5 | 0 | 0-0 | 25 | 0.1 | 0 | 0-0 | 35 |

| | | | | | | | | |
|--------------------|-----|-----|-----|----|-----|---|-------|----|
| • Health Visitors | 0 | 0 | 0-0 | 25 | 0 | 0 | 0-0 | 35 |
| • Physiotherapists | 0.7 | 0.5 | 0-1 | 25 | 1 | 1 | 0-1.5 | 35 |
| • Other Staff | 1.5 | 0 | 0-1 | 25 | 1.3 | 0 | 0-1 | 35 |

Mann-Whitney test: *¹: borderline 0.5<P<0.10. All others were P>0.10

NCROP participation

Data from the previous national COPD audit of 2003 were analysed to see how representative the hospitals participating in NCROP were of all hospitals. Data were available for 87 participating and 131 non-participating hospitals and results indicate that NCROP participating hospitals tended to be larger (49% vs. 38% with >600 beds), and generally better organised (e.g. speciality triage 41% vs. 28%, specialist respiratory ward 76% vs. 58%, NIV on ICU 68% v.s. 54%, NIV on wards 70% vs. 58%, formal pulmonary rehabilitation programme 71% vs 58%). In addition quality scores for non-participating NCROP units were available from the 2008 national audit (Table 8) and for each service area the non-NCROP units were scoring at similar but slightly lower levels of quality as both NCROP groups.

Table 8. NCROP participation and quality scores of the 2008 National COPD Audit

| Service | Intervention | | | Control | | | Non-NCROP | | |
|--------------------------|--------------|-------|----|---------|-------|----|-----------|-------|-----|
| | Median | IQR | n | Median | IQR | n | Median | IQR | n |
| 2008 AUDIT | | | | | | | | | |
| Organisation of care | 70 | 59-77 | 51 | 72 | 62-79 | 45 | 69 | 58-75 | 135 |
| NIV | 67 | 58-79 | 51 | 71 | 63-79 | 45 | 67 | 58-75 | 135 |
| Pulmonary Rehabilitation | 86 | 77-91 | 51 | 86 | 73-95 | 45 | 82 | 73-86 | 135 |
| Early Discharge (if EDS) | 89 | 83-89 | 25 | 89 | 72-94 | 35 | 83 | 72-94 | 81 |
| Oxygen provision | 79 | 61-86 | 51 | 79 | 61-86 | 45 | 75 | 61-86 | 135 |

Appendix B: Governance of the National COPD Resources and Outcomes Project

Members of both Steering and Implementation Groups are indicated in *italics*

- *Professor Mike Roberts, Associate Director of the National COPD Audit 2008: Consultant Respiratory Physician, Whipps Cross University Hospital NHS Trust, Barts and The London School of Medicine and Dentistry, Queen Mary University of London.*
- *Dr Robert Stone, Associate Director of the National COPD Audit 2008 and Consultant Respiratory Physician, Musgrove Park Hospital, Taunton.*
- Dr Ian Basnett, Public Health Consultant, Tower Hamlets Primary Care Trust, London.
- *Rhona Buckingham, National COPD Audit 2008 Project Manager, Clinical Effectiveness and Evaluation unit, Royal College of Physicians.*
- Maria Buxton, Consultant Physiotherapist, Central Middlesex Hospital and Brent Primary Care Trust.
- Dr John Coakley, Medical Director, Homerton University Hospital NHS Foundation Trust.
- Denise Daly, Consultant Physiotherapist, Royal Surrey County Hospital, Guildford.
- *Sheila Edwards, Chief Executive, British Thoracic Society.*
- *Professor Brian Harrison, British Thoracic Society.*
- Dr Steve Holmes, General Practitioner, General Practice Airways Group (GPIAG).
- Kevin Holton, Head of the COPD National Service Framework (NSF) Team, Department of Health.
- *Dr Harold Hosker, Consultant Respiratory Physician, Airedale General Hospital, Keighley.*
- *Jane Ingham, Director of Clinical Standards, Royal College of Physicians.*
- Dr Lawrence McAlpine, Consultant Physician, Monklands Hospital, Airdrie.
- Dr Phyo Myint, Honorary Consultant Physician, Norfolk and Norwich University Hospitals.
- Fiona Phillips, Public Health Consultant, COPD National Service Framework (NSF) Team, Department of Health.
- *Dr Jonathan Potter, Clinical Director, Clinical Effectiveness and Evaluation unit, Royal College of Physicians.*
- *Samantha Prigmore, Respiratory Nurse Consultant, St George's Hospital, London.*
- *Nancy Pursey, National COPD Audit 2008 Project Co-ordinator, Clinical Effectiveness and Evaluation unit, Royal College of Physicians.*
- *Carol Rivas, Research Fellow, Queen Mary's School of Medicine & Dentistry, University of London.*
- *Anil Seiger, Manager, Clinical Effectiveness and Evaluation unit, Royal College of Physicians.*
- *Dame Helena Shovelton, Chief Executive, British Lung Foundation.*
- Teresa Smith, Chest Clinic Manager, King Edward VII Hospital, Windsor.
- *Dr Stephanie Taylor, Reader in Applied Research, Barts and The London School of Medicine & Dentistry, Queen Mary, University of London / Honorary Consultant in Public Health Tower Hamlets Primary Care Trust.*

Appendix C: The National COPD Resources and Outcomes Project: participating NHS units

- Aberdeen Royal Infirmary
- Airedale General Hospital
- Altnagelvin Hospital
- Antrim Area Hospital
- Barnet Hospital
- Basildon Hospital
- Basingstoke & North Hampshire Hospital
- Bedford Hospital
- Belfast City Hospital
- Bishop Auckland Hospital
- Bristol Royal Infirmary
- Burnley General Hospital
- Churchill Hospital; John Radcliffe Hospital
- Daisy Hill Hospital
- Darent Valley Hospital
- Derbyshire Royal Infirmary; Derby City General Hospital
- Dewsbury & District Hospital
- Doncaster Royal Infirmary
- Ealing Hospital
- Eastbourne District General Hospital
- Epsom General Hospital; St Helier Hospital
- Fairfield General Hospital
- Gartnavel General Hospital
- George Eliot Hospital
- Grantham & District Hospital
- Great Western Hospital
- Halton General Hospital
- Hereford County Hospital
- Homerton Hospital
- Hope Hospital
- Huddersfield Royal Infirmary
- Kent & Sussex Hospital
- King's Mill Hospital
- Leighton Hospital
- Lincoln City Hospital
- Macclesfield District General Hospital
- Manchester Royal Infirmary
- Manor Hospital
- Milton Keynes General Hospital
- Monklands Hospital
- Montagu Hospital
- Morriston Hospital
- Neath Port Talbot Hospital
- New Cross Hospital
- Ninewells Hospital
- Norfolk & Norwich University Hospital
- North Manchester General Hospital
- North Staffordshire Hospital
- Northampton General Hospital
- Pilgrim Hospital
- Pinderfields General Hospital
- Poole Hospital
- Queen Elizabeth II Hospital
- Raigmore Hospital
- Rochdale Infirmary
- Rotherham General Hospital
- Royal Albert Edward Infirmary
- Royal Berkshire Hospital
- Royal Bolton Hospital
- Royal Bournemouth Hospital
- Royal Brompton Hospital
- Royal Cornwall Hospital
- Royal Free Hospital
- Royal Oldham Hospital
- Royal Preston Hospital
- Royal Surrey County Hospital
- Royal Victoria Infirmary
- Selly Oak Hospital
- Singleton Hospital
- Southend University Hospital
- Southern General Hospital
- Southmead Hospital
- St George's Hospital
- St James's University Hospital (Leeds Chest Clinic)
- St Mary's Hospital
- St Peter's Hospital
- St Woolos Hospital
- Stobhill Hospital
- Sunderland Royal Hospital
- Taunton & Somerset Hospital
- Torbay Hospital
- Trafford General Hospital
- Tyrone County Hospital
- University Hospital Aintree
- University Hospital Coventry (Walsgrave)
- University Hospital of North Tees
- Victoria Hospital Blackpool
- Warwick Hospital
- West Suffolk Hospital
- West Wales General Hospital
- Western General Hospital
- Weston General Hospital
- Wexham Park Hospital
- Whipps Cross University Hospital
- Whiston Hospital
- Whittington Hospital
- Worthing Hospital
- Wrexham Maelor Hospital
- Wythenshawe Hospital
- York Hospital