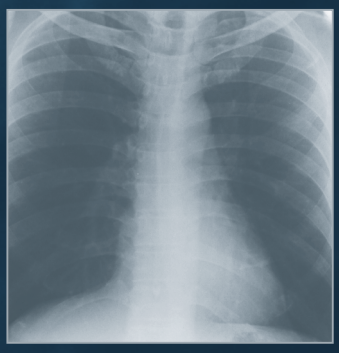
National COPD Audit Programme



COPD: Who cares matters

National Chronic Obstructive Pulmonary Disease (COPD) Audit Programme: Clinical audit of COPD exacerbations admitted to acute units in England and Wales 2014

National clinical audit report
February 2015

Prepared by:

Royal College of Physicians

British Thoracic Society

In partnership with:

PCRS Primary Care Respiratory Society UK

RCGP Royal College of General Practitioners

British Lung Foundation

Commissioned by:

Working in wider partnership with:

The Royal College of Physicians
The Royal College of Physicians (RCP) plays a leading role in the delivery of high-quality patient care by setting standards of medical practice and promoting clinical excellence. The RCP provides physicians in over 30 medical specialties with education, training and support throughout their careers. As an independent charity representing 30,000 fellows and members worldwide, the RCP advises and works with government, patients, allied healthcare professionals and the public to improve health and healthcare.

The Clinical Effectiveness and Evaluation Unit (CEEU) of the RCP runs projects that aim to improve healthcare in line with the best evidence for clinical practice: national comparative clinical audits, the measurement of clinical and patient outcomes, clinical change management and guideline development. All of the RCP's work is carried out in collaboration with relevant specialist societies, patient groups and NHS bodies. The CEEU is self-funding, securing commissions and grants from various organisations including the Department of Health and charities such as the Health Foundation.

The British Thoracic Society
The British Thoracic Society (BTS) was formed in 1982 by the amalgamation of the British Thoracic and Tuberculosis Association and the Thoracic Society, but their roots go back as far as the 1920s. BTS is a registered charity and a company limited by guarantee. The Society's statutory objectives are: 'the relief of sickness and the preservation and protection of public health by promoting the best standards of care for patients with respiratory and associated disorders, advancing knowledge about their causes, prevention and treatment and promoting the prevention of respiratory disorders'. Members include doctors, nurses, respiratory physiotherapists, scientists and other professionals with an interest in respiratory disease. In September 2014, BTS had 2950 members. All members join because they share an interest in BTS's main charitable objective, which is to improve the care of people with respiratory disorders.

Healthcare Quality Improvement Partnership (HQIP)
The National COPD Audit Programme is commissioned by the Healthcare Quality Improvement Partnership (HQIP) as part of the National Clinical Audit Programme (NCA). HQIP is led by a consortium of the Academy of Medical Royal Colleges, the Royal College of Nursing and National Voices. Its aim is to promote quality improvement, and in particular to increase the impact that clinical audit has on healthcare quality in England and Wales. HQIP holds the contract to manage and develop the NCA Programme, comprising more than 30 clinical audits that cover care provided to people with a wide range of medical, surgical and mental health conditions. The programme is funded by NHS England, the Welsh Government and, with some individual audits, also funded by the Health Department of the Scottish Government, DHSSPS Northern Ireland and the Channel Islands.

Citation for this document: Stone RA, Holzhauer-Barrie J, Lowe D, Searle L, Skipper E, Welham S, Roberts CM. COPD: Who cares matters. National Chronic Obstructive Pulmonary Disease (COPD) Audit Programme: Clinical audit of COPD exacerbations admitted to acute units in England and Wales 2014. National clinical audit report. London: RCP, February 2015.

ISBN 978-1-86016-558-0
eISBN 978-1-86016-559-7

Royal College of Physicians
Clinical Effectiveness and Evaluation Unit
11 St Andrews Place
Regent's Park
London NW1 4LE

www.rcplondon.ac.uk/COPD **#COPDaudit #COPDwhocares? #COPDwhocaresmatters**
Registered charity no 210508

Document purpose	To disseminate the results of the national COPD secondary care clinical audit of COPD exacerbations admitted to acute units in England and Wales 2014
Title	COPD: Who cares matters. National Chronic Obstructive Pulmonary Disease (COPD) Audit Programme: Clinical audit of COPD exacerbations admitted to acute units in England and Wales 2014
Author	Stone RA, Holzhauer-Barrie J, Lowe D, Searle L, Skipper E, Welham S, Roberts CM (on behalf of the National COPD Audit Programme: secondary care workstream)
Publication date	February 2015
Audience	Healthcare professionals, NHS managers, chief executives and board members, service commissioners, policymakers, COPD patients, their families/carers and the public
Description	This is the second of the COPD secondary care audit reports, published as part of the National COPD Audit Programme. This report details national data relating to the management of COPD exacerbations admitted to acute NHS units in England and Wales. It also documents attainment against relevant COPD quality standards as published by the National Institute for Health and Clinical Excellence (NICE) in 2011. The report is relevant to anyone with an interest in COPD and will enable lay people, as well as experts, to understand how COPD exacerbations admitted to acute NHS units in England and Wales are currently managed, and where change needs to occur. The information, key findings and recommendations outlined in the report are designed to provide readers with a basis for identifying areas in need of change and to facilitate development of improvement programmes that are relevant not only to units but also to commissioners and policymakers.
Supersedes	Previous national COPD secondary care clinical audit reports: www.rcplondon.ac.uk/projects/previous-copd-audits
Related publications	• Department of Health. *An outcomes strategy for people with chronic obstructive pulmonary disease (COPD) and asthma in England*. London: DH, 2011. www.gov.uk/government/publications/an-outcomes-strategy-for-people-with-chronic-obstructive-pulmonary-disease-copd-and-asthma-in-england • National Institute for Health and Clinical Excellence. *Chronic obstructive pulmonary disease: Management of chronic obstructive pulmonary disease in adults in primary and secondary care (partial update) (CG101)*. London: NICE, 2010. www.nice.org.uk/guidance/CG101 • National Institute for Health and Clinical Excellence. *Chronic obstructive pulmonary disease quality standard (QS10)*. London: NICE, 2011. www.nice.org.uk/Guidance/QS10 • NHS England. *NHS Outcomes Framework – 5 domains resources* [accessed January 2015]. www.england.nhs.uk/resources/resources-for-ccgs/out-frwrk/ • British Thoracic Society. *Guideline for emergency oxygen use in adult patients*. London: BTS, 2008. www.brit-thoracic.org.uk/guidelines-and-quality-standards/emergency-oxygen-use-in-adult-patients-guideline/ • British Thoracic Society. *BTS guideline on pulmonary rehabilitation in adults*. London: BTS, 2013. www.brit-thoracic.org.uk/guidelines-and-quality-standards/pulmonary-rehabilitation-guideline/ • British Thoracic Society. *The use of non-invasive ventilation in the management of patients with chronic obstructive pulmonary disease admitted to hospital with acute type II respiratory failure*. London: BTS, 2008. www.brit-thoracic.org.uk/document-library/clinical-information/niv/niv-guidelines/the-

	use-of-non-invasive-ventilation-in-the-management-of-patients-with-copd-admitted-to-hospital-with-acute-type-ii-respiratory-failure/
Contact	COPD@rcplondon.ac.uk

Report preparation

This report was written by the following, on behalf of the national COPD secondary care audit 2014 workstream group. (The full list of workstream group members is included at Appendix D.)

Dr Robert A Stone BSc PhD FRCP
Associate Director, Clinical Effectiveness and Evaluation Unit, Clinical Standards Department, Royal College of Physicians, London; Clinical Lead, Secondary Care Workstream, National COPD Secondary Care Audit; and Consultant Respiratory Physician, Taunton and Somerset NHS Foundation Trust, Musgrove Park Hospital, Taunton

Professor C Michael Roberts MA MD FRCP ILTHE
Associate Director, Clinical Effectiveness and Evaluation Unit, Clinical Standards Department, Royal College of Physicians, London; Programme Clinical Lead, National COPD Audit Programme; and Consultant Respiratory Physician, Whipps Cross University Hospital NHS Trust, Barts Health, Barts and The London School of Medicine and Dentistry, Queen Mary University of London

Mr Derek Lowe MSc C.Stat
Medical Statistician, Clinical Standards Department, Royal College of Physicians, London

Miss Sally Welham MA
Deputy Chief Executive and British Thoracic Society Lead for the National COPD Secondary Care Audit 2014, the British Thoracic Society, London

Ms Laura Searle PGDip
Project Coordinator, National COPD Secondary Care Audit 2014, the British Thoracic Society, London

Mrs Emma Skipper PGDip
Programme Manager, National COPD Audit Programme, Clinical Effectiveness and Evaluation Unit, Clinical Standards Department, Royal College of Physicians, London

Ms Juliana Holzhauer-Barrie MA
Programme Coordinator, National COPD Audit Programme, Clinical Effectiveness and Evaluation Unit, Clinical Standards Department, Royal College of Physicians, London

We would specifically like to acknowledge the input of the following contributing members of the secondary care group: Dr Colin Gelder, Dr John Hurst, Dr Gill Lowrey, Professor Michael Steiner and Ms Catherine Thompson.

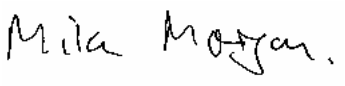
Foreword

This report is the second in the current round of the 2014 secondary care component of the national chronic obstructive pulmonary disease (COPD) audit, and it covers the description of clinical care in the acute hospital setting. The audit builds on the experiences of the three previous audits since 1997 and it reflects not only the performance of the hospital services but also the generally improving long-term care for patients with COPD. The authors are to be congratulated on the acquisition of an internationally unique and comprehensive description of COPD care that can be used to further improve both the hospital and community care of patients.

The number of acute medical admissions to hospital in the UK continues to rise inexorably, in spite of efforts to improve community care. However, this report outlines some pleasing improvements in the process of care, with significant reductions in length of stay and mortality. Any country in the world would be proud of these figures, but the report still finds that there is room for improvement. There is still noticeable variation in care, and the report suggests that those patients who receive attention from respiratory specialists receive better evidence-based care. A lack of specialist input was particularly noticeable at weekends. While the hospital service cannot take responsibility for failures in diagnosis or management prior to admission, it remains disappointing that there are still some basic deficiencies in acute care practice around assessment, management of respiratory failure and preparation for discharge.

This report differs from its predecessors by beginning to appreciate that it is not entirely possible to divorce the hospital episode from what is happening in the community. It also acknowledges that the shape of hospital care is changing. We cannot assume that the repeated audits over the last 20 years have examined exactly the same interaction or the same type of patient. Community care and self-management behaviour have improved markedly over this period but may paradoxically have resulted in a lower threshold for admission to hospital, which may have some bearing on the reduction of length of stay and mortality. Also, those patients who have successfully adopted self-management behaviours as a result of pulmonary rehabilitation may be able to leave hospital sooner than their predecessors. The later reports in this audit cycle on primary care and pulmonary rehabilitation may shed some light on this area. Hospitals are changing as well, with much emergency care being delivered by generic acute physicians. It is likely that many patients with short attendances will never be admitted to a ward that is supervised by a respiratory consultant. However, this should not mean that they are denied ongoing contact with the respiratory team. A hospital attendance signals a crisis in the long-term care of the patient but it should not be considered as an isolated incident, and communication with the community respiratory teams on discharge is vital if the hospital attendance is to add value to the overall care of the patient.

The authors of this report are to be congratulated for their prescience in understanding that a hospital admission is but a small, albeit significant, part of many patients' experience during the course of their illness, in which COPD is almost always compounded by other chronic conditions. This latest excellent report builds on the experience of the past and identifies continued deficiencies in our management of patients who require hospital admission. It shows that patients do get better care if they have specialist involvement, but in the future this cannot be confined simply to a hospital admission. New models of care must include specialist advice in the local commissioning arrangements that cover the whole pathway of care.



Professor Mike Morgan
National Clinical Director for Respiratory Services in England

Contents

Executive summary

Context: there has been a 22% rise in median emergency medical admissions since 2008, with COPD admissions having risen by 13%.

This report presents results from the second element of the national COPD secondary care audit, a clinical audit of COPD exacerbations admitted to acute NHS units in England and Wales during February to April 2014. The audit assessed performance against key quality standards, clinical guidelines and accepted best practice for COPD management (1,2,3,4,5,6,7). The current report links to the recently published account of COPD resources and organisation in England and Wales (*COPD: Who cares?* (8)), whilst outcomes from the patient group, which we believe to be the largest cohort of audited COPD exacerbations hitherto collected, will be reported in 2015.

The findings from the clinical audit align closely to those reported in the audit of COPD service organisation and resource (8), which highlighted some improvements in the organisation of admissions processes, non-invasive ventilation (NIV) and the availability of early/supported discharge services since 2008. There were, however, major concerns around the variation in care, availability of specialist respiratory services/weekend care and the coordination of care at discharge and beyond.

Data reported here demonstrate some important improvements in the management of COPD exacerbation since the last audit in 2008, for which clinical teams are to be commended. Firstly, it appears that fewer patients are being treated inappropriately with high-flow oxygen at the time of admission. Secondly, the management of acute respiratory failure has improved, with the overwhelming majority of patients receiving prompt assessment, appropriate measurement of blood gases (albeit with some unacceptable delays between the first and second samples) and management of respiratory acidosis with NIV. Thirdly, there has been a significant increase in the number of patients referred into early/supported discharge services and a concomitant reduction in the length of stay since 2008.

There are particular concerns, raised also by the audit of organisation and resource (8), around the marked variation in care offered to COPD patients across England and Wales, the access to specialist respiratory care, the availability of care at weekends and the observation that many patients are not cared for on respiratory wards. There was poor recording of important diagnostic information, alongside suboptimal delivery of, and referral into, key evidence-based services such as smoking cessation and pulmonary rehabilitation. Only half of the patients were under the care of a respiratory consultant at the time of discharge, although it was notable that those patients who were reviewed by, or under the care of, respiratory specialist teams received much better evidence-based COPD care.

Patients are not supported well at weekends, and this is associated with a major reduction in the rate of hospital discharge on Saturdays and Sundays (Mondays having the highest rate of COPD admissions). While a connection between the longer times taken to review patients on Mondays is unproven, we are sufficiently concerned to mention that the highest in-hospital mortality within the patient group is observed on a Tuesday following admission on a Monday.

The picture painted by the data is very much one of high front-end efficiency, with short hospital stays organised around a 5-day working week. There appears to be less emphasis on whole-case management and the important application of evidence-based care during the hospital episode, factors that have ramifications for patient experience and longer-term outcomes. Many patients do not receive specialist care from the multiprofessional respiratory team.

The data suggest that, having bolstered front-end safety and efficiency, it is now necessary to focus urgently on wider issues in order to improve compliance with standards: the respiratory bed base should increase to reflect the COPD admission burden, so maximising the number of patients who fall under the care of respiratory specialists; respiratory specialists (and this means not just doctors but the wider multidisciplinary team) should review exacerbating patients sooner, including on weekends; weekend care should improve and weekend working should extend to early/supported discharge teams, as this will also have a positive impact on Saturday/Sunday discharges; and acute units should continue to review their protocols for recording key clinical information, prescribing oxygen, referring into pulmonary rehabilitation and early/supported discharge services. The adoption of COPD admission and discharge care bundles may help to drive this change.

Our recommendations parallel those within the audit of COPD service organisation and resource (8). They are intended to improve the observed deficiencies in care and performance against key quality standards/guidelines. Some will be relatively easy to achieve. Others will be more challenging, and acute units will have to consider them not only within their own organisations but also in collaboration with primary care colleagues and maybe other acute units that are geographically close. There can be little doubt that their adoption will result in improved organisational efficiency, better patient experience and better outcomes.

While reorganisation and investment will be necessary to deliver these improvements, there has hitherto been no 'go-to' resource for providers and commissioners wishing to seek advice about improving their services and to share or search for experience, learning and innovation that will help to solve some of these challenges. The launch of 'Respiratory Futures' (9) is therefore welcomed as a potential platform within which to host this resource, and we commend its further development.

Summary of recommendations

We suggest that these recommendations are discussed carefully at departmental/trust board/clinical commissioning group (CCG)/health board level, and within local respiratory programme groups.

For commissioners

1. Oxygen prescribing should be linked to local/national care quality initiatives (CQUINs).
2. The provision of hospital smoking cessation services should be linked to local/national CQUINs.
3. Hospitals, CCGs and health boards should review the availability of their early/supported discharge services for COPD patients; these schemes should extend their service to cover weekends.
4. Hospitals, CCGs and health boards should clarify and formalise their pathways to improve referral to early/supported discharge teams and community pulmonary rehabilitation programmes; respiratory specialists should take a lead in this process.

For providers

1. To improve access to specialist care (performance against NICE QS 10, 11):
    - Patients admitted with COPD exacerbation should receive a respiratory specialist opinion within 24 hours, 7 days a week.
    - Hospitals should appraise carefully their staff rosters at weekends and on Mondays, the former having the lowest rate of discharges and the latter having the highest rate of admission and the longest times to clinical review.

- Patients with COPD exacerbation who need onward hospital care after their stay on the medical admissions unit should be managed in a respiratory ward. Hospitals should reappraise their complement of respiratory beds to ensure that it reflects their size and respiratory/COPD admission burden.

2. To improve the recording of key information and hence onward care (performance against NICE QS 1, 8, 10, 11 and BTS emergency oxygen/BTS NIV guideline), the following should be noted at admission, ideally as part of an admission care bundle:
   - confirmation that the patient has a COPD exacerbation on the basis of symptoms and spirometric evidence
   - the presence or absence of consolidation on the chest X-ray (treatment for pneumonia should commence if there is consolidation)
   - the estimated Medical Research Council (MRC) breathlessness score in the weeks prior to the current exacerbation
   - the initial oxygen saturation, alongside confirmation that oxygen has been prescribed and titrated to a target saturation
   - the blood gas analyses
   - components of the DECAF (**d**yspnoea, **e**osinopenia, **c**onsolidation, **a**trial **f**ibrillation) score (10) – this could usefully become an integral part of the admission documentation for patients with COPD exacerbation, just as the CURB 65 score is for pneumonia.

3. To improve the management of respiratory failure – oxygen (performance against NICE QS 8, 9, 10, 11 and BTS emergency oxygen guideline):
   - Units should ensure that they have a mandatory, rolling training programme in place to support better prescribing and titration of emergency oxygen therapy. The training programme should extend to all medical and nursing staff, and should be a core topic within junior doctors' induction programmes.

4. To improve the management of respiratory failure – NIV (performance against NICE QS 10, 11 and BTS NIV guideline):
   - Units should ensure that a written proforma is deployed for patients receiving NIV. The proforma should provide fields in which to record the time and value of each blood gas, the time of NIV application and NIV pressures. It should be freely available wherever NIV is used. The NIV proforma should be demonstrated as part of junior doctors' induction programmes.
   - Patients requiring NIV should have access to level 2 care; there should be at least one staffed level 2 bed on the respiratory ward, dependent upon demand and the size of the hospital, in which NIV can be administered according to accepted clinical guidelines.

5. To improve the recording and documentation of spirometry (performance against NICE QS 1, 2, 3, 10):
   - All hospitals/units should make spirometry results, normally available on lung function laboratory software, accessible from every computer desktop via their IT department's browser system/intranet.
   - All admission units and respiratory wards should have a basic portable spirometer as part of their standard equipment.
   - All hospitals/units should introduce mandatory training for key health professionals to ensure that the measurement/recording of spirometry is understood and undertaken, when

appropriate, as part of routine practice.

6. To improve the administration of smoking cessation advice (performance against NICE QS 5):
    - All hospitals/units should have a fully funded and resourced smoking cessation programme delivered by dedicated smoking cessation practitioners.

7. To improve the coordination of care at discharge, and hence onward care, hospitals/units should ensure that their discharge information contains the following information, ideally as part of a discharge care bundle (performance against NICE QS 1, 5, 6, 12):
    - MRC breathlessness score in the period prior to admission
    - latest spirometry (date and value)
    - body mass index (BMI)
    - evidence of any decision made around escalation of care, and who has been involved in that decision
    - evidence that smoking cessation support has been given to current smokers
    - evidence that a pulmonary rehabilitation referral has been made, or is considered inappropriate at the present time
    - identification of those with type 2 respiratory failure who are at risk of oxygen toxicity (and confirmation that an oxygen alert card has been issued)
    - clear evidence that follow-up has been arranged (hospital team, community team, GP).

Quality improvement

- Future audit should be undertaken by continuous, prospective collection (and regular reporting) of selected clinical indicators drawn from the current recommendations, with intermittent spot audit of COPD service resource and organisation.
- A nationally-recognised repository for COPD service improvement should be developed, aligned to the recommendations made in the national COPD audit, and made available as a resource for clinicians and managers across all health sectors. The recent launch of 'Respiratory Futures' offers an ideal platform for this resource.

Key findings

Context: there has been a 22% rise in median emergency medical admissions since 2008, with COPD admissions having risen by 13%.

GENERAL OBSERVATIONS

1. COPD is a disease associated predominantly with deprivation. Younger patients with COPD tend to live in the most deprived areas, and hospital admissions for COPD exacerbation are now commoner in women (51%) than in men.
2. Cardiovascular disease and diabetes are the most commonly associated comorbidities in patients admitted with COPD exacerbation.
3. Patients admitted to hospital, as in previous audit rounds, have severe COPD.
4. Monday is the busiest day for COPD admissions, which tail off as the week progresses and start to rise during the latter part of Sunday.
5. Increased efficiency within acute units is evident through a reduction in length of stay from a median of 6 days in 2003 to 5 days in 2008 and 4 days in 2014.
6. The reduction in length of stay is likely to have been achieved by a large rise in the number of patients being referred into early/supported discharge schemes (40% in 2014, 18% in 2008) and the front-loading of medical assessment unit (MAU) care by acute physicians (median 4 per unit).
7. However, far fewer patients are discharged from hospital on Saturdays and Sundays, which has the potential to destabilise bed states on Mondays. It is not known whether this difference relates to non-availability of clinical review or social care at weekends, although the former is undoubtedly reduced.
8. Inpatient mortality is lower in the 2014 audit, at 4.3% (7.8% in 2008, 7.7% in 2003), for reasons that remain unclear. There is a peak in the number of inpatient deaths on Tuesdays, although it is unclear whether this is the upshot of reduced weekend review, the large influx of patients on Mondays and the extra time it takes to review cases that day.
9. Inpatient mortality is higher in those with consolidation noted on their chest X-ray (6.8% versus 3.6%), as observed in previous audits, and 15% of patients waited more than 4 hours before receiving a chest X-ray.
10. The DECAF score is strongly predictive of both mortality and length of stay, but there is poor recording of variables needed for its calculation.
11. Thirty-one per cent of all the 13,414 patients in the audit were managed solely on the MAU/admissions ward.

ACCESS TO SPECIALIST CARE (NICE QS 10)

There is significant concern around access to specialist care, a finding anticipated in our recent report into the organisation and resourcing of COPD services.

1. Only 42% of patients seen by a middle-grade doctor (SpR/ST3 or above) were seen within 4 hours.
2. Although 85% of patients seen by a consultant of any specialty other than respiratory (median 10 hours) were seen within 24 hours, respiratory consultants saw only 54% of patients within 24 hours (median 22 hours).
3. Only 46% of patients were seen by a respiratory nurse/member of the COPD/respiratory team within 24 hours (median 26 hours).
4. Forty-two per cent of patients who were discharged after a length of stay less than or equal to 1 day were not seen by a respiratory consultant or respiratory nurse/member of the COPD/respiratory team.

5. Far fewer patients admitted on Fridays and Saturdays were seen within 24 hours by either a respiratory consultant or respiratory nurse/member of the COPD/respiratory team.
6. Only 42% of patients received their care on a respiratory ward.
7. Only 51% of patients were under the care of a respiratory consultant when the decision was made to discharge or transfer to an early/supported discharge service (compared with 54% in 2008).

However, patients received better evidence-based care when seen by the respiratory team.

1. More patients had their MRC breathlessness score recorded (the dataset revealing a strong relationship between MRC breathlessness score, when it was recorded, and length of stay and inpatient mortality).
2. More patients had their oxygen therapy prescribed.
3. More patients had their spirometry recorded.
4. More patients had their BMI recorded.
5. More patients received smoking cessation advice.
6. More patients were referred to early/supported discharge services.
7. More patients were assessed and referred for pulmonary rehabilitation.

DOCUMENTING KEY CLINICAL INFORMATION AND DELIVERY OF EVIDENCE-BASED CARE

Although there was clear evidence of better care being received by patients who were seen by, or under the care of, respiratory specialists, there was significant concern in relation to the following.

1. An MRC breathlessness score is not being recorded in 4 out of 10 patients.
2. The presence of consolidation on chest X-rays is poorly recorded.
3. Oxygen prescribing remains poor (the organisational audit shows that there is a paucity of oxygen therapy training programmes across acute units).
4. The availability of spirometry results (46%) was worse than in 2008 (54%).
5. Only 58% of current smokers received smoking cessation advice during their admission.
6. There was no decision on the ceiling of care recorded in 53% of cases.
7. Forty-four per cent of patients had no assessment made for pulmonary rehabilitation at the point of discharge.

MANAGING RESPIRATORY FAILURE

The management of respiratory failure seemed better in 2014, confirming observations in the report of organisation and resource (8) and the general impression from both organisational and clinical data that the front end of admission is improving. However, areas for further work remain.

1. There has been a continued reduction in the pO_2 recorded on initial blood gas testing since 2003 (median 9.2 kPa), through 2008 (8.9 kPa) to 2014 (8.3 kPa), with concomitantly fewer patients having an initial pO_2 of >13 kPa, indicating that there may well be less treatment with inappropriate high-flow oxygen.
2. Stipulation of target oxygen saturation was good (84%) but prescribing of oxygen was low (55%).
3. Although the proportion of patients receiving NIV has increased slightly since 2008, the intervention seemed appropriate in the majority of cases, the most severely acidotic patients receiving treatment the quickest, and following repeated testing of arterial blood gases at an appropriate time.
4. There was, however, a gap of more than 12 hours from first to second blood gas testing in 13% of patients who received NIV.
5. The median time from admission to receipt of NIV was 4.1 hours, although nearly a fifth of patients (19%) received NIV for the first time beyond 24 hours.

Recommendations (and future auditable standards)

The recommendations that we make parallel those made in the recent report into organisation and resource of COPD services (8), because the conclusions made from the clinical dataset align closely with those from the organisational data.

1. **To improve access to specialist care (performance against NICE QS 10, 11):**

   - **Patients admitted with COPD exacerbation should receive a respiratory specialist opinion within 24 hours, 7 days a week.**
   - **Hospitals should appraise carefully their staff rosters at weekends and on Mondays, the former having the lowest rate of discharges and the latter the highest rate of admission and longest times to clinical review.**

     The organisational data (8) showed that most acute units were not set up to provide responsive specialist care, 7 days a week. The clinical data confirm that respiratory specialists are often the last to see exacerbating patients, and many are discharged before receiving a specialist opinion. Although acute respiratory failure is now managed better on admission, it is clear that respiratory specialists add significant value to the overall delivery of evidence-based care to these patients. We feel that it is especially important that a respiratory specialist reviews all exacerbating patients, even those with a short anticipated stay, within the first 24 hours. As stated in the organisational report, this will require both reorganisation and better team working, to ensure that the benefits of the *whole* respiratory multidisciplinary team (MDT) are bestowed on patients (ie using respiratory-trained doctors, nurses and physiotherapists); hospital management teams should take particular note of the poor discharge and review rates at weekends, allied to the surge in admissions on Mondays, the longer time to review patients on Mondays and our concern about a possible connection with the peak in mortality on Tuesdays. This may necessitate the rostering of extra staff not just at weekends but also on Mondays. These changes are likely to require investment but also to yield improved patient satisfaction, greater efficiency and better outcomes.

   - **Patients with COPD exacerbation who need onward hospital care after their stay on the MAU should be managed in a respiratory ward.**
   - **Hospitals should reappraise their complement of respiratory beds to ensure that it reflects their size and COPD admission burden.**

     As noted above, and as with other organ-specific diseases, COPD patients receive better care when they are looked after by respiratory specialists. Having demonstrated this consistently in sequential audits, having shown that the number of patients with COPD exacerbation cared for by respiratory specialists on respiratory wards has not changed (only 54%) and having found that there remains significant variation in the delivery of respiratory care across sites, we again recommend that patients requiring admission with COPD exacerbation should be cared for in a respiratory ward. To achieve this, hospitals will need to look carefully at their bed allocation for COPD/respiratory patients and ensure that it is proportionate to the number of admissions.

2. **To improve the recording of key information at admission, and hence onward care, the following should be noted at admission, ideally as part of an admission care bundle (performance against NICE QS 1, 8, 10, 11 and BTS emergency oxygen/BTS NIV guideline):**

   - **confirmation that the patient has a COPD exacerbation on the basis of symptoms and spirometric evidence**

- **the presence or absence of consolidation on the chest X-ray (treatment for pneumonia should commence if there is consolidation)**
- **the estimated MRC breathlessness score in the weeks prior to the current exacerbation**
- **the initial oxygen saturation, alongside confirmation that oxygen has been prescribed and titrated to an appropriate target saturation**
- **the blood gas analyses**
- **components of the DECAF score – this could usefully become an integral part of the admission documentation for patients with COPD exacerbation, as per the CURB 65 score for pneumonia.**

  The recording of essential information was highly variable, ranging from very poor to very good. The availability of spirometry results, vital to confirming the diagnosis of COPD, has got worse. The MRC breathlessness score in the weeks leading up to admission (which correlated strongly with inpatient mortality and length of stay) and the presence of consolidation on the chest X-ray (also associated with higher inpatient mortality) were both recorded poorly, as were oxygen prescribing and titration.

  We therefore recommend that hospitals review their admission processes to facilitate better recording of each metric, as noted above, and would suggest their incorporation into an admission bundle as the best way of doing so. Although we did not specifically ask units to calculate a DECAF score, we were able to provide a modified score for 5583 patients (table 3.22). High scores were closely related to higher inpatient mortality and longer length of stay, and vice versa. We therefore recommend that calculation of and recording the DECAF score is included within the admission bundle for patients admitted with COPD exacerbation. Our next report will further outline the relationship between admission DECAF score and post-discharge outcome.

3. **To improve the management of respiratory failure – oxygen (performance against NICE QS 8, 9, 10, 11 and BTS emergency oxygen guideline):**

   - **Units should ensure that they have a mandatory, rolling training programme in place to support better prescribing and titration of emergency oxygen therapy. The training programme should extend to all medical and nursing staff, and should be a core topic within junior doctors' induction programmes.**
   - **Oxygen prescribing should be linked to local/national CQUINs.**

     Although target saturation was specified in 84% of cases, oxygen was prescribed to only 55% of patients. The organisational audit revealed that 41% of units did not have a training programme for oxygen therapy. We therefore recommend the introduction of a mandatory, rolling training programme to address this point, designed for all nursing and medical staff, with oxygen prescribing being a core part of junior doctors' induction. Given that oxygen prescribing has remained consistently poor, we recommend that this metric be linked to local/national CQUINs.

4. **To improve the management of respiratory failure – NIV (performance against NICE QS 10, 11 and BTS NIV guideline):**

   - **Units should ensure that a written proforma is deployed for patients receiving NIV. The proforma should provide fields in which to record the time and value of each blood gas, the time of NIV application and NIV pressures. It should be freely available wherever NIV is used. The NIV proforma should be demonstrated as part of junior doctors' induction programmes.**

- **Patients requiring NIV should have access to level 2 care; there should be at least one staffed level 2 bed on the respiratory ward, dependent upon demand and the size of the hospital, in which NIV can be administered according to accepted clinical guidelines.**

  Although the management of respiratory failure has improved, there is still a significant issue around the delayed testing of a second blood gas and the application of NIV (the delays seem longer for patients admitted on Mondays). We feel that a more robust approach to the recording of blood gases and NIV pressures, ie on specific proformas (as happens in many units), will improve this aspect of care. We have already stated in the recent organisational report that respiratory wards should have at least one level 2 bed, in which NIV can be administered according to accepted guidelines. The clinical data confirm that this is a reasonable recommendation in view of the number of patients with severe, acidotic respiratory failure on admission and the delays taken to apply treatment in a significant number of patients.

5. **To improve the recording and documentation of spirometry, and hence the diagnosis/staging of COPD (performance against NICE QS 1, 2, 3, 10):**

   - **All hospitals/units should make spirometry results, normally available on lung function laboratory software, accessible from every computer desktop via their IT department's browser system/intranet.**
   - **All admission units and respiratory wards should have a basic portable spirometer as part of their standard equipment.**
   - **All hospitals should introduce mandatory training for key health professionals to ensure that the measurement/recording of spirometry is understood and undertaken, when appropriate, as part of routine practice.**

     The availability/recording of spirometry, vital to the diagnosis/staging/risk management of COPD patients, is getting worse. The reason is unclear, but the finding is unacceptable. We recommend that all hospitals/units should make spirometry results, normally available on lung function laboratory software, accessible from every computer desktop via their IT department's browser system/intranet. We additionally recommend that all admission units and respiratory wards have a portable spirometer as part of their standard equipment. There needs to be a culture change such that appropriate measurement and recording of spirometry, as is the case for recording an electrocardiogram (ECG) in patients with heart disease, becomes engrained into the routine assessment of those admitted with respiratory symptoms. Hospitals should develop mandatory training programmes for key health professionals, to ensure that the indications for undertaking and measuring simple spirometry are understood.

6. **To improve the administration of smoking cessation advice and hence quit rates (performance against NICE QS 5):**

   - **All hospitals should have a fully funded and resourced smoking cessation programme delivered by dedicated smoking cessation practitioners.**
   - **The provision of hospital smoking cessation services should be linked to local/national CQUINs.**

     The poor administration of smoking cessation advice to current smokers admitted with COPD exacerbation confirms that this important intervention, and therapy, for COPD patients must improve. As recommended in the organisational report, at least 1 whole-time equivalent (WTE) per week of smoking cessation support, commensurate with the size of the hospital/unit, should be delivered to patients (through individual and group sessions),

demonstrable by future audit. Forty-five per cent of units reported in their organisational survey that CQUINs were used as a local driver to improve smoking cessation, suggesting that CQUINs could be used more widely to improve smoking cessation services.

7. **To improve the coordination of care at discharge, and hence onward care, hospitals/units should ensure that their respiratory discharge summaries contain the following information, ideally as part of a discharge care bundle (performance against NICE QS 1, 5, 6, 12):**

   - **the MRC breathlessness score in the period prior to admission**
   - **the latest spirometry (date and value)**
   - **BMI**
   - **evidence of any decision made around escalation of care, and who has been involved in that decision**
   - **evidence that smoking cessation support has been given to current smokers**
   - **evidence that a pulmonary rehabilitation referral has been made, or is considered inappropriate at the present time**
   - **identification of those with type 2 respiratory failure who are at risk of oxygen toxicity (and confirmation that an oxygen alert card has been issued)**
   - **clear evidence that follow-up has been arranged (hospital team, community team, GP).**

     The clinical data showed that recording of MRC score, spirometry, BMI, documentation of ceiling of care, provision of smoking cessation advice and assessment/referral for pulmonary rehabilitation was highly variable and generally poor. We therefore recommend that these metrics are included within discharge information. Integrating discharge care bundles into the discharge summary and the adoption of admission bundles should similarly facilitate this change.

   - **Hospitals, CCGs and health boards should also review the availability of their early/supported discharge services for COPD patients; these schemes should extend their service to cover weekends.**

   - **Hospitals, working with community providers, primary care, patient groups and commissioners, should clarify and formalise their pathways to improve referral to early/supported discharge teams and community pulmonary rehabilitation programmes; respiratory specialists should take a lead in this process.**

     The organisational audit showed that 80% of units had access to an early/supported discharge team, a substantial increase. Teams working across the primary/secondary interface offered the most comprehensive supported discharge service, including more weekend working, although there was generally reduced access at weekends. Respiratory specialists were much more likely to refer patients to early/supported discharge schemes. The clinical data suggested that 40% of patients were referred for consideration of early/supported discharge services (mainly Monday to Friday). Extending these services to cover weekends is likely to prove especially beneficial, and we therefore recommend that the scope, availability and pathways into these services are clarified and formalised at local level. Acute units and community teams should come together to deliver this change.

8. **Quality improvement**

   - **Future audit should be undertaken by continuous, prospective collection (and regular reporting) of selected clinical indicators drawn from the current recommendations, with intermittent spot audit of COPD service resource and organisation.**

- **A nationally-recognised repository for COPD service improvement should be developed, aligned to the recommendations made in the national COPD audit, and made available as a resource for clinicians and managers across all health sectors.**

  The audits of 2003 and 2008, and now 2014, have enabled a gradual reduction in the dataset size, such that the indicators with the closest relationship to outcomes are now much clearer. For this reason, we feel that it is no longer necessary to undertake such a broad-ranging audit of variables; a targeted, and prospective, audit of indicators contained within the current recommendations, allied to occasional spot audit of resource and organisation, is appropriate.

  Although some of the recommendations in this report are challenging, it is clear that there is wide site variation in both the organisation and clinical delivery of COPD services across England and Wales. Some units manage certain aspects very well but struggle to maintain quality in other areas, and vice versa. Until the recent development of the 'Respiratory Futures' website, there has been no 'go-to' resource that facilitates service improvement, permits the sharing of expertise, highlights examples of outstanding practice or innovation and invites communication and collaboration between units who are trying to find novel methods to improve patient services and coordinate care in a financially straightened environment. We therefore strongly commend the development of this new resource.

1. Introduction

The 2008 national COPD audit comprised a survey of acute unit organisation and resources, linked to a clinical audit of COPD exacerbations with outcomes at 90 days. There was also a survey undertaken in primary care and a limited study of patient experience. The survey of organisation and resources identified an increase in staffing and the availability of some COPD-specific services such as NIV and supported discharge since 2003, although palliative care support was lacking. The clinical audit showed many examples of good practice, but there were significant problems around the timely management of patients with ventilatory failure and the application of NIV. Both elements highlighted significant variation in the standard of COPD care across UK units. Further challenges were identified in the management of older patients and those with pneumonia. Although the main findings were published widely, site-specific data were not made publicly available.

The National COPD Audit Programme, commissioned by the Health Quality Improvement Partnership (HQIP) as part of the National Clinical Audit Programme (NCA), sets out an ambitious programme of work that aims to drive improvements in the quality of care and services provided for COPD patients in England and Wales. For the first time in respiratory audit, the programme will look at COPD care across the patient pathway, both in and out of hospital, bringing together key elements from the primary and secondary care sectors.

The programme is led by the Royal College of Physicians (RCP), working in partnership with the British Thoracic Society (BTS), the British Lung Foundation (BLF), the Primary Care Respiratory Society UK (PCRS-UK), the Royal College of General Practitioners (RCGP) and the Health and Social Care Information Centre (HSCIC).

There are four programme workstreams:

1. Primary care: collection of audit data from general practice patient record systems; delivered by the RCP and the HSCIC, working with the PCRS-UK and the RCGP
2. Secondary care: audits of patients admitted to hospital with COPD exacerbation, allied to outcomes at 30 and 90 days; organisational audits of the resourcing and organisation of COPD services in acute units admitting patients with COPD exacerbation; delivered by the BTS, working with the RCP
3. Pulmonary rehabilitation: audits of service delivery, quality, organisation and resourcing of pulmonary rehabilitation services; delivered by the BTS, working with the RCP
4. Patient Reported Experience Measures (PREMs): a 1-year programme exploring the potential/feasibility for the future incorporation of PREMs into the main audit programme; delivered by the BLF, working with Picker Institute Europe.

Reported here are data from the 2014 audit of COPD exacerbations managed in acute units in England and Wales. Please see the appendices for further detail on methods, the component parts of the wider COPD Audit Programme and programme governance. Outcome data will be reported in spring 2015.

2. Results

Presentation of results

This report gives national results for all units participating in this audit.

Where applicable, 2008 and 2003 national COPD audit data are recorded beneath tables to allow an assessment of change at the national level. As both of these earlier audits included units outside England and Wales, data from these audits were reworked for just England and Wales. The 2014 audit asked many different questions compared with the previous audits, and only a few questions were applicable for providing historical comparisons.

Visual methods are used to convey site variation in some results. Some of the graphics are what are known as 'funnel plots', which are diagrams that show site results plotted against site sample size, in comparison to a line that indicates the overall national result and dotted lines that indicate limits of control. Control limits are often shaped like a 'funnel' and serve as boundaries, and any results falling above the upper boundary or below the lower boundary are considered to be outliers. The chance of results being outside these limits due to chance alone is very small (5% for the inner and 0.2% for the outer limits), so when site results do fall outside, these are inconsistent with the overall national result in relation to their sample size. This implies that something else is happening, non-random in nature, probably systematic organisational differences rather than randomness of scatter.

Each section is preceded by a short summary of key messages and of areas needing improvement. The executive summary, earlier in this report, provides an overview of all the key messages and recommendations, particularly in relation to published standards of care for COPD patients.

For the main audit analyses there were a small number of exclusions: triplicate entries of the same episode (only a single replication was needed for the reliability analyses) and readmissions of the same patient to the same or a different hospital within the audit period. Thus one record per patient (first admission in audit period) was included in the main analyses.

There was some data cleansing required to account for unnecessary completion of nested questions and also to account for illogical data. There was a sizeable amount of data cleaning required of 'other' free-text entries, as it was apparent that some auditors gave free text that should have been recorded as one of the listed options. Occasionally there were missing data, resulting in data cells being blank.

In tables and text, please note that when categories are combined to give a combined percentage, it is the numbers that are added and not the percentages.

Reliability of data

In order to gain a measure of the reliability of the data submitted, units were asked to identify a second individual to re-enter clinical data on the first five patients included in the audit. It was stressed that this re-entry should be done without reference to the data that was collected and entered by the first auditor. One hundred and eighty-nine units contributed 1105 cases for analysis. The levels of reliability were generally 'good' to 'very good', with about 80% of kappa coefficient of agreement values over 0.60, more than half over 0.70 and about one-third over 0.80. About one in 10 were below 0.50.

There will be a need to exercise caution when performing analyses that correlate one variable with another when one or both variables has less than good inter-auditor reliability, because association between them may dilute as a consequence. Variables with a kappa below 0.50 included: hearing

impairment comorbidity; whether patient had a chest X-ray; decision on ceiling of care being made within 24 hours in regard to CT1/CT2, FY1/2, patient, other health professional; and decision of care regarding 'yes, not for NIV'.

Full details of the reliability analyses can be found at www.rcplondon.ac.uk/projects/secondary-care-workstream.

Results 2014

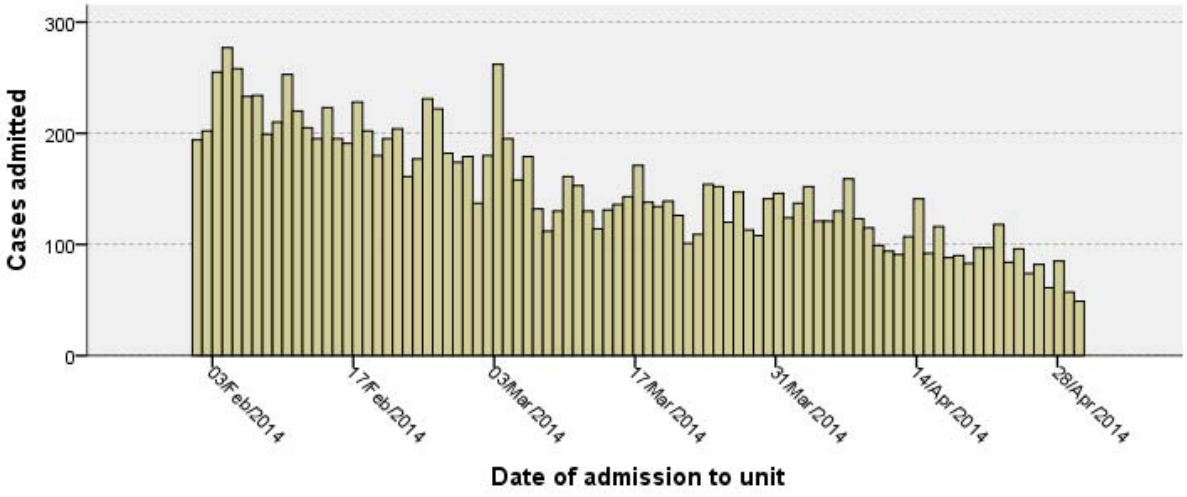
In total, 14743 data records were exported, of which 1105 were duplicates used in the reliability agreement analyses, and a further 224 were excluded (45 triplicate or greater replication, 99 same-site readmission and 80 different-site readmission). Data on 13414 patients were included in the main clinical audit analyses, from 199 units within 148 trusts/health boards, median (interquartile range – IQR) 61 (38–85) per unit.

There were 12594 from 183 English units within 142 trusts, median (IQR) 61 (38–86) per unit, and 820 from 16 Welsh units within 6 health boards, median 51 (28–72) per unit.

The overall response rate for trusts/health boards was 100% (148/148): England 100% (142/142) and Wales 100% (6/6) (Appendix B).

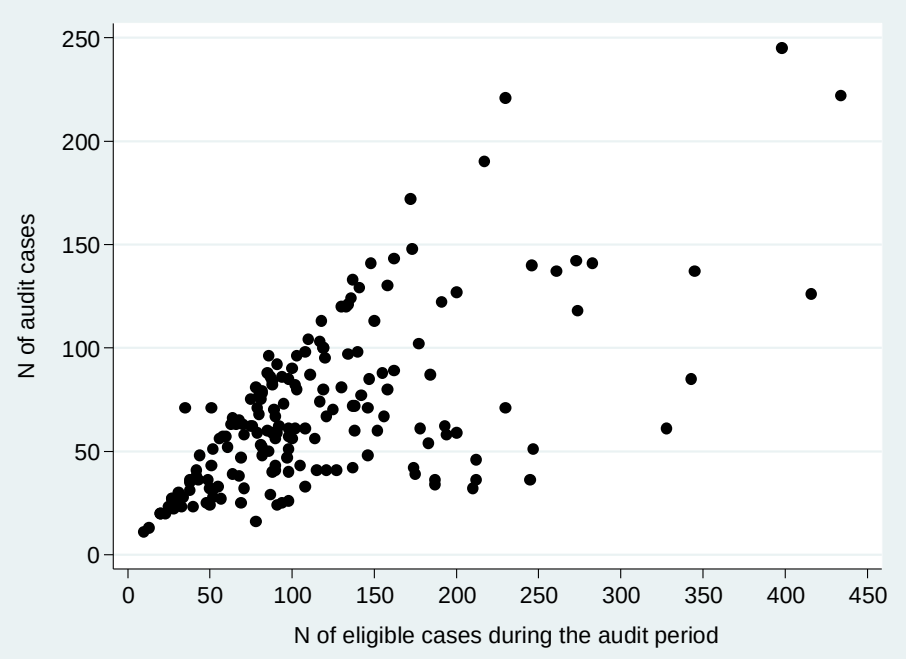
Forty-four per cent (5879) were admitted during February 2014, 33% (4452) were admitted during March 2014 and 23% (3083) were admitted during April 2014.

Regarding the cases admitted per day during the audit, the drop-off in part reflects the non-inclusion of index cases that were subsequently readmitted during the audit period. It may also in part reflect audit fatigue due to the audit workload and the reduction in admissions as winter gave way to spring.

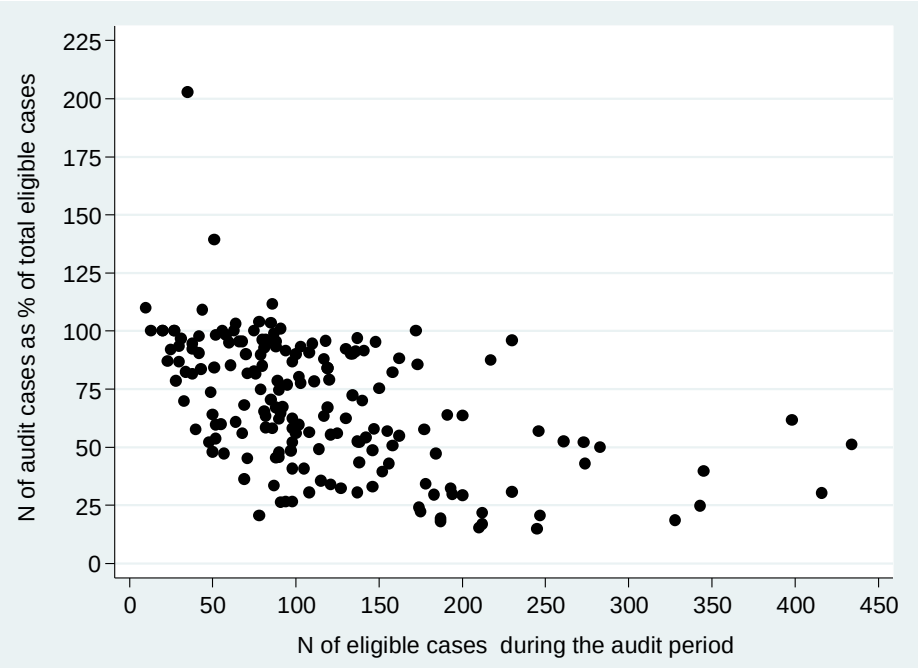


Question 1.4 in the organisational audit asked for the total number of eligible cases (coded COPD admission) during the audit period (1 February – 30 April 2014). This was stated for 178 units with a grand total of 20827 cases. These 178 units contributed 12327 cases to the main analysis, representing 59% of the specified grand total. The median (IQR) percentage of audit cases to total eligible cases was 67% (48–91%), range 15–203%.

The graphic below shows the number of audit cases in the main analysis plotted against the total eligible number during the audit period from 1 February to 30 April 2014.



The graphic below shows the number of audit cases as a percentage of total eligible cases, plotted against total eligible cases. Larger units in particular seem to have struggled to include eligible cases.



Spearman correlation coefficient, r_s= -0.54, p<0.001, n=178

Section 1: General information

KEY FINDINGS

Socio-demographic characteristics

- This is the first COPD audit in which females make up the majority (51%) of admitted cases.
- The percentage of females admitted with COPD exacerbation has risen slowly since 2003 (47%) and 2008 (49%).
- The COPD audit sample in England, calculated using the Index of Multiple Deprivation (IMD), was notably deprived in respect of income, employment, health deprivation/disability and education/skills/training, but was less deprived with regard to barriers to housing and services.
- The COPD sample in Wales, calculated using the Welsh Index of Multiple Deprivation (WIMD), was notably deprived in respect of income, employment, health, education and community safety, but was less deprived with regard to geographical access to services.
- There is a clear association between age and area-of-residence deprivation, with younger COPD patients in both England and Wales more likely to live in the more deprived areas.

Admissions/discharges

- Most cases are admitted on Mondays, with the number of admissions tailing off until they begin to rise again on Sundays.
- Admissions start to rise between 8-10am and peak between 2-4pm, but continue at a relatively high rate before reducing around midnight.
- The number of cases discharged from hospital is markedly reduced at weekends, particularly on Sundays.

Mortality

- Inpatient mortality, at 4.3%, was appreciably lower in 2014 than in 2008 (7.8%) and 2003 (7.7%), although the reason for this is unclear. There was no notable difference with regard to the day on which the patient was admitted.
- It was noted, however, that the highest in-hospital mortality on the next day after admission was on a Tuesday following admission on a Monday.

Length of stay

- There has been a further reduction in the length of stay, to a median of 4 days in 2014, from 5 days in 2008 and 6 days in 2003.
- Forty-five per cent of patients now have a length of stay between 0 and 3 days (35% in 2008 and 26% in 2003).
- The majority (63%) of patients are now admitted under the initial care of acute physicians.
- Thus, only 18% of cases were admitted under the initial care of respiratory physicians, compared with 30% in 2008 and 29% in 2003, reflecting this change in admission processes.
- Similarly, only 8% of cases were admitted under care-of-elderly physicians, compared with 16% in 2008 and 17% in 2003.

AREAS IDENTIFIED AS NEEDING IMPROVEMENT

- Increase discharges at weekends.
- Review staffing arrangements at weekends and on Mondays.
- Ensure that patients receive a respiratory specialist review.

1.1 Socio-demographic characteristics

Gender
The audit sample comprised 51% (6842) females and 49% (6572) males. This compares with 49% females in the 2008 audit and 47% females in the 2003 audit.

Age
Mean (standard deviation – SD) age was 72 (11) years), median (IQR) was 72 (65-80). Twenty-four per cent (3233) were aged under 65 years, 34% (4515) were 65-74 years, 30% (4080) were 75-84 years and 12% (1584) were 85 years and older (age was unknown for 2).

The mean ages in the 2014 audit were 72 for males and 72 for females.
The mean ages in the 2008 audit were 73 for males and 73 for females.
The mean ages in the 2003 audit were 72 for males and 71 for females.

Ethnicity
Ethnicity was known for 90% (12077), similar to the 91% in the 2008 audit. When known, 95% (11414) of the audit sample were recorded as being white British.

Indices of deprivation

England
The English Indices of Deprivation 2010 is based on the concept that deprivation consists of more than just poverty. The Indices of Deprivation 2010 is the collective name for a group of indices that all measure different aspects of deprivation. The most widely used of these is the Index of Multiple Deprivation (IMD), which combines other indices to give an overall score for the relative level of multiple deprivation experienced in every neighbourhood in England. The indices relate to areas and not individuals – within each area there will be individuals who are deprived and individuals who are not.

Thirty-eight separate indicators are grouped into seven domains, each of which reflects a different aspect of deprivation, and these are used to produce an overall IMD score for each of 32482 small areas in England. These can be ranked from 1 (most deprived area) to 32482 (least deprived area). Each small area is defined by a set of postcodes and so, for this audit, patient postcodes were used to obtain a set of deprivation indices data pertaining to the area in which the patient lived at the time of their admission to hospital.

The overall IMD 2010 score is constructed by combining seven weighted standardised domain scores: income deprivation (22.5%); employment deprivation (22.5%); health deprivation and disability (13.5%); education, skills and training deprivation (13.5%); barriers to housing and services (9.3%); crime (9.3%); and living environment deprivation (9.3%). Scores for different domains cannot be compared, as they have different ranges, and different minimum and maximum values. Comparisons can however be made across the domains by using the ranks.

For further information, go to:

- www.neighbourhood.statistics.gov.uk/dissemination/MetadataDownloadPDF.do?downloadId=27507&nsjs=true&nsck=false&nssvg=false&nswid=977
- www.gov.uk/government/uploads/system/uploads/attachment_data/file/6222/1871538.pdf

Index of Multiple Deprivation measures by national quintile: England (n=12245 postcodes)

Table 1.1.1	% of audit sample living in postcode areas within English national quintiles*				
	Most deprived quintile Q1	Q2	Q3	Q4	Least deprived quintile Q5
Index of Multiple Deprivation (IMD 2010)	33% (4006)	24% (2895)	19% (2282)	15% (1804)	10% (1258)
Income deprivation	32% (3969)	25% (3011)	19% (2310)	15% (1790)	10% (1165)
Employment deprivation	34% (4139)	24% (2929)	18% (2204)	14% (1768)	10% (1205)
Health deprivation and disability	33% (4073)	23% (2781)	18% (2238)	15% (1805)	11% (1348)
Education, skill and training deprivation	34% (4169)	24% (2896)	18% (2167)	15% (1786)	10% (1227)
Barriers to housing and services	16% (1998)	19% (2323)	21% (2517)	22% (2641)	23% (2766)
Crime	27% (3289)	23% (2863)	19% (2350)	17% (2058)	14% (1685)
Living environment deprivation	23% (2809)	21% (2615)	21% (2603)	19% (2371)	15% (1847)

*The 32482 small areas of England were grouped into quintiles (20% categories), thus: 1-6496 (most deprived quintile), 6497-12993, 12994-19489, 19490-25985, 25986-32482 (least deprived quintile). A patient could live in different quintiles depending on the domain considered, eg in the worst national quintile for income but in the best quintile for barriers to housing and services.

If the COPD audit sample residing in England was comparable to England as a whole, then we would expect 20% of the sample to live in postcode areas within each national quintile. If the sample has more than 20% in the most deprived quintile, then the sample can be considered relatively deprived. One-third (33%) of the COPD audit sample lived in postcode areas within the 'most deprived' national IMD (2010) quintile and 56% in the two most deprived quintiles; only 10% lived in areas within the 'least deprived' national quintile. Relative to the national distribution of deprivation rankings, the COPD audit sample was notably deprived in respect of income, employment, health deprivation/disability and education/skills/training, but was less deprived with regard to barriers to housing and services (possibly reflecting a higher concentration of city dwelling in COPD patients, and their proximity to acute units).

Wales

The Welsh Index of Multiple Deprivation (WIMD) 2011 is the official measure of relative deprivation for small areas in Wales. It was produced by the Welsh government. The index was developed as a tool to identify and understand deprivation in Wales, so that funding, policy, and programmes can be effectively focused on the most disadvantaged communities.

'Multiple' deprivation refers to the different types of deprivation that might occur. Eight types of deprivation, or domains, are included in the index. These are: employment, income, education, health, community safety, geographical access to services, housing and physical environment. The index is produced as a set of ranks, with a rank of 1 assigned to the most deprived area. The ranks of the index are calculated for each of the 1896 lower layer super output areas (LSOAs) of Wales. Although the geographical size of these small areas varies quite widely, and depends on the local population density, the populations are intended to be roughly the same in each LSOA, with an average population of 1500 people.

The WIMD 2011 is constructed from a weighted sum of the deprivation score for each domain: income (23.5%), employment (23.5%), health (14%), education (14%), geographical access to services (10%), community safety (5%), physical environment (5%) and housing (5%). The domains are in turn built up from sets of indicators.

England and Wales produce their own indexes of multiple deprivation. These are not directly comparable because they are produced for different geographies, they are on different timescales,

indicators are made up differently, different policy drivers have driven change and, as devolution has evolved, differences have grown. For further information, go to: http://wales.gov.uk/statistics-and-research/welsh-index-multiple-deprivation/?lang=en.

Index of Multiple Deprivation measures by national quintile: Wales (829 postcodes)

Table 1.1.2	% of audit sample living in postcode areas within Welsh national quintiles*				
	Most deprived quintile Q1	Q2	Q3	Q4	Least deprived quintile Q5
Index of Multiple Deprivation (IMD 2011)	34% (283)	27% (224)	16% (135)	13% (108)	10% (79)
Income	33% (272)	28% (231)	19% (158)	11% (95)	9% (73)
Employment	37% (307)	26% (214)	18% (153)	12% (97)	7% (58)
Health	35% (287)	26% (213)	17% (141)	13% (105)	10% (83)
Education	33% (277)	26% (219)	18% (153)	12% (99)	10% (81)
Housing	22% (183)	23% (188)	24% (195)	17% (145)	14% (118)
Physical environment	22% (185)	18% (151)	20% (169)	19% (158)	20% (166)
Geographical access to services	12% (97)	19% (156)	22% (184)	24% (203)	23% (189)
Community safety	31% (257)	26% (213)	18% (151)	15% (127)	10% (81)

*The 1896 small areas of Wales were grouped into quintiles (20% categories), thus: 1-379 (most deprived quintile), 380-758, 759-1138, 1139-1517, 1518-1896 (least deprived quintile). A patient could live in different quintiles depending on the domain considered, eg in the worst national quintile for income but in the best quintile for access to services.

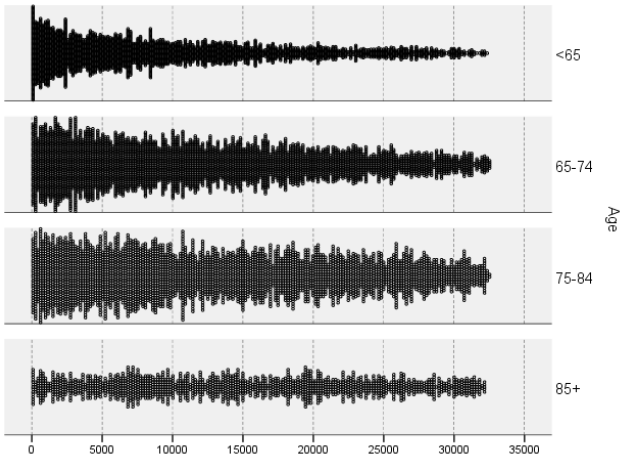
If the COPD audit sample residing in Wales was comparable to Wales as a whole, then we would expect 20% of the sample to live in postcode areas within each national quintile. If the sample has more than 20% in the most deprived quintile, then the sample can be considered relatively deprived. One-third (34%) of the audit sample lived in postcode areas within the 'most deprived' national WIMD (2011) quintile and 61% lived in the two most deprived quintiles; only 10% lived in areas within the 'least deprived' national quintile. Relative to the national distribution of deprivation rankings, the COPD audit sample was notably deprived in respect of income, employment, health, education and community safety, but was less deprived with regard to geographical access to services (possibly reflecting a higher concentration of city dwelling in COPD patients, and their proximity to acute units).

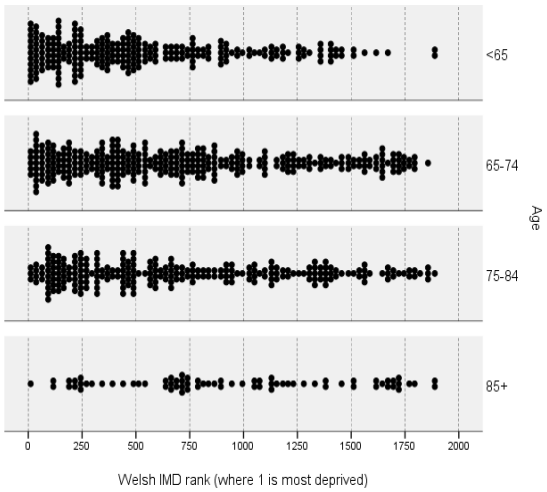
Age and IMD deprivation

Table 1.1.3		English national quintiles of IMD ranks (where 1 is most deprived)										
		Most deprived quintile Q1		Q2		Q3		Q4		Least deprived quintile Q5		Total
Age	<65	44%	1286	24%	714	15%	441	10%	296	6%	189	2926
	65-74	33%	1358	24%	977	20%	804	14%	589	9%	379	4107
	75-84	28%	1051	23%	862	19%	721	17%	630	13%	476	3740
	85+	21%	311	23%	342	21%	315	20%	289	15%	214	1471
	Total	33%	4006	24%	2895	19%	2281	15%	1804	10%	1258	12244

Table 1.1.4		Welsh national quintiles of IMD ranks (where 1 is most deprived)										
		Most deprived quintile Q1		Q2		Q3		Q4		Least deprived quintile Q5		Total
Age	<65	45%	103	27%	61	15%	34	11%	26	2%	5	229
	65-74	30%	89	29%	84	17%	49	13%	37	12%	35	294
	75-84	34%	78	25%	59	16%	37	14%	33	11%	25	232
	85+	18%	13	26%	19	21%	15	16%	12	19%	14	73
	Total	34%	283	27%	223	16%	135	13%	108	10%	79	828

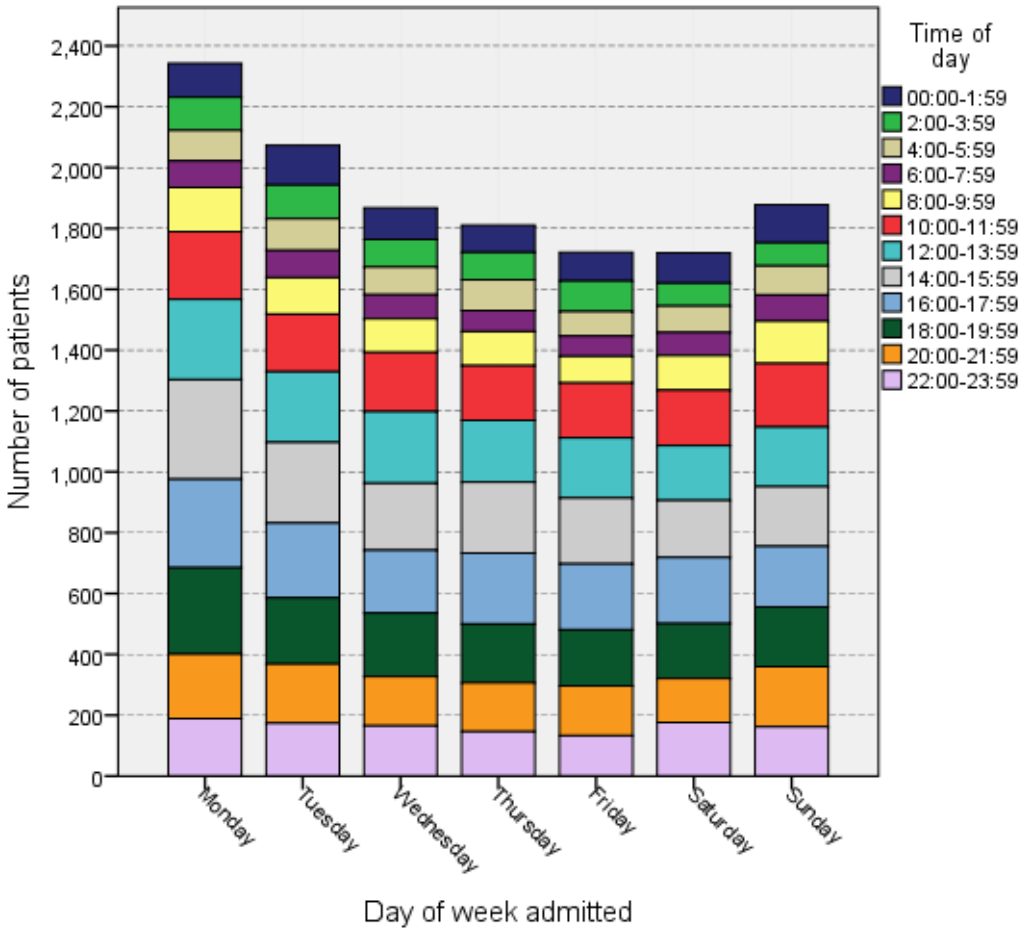
Below is a dot plot that shows scatter of IMD and WIMD scores within age group. There is a greater concentration of low (more deprived) ranks the younger the age of the patients.





1.2 Admissions/discharges/length of stay/mortality

When during the week were the cases admitted? (The time recorded is that at arrival to the unit.)

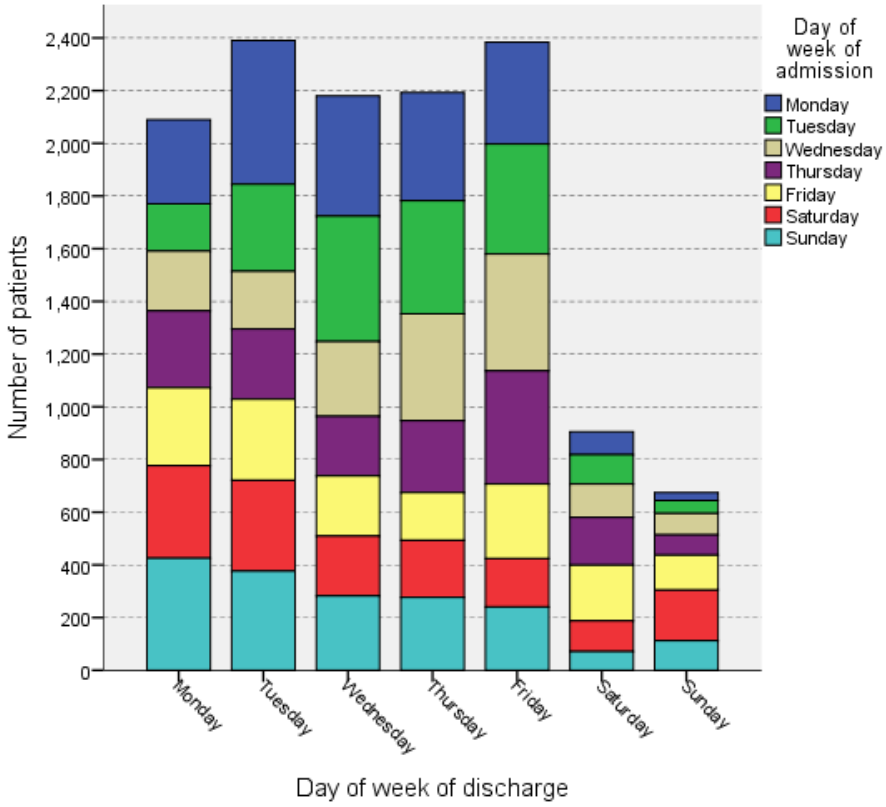


Goodness of fit test: if admissions were random, this would be expected to be 1916 each day. The observed numbers did not fit this expectation: $p<0.001$.

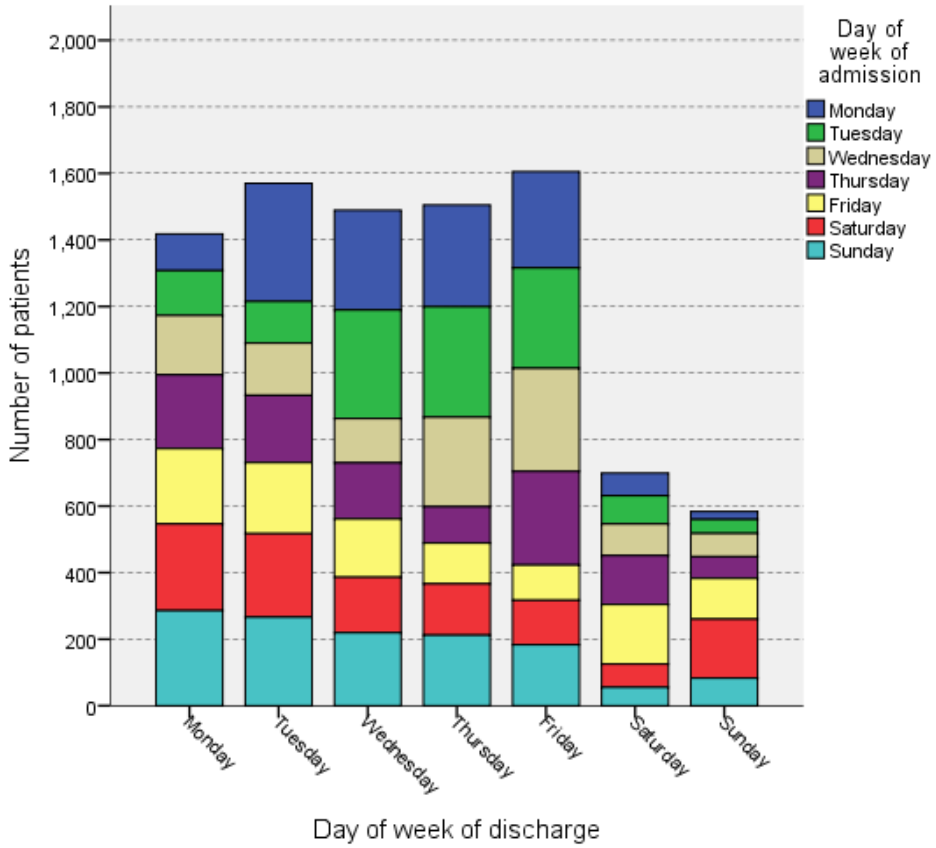
Chi-squared test: to compare the distribution of times of arrival by day of week: $p=0.05$.

Thus there is evidence of a difference in the total numbers admitted by day of week, but no notable difference in the times of arrival by day of week.

Number of patients discharged, by day of discharge (n=12838)



Number of patients discharged within 0-6 days of admission, by day of discharge (n=8870)



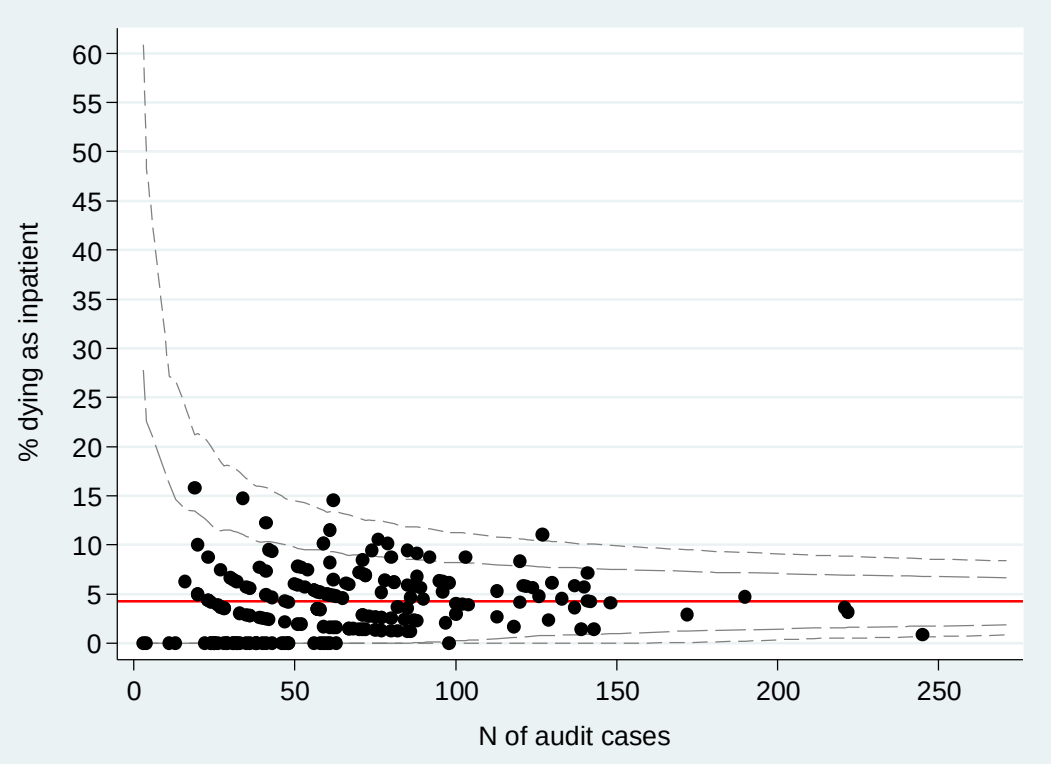
Patient died in hospital during index admission

Table 1.2.1	National audit (13414)	
Yes, died	4.3%	576
No, discharged	95.7%	12838

***2008 audit**: Yes 7.8%, No 92.2%.*
***2003 audit**: Yes 7.7%, No 92.3%.*

Note that the audit question asked for the date of death if the patient died while they were an inpatient in the unit. After HSCIC had stripped the dataset of identifying information, we had only the month of death with which to work. However, it was clear that some patients died in a month later than the month of discharge, implying death during a readmission, whilst for some dying in the same month as the month of discharge there was a conflict between discharge destination (eg to house) and death as an inpatient, again suggesting death during a readmission. As the HSCIC was unable to supply the full date of death for reasons of confidentiality we were unable to clarify the situation fully and have merely assumed that, where there was conflict (56 cases), the death occurred as a readmission and not during the index admission.

Site variation funnel plot: (unadjusted) inpatient mortality



Outlier contours – 5% and 0.2% equate to 2 SD and 3 SD from the target value (overall rate: 4.3%)

Inpatient mortality, by day admitted

Table 1.2.2								
Day admitted	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Total
Inpatient mortality	4.4%	3.8%	4.2%	3.5%	4.5%	5.0%	4.8%	4.3%
	102/2343	78/2073	78/1868	64/1811	78/1721	86/1720	90/1878	576/13414

Chi-squared test: p=0.28

Day of week of death, irrespective of day of admission

Table 1.2.3

Day of death	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Total
Deaths	80	107	87	80	80	71	71	576

Goodness of fit test (all categories equal): p=0.09

Number of inpatient deaths, by when patients were admitted

Table 1.2.4

		Day admitted						
		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Day of death (within 0-6 days of being admitted)	Monday	4	7	6	2	9	12	5
	Tuesday	19	2	4	5	7	8	11
	Wednesday	7	8	2	2	0	8	9
	Thursday	10	4	5	5	5	6	7
	Friday	9	8	6	6	3	2	10
	Saturday	3	5	12	3	9	1	5
	Sunday	4	7	6	3	6	3	3
Death within 0-6 days		56	41	41	26	39	40	50
Death after 7 or more days		46	34	36	37	39	44	38
Length of stay (LOS) not known		0	3	1	1	0	2	2
All deaths		102	78	78	64	78	86	90
Total admitted		2343	2073	1868	1811	1721	1720	1878

For example, of 2343 patients admitted on a Monday, 4 died on that Monday, 19 on the next day (Tuesday), 56 died within the week (Monday through to Sunday) and 46 died 7 or more days after being admitted. Of 2073 admitted on a Tuesday, 2 died on that day, 8 the following day (Wednesday), 41 within the week (Tuesday through to Monday) and 34 after 7 days, with the time to death not known for 3.

Percentage (%) of admissions that were inpatient deaths, by when patients were admitted

Table 1.2.5

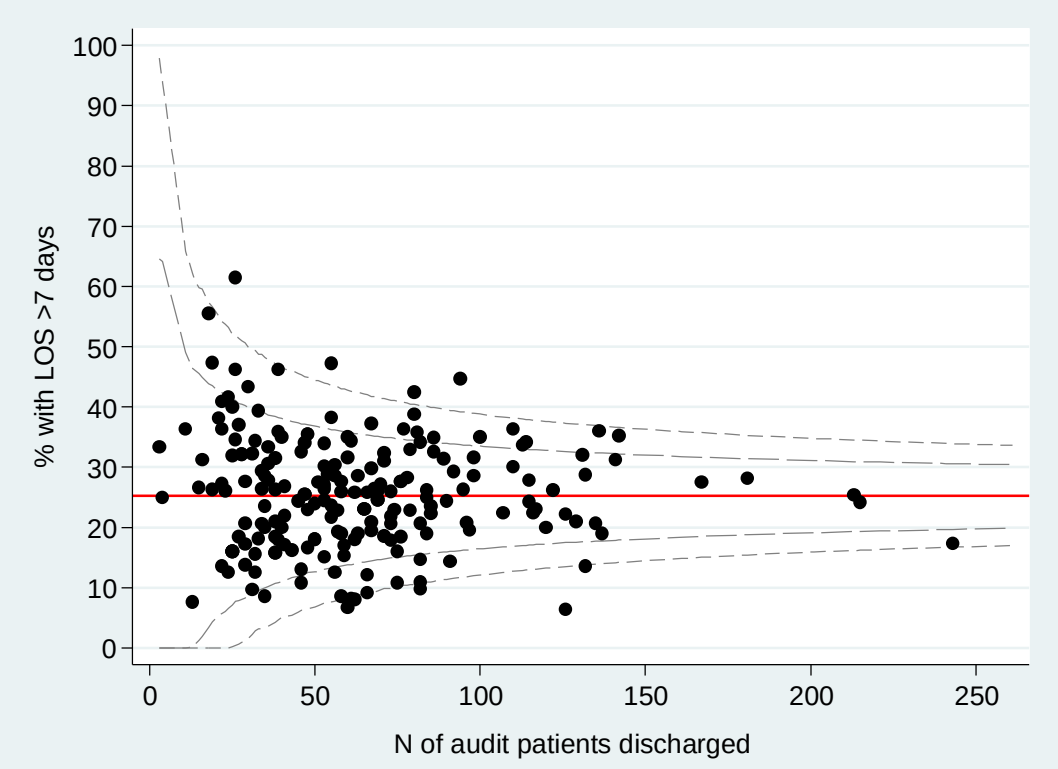
		Day admitted						
		Monday (2343)	Tuesday (2073)	Wednesday (1868)	Thursday (1811)	Friday (1721)	Saturday (1720)	Sunday (1878)
Day of death (within 0-6 days of being admitted)	Monday	0.17	0.34	0.32	0.11	0.52	0.70	0.27
	Tuesday	0.81	0.10	0.21	0.28	0.41	0.47	0.59
	Wednesday	0.30	0.39	0.11	0.11	0.00	0.47	0.48
	Thursday	0.43	0.19	0.27	0.28	0.29	0.35	0.37
	Friday	0.38	0.39	0.32	0.33	0.17	0.12	0.53
	Saturday	0.13	0.24	0.64	0.17	0.52	0.06	0.27
	Sunday	0.17	0.34	0.32	0.17	0.35	0.17	0.16
Death within 0-6 days		2.39	1.98	2.19	1.44	2.27	2.33	2.66
Death after 7 or more days		1.96	1.64	1.93	2.04	2.27	2.56	2.02
LOS not known		0.00	0.14	0.05	0.06	0.00	0.12	0.11
All deaths		4.35	3.76	4.18	3.53	4.53	5.00	4.79

For example, of 2343 patients admitted on a Monday, 0.17% died on that Monday, 0.81% on the next day (Tuesday), 2.39% died within the week (Monday through to Sunday) and 1.96% died 7 or more days after being admitted. Of 2073 admitted on a Tuesday, 0.10% died on that day, 0.39% the following day (Wednesday), 1.98% within the week (Tuesday through to Monday) and 1.64% after 7 days, with the time to death not known for 0.14%.

Length of stay in hospital: discharged patients

Table 1.2.6	National audit (12838)	
0-3 days	45%	5812
4-7 days	29%	3768
8-14 days	16%	2086
15+ days	9%	1150
Not known		22
Median (IQR) LOS	4 days	(2-8) days

***2008 audit (discharges)**: median 5 days, IQR 3-10 days. 0-3 days 35%, 4-7 days 30%, 8-14 days 20%, 15+ days 15%.*
***2003 audit (discharges)**: median 6 days, IQR 3-11 days. 0-3 days 26%, 4-7 days 33%, 8-14 days 25%, 15+ days 16%.*



Length of stay in hospital: patients who died as an inpatient

Table 1.2.7	National audit (576)	
0-3 days	32%	183
4-7 days	25%	139
8-14 days	22%	123
15+ days	22%	122
Not known		9
Median (IQR) LOS	6 days	(3-12) days

Length of stay in hospital by day of admission, for patients who were discharged

Table 1.2.8	Day of week of admission						
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
LOS >7 days*	28% 630/2236	25% 502/1992	26% 461/1788	25% 434/1744	22% 365/1642	23% 382/1631	26% 462/1783
Median (IQR) LOS**	4 (2-8)	3 (2-8)	5 (2-8)	5 (2-7)	4 (3-7)	4 (2-7)	4 (2-8)

*Chi-squared test: p=0.001, **Kruskal–Wallis test: p<0.001

Initial care

Table 1.2.9	National audit (13414)	
Under whose care was the patient admitted?		
Respiratory consultant	18%	2357
Care-of-elderly consultant	8%	1103
Acute medicine consultant	63%	8478
Nurse consultant*	0.3%	43
Other physician	10%	1339
GP		1
Not recorded	0.7%	93

*These 43 were all at Rotherham Community COPD Unit.

***2008 audit**: admitted to hospital under: respiratory physician 30%, care-of-elderly (COE) physician 16%, general physician 54%, other/not known 0.4%.*
***2003 audit**: admitted to hospital under: respiratory physician 29%, COE physician 17%, general physician 48%, other/not known 6%.*

Transfer in

Table 1.2.10	National audit (13414)	
Was this case admitted at another unit and then transferred to your unit?		
Yes	9%	1155

Section 2: Provision of timely care

KEY FINDINGS

- With regard to the timing from admission to medical review by a doctor, a specialty trainee/SpR/ST3+ saw 42% of patients within 4 hours of the admission, median 5.5 hours; a non-respiratory consultant saw 85% of patients within 24 hours, median 10 hours; while a respiratory consultant saw 54% of patients within 24 hours, median 22 hours.
- There was statistically significant difference between days of admission in the time to review by a specialty trainee/SpR. Observation of the data indicates that the median time was longer for patients admitted on Mondays (6.8 hours) than for other days of the week (range 5.0-5.6 hours) and with a corresponding lower percentage seen within 4 hours (38% Monday, 41-45% other days).
- During the admission, only 62% of patients were seen by a middle-grade doctor of ST3/SpR level, with wide site variation.

However:

- During the admission, 57% of cases were seen by a respiratory consultant.
- During the admission, 62% of cases were seen by a respiratory nurse/member of the COPD/respiratory team.
- During the admission, 79% of cases overall were seen by either a respiratory consultant or respiratory nurse/member of the COPD/respiratory team at some point during the admission, with wide site variation.
- The median length of time into the admission to be seen by a respiratory nurse/member of the COPD/respiratory team was 26 hours.
- The median length of stay of those patients seen by a respiratory consultant/respiratory nurse/member of the COPD/respiratory team was 5 days, compared with 2 days for those patients not seen by the respiratory team.
- Forty-two per cent of patients who had a length of stay less than or equal to 1 day before discharge were not seen by the respiratory team.
- Thirty-nine per cent of discharged patients who were seen by the respiratory team were discharged within 3 days.
- The percentage of patients seen by the respiratory team within 24 hours of admission was notably less for those patients admitted on Fridays (47%), Saturdays (39%) and Sundays (58%), compared with other days (62-66%).
- Fifteen per cent of chest X-rays were taken more than 4 hours after admission (although median 1.3 hours, and 22% prior to the official admission time to the unit).
- Eighteen per cent of patient chest X-rays had evidence of consolidation, although this was recorded poorly.
- Of patients with consolidation on the chest X-ray, 6.8% died as inpatients, compared with 3.6% of those without evidence of consolidation.
- Eighty-six per cent of patients had a first dose of antibiotics within 24 hours of arrival.
- Eighty-eight per cent of patients had a first dose of steroids within 24 hours of arrival.

AREAS IDENTIFIED AS NEEDING IMPROVEMENT

- Improve time to specialist respiratory review.
- Improve number of patients receiving specialist review.
- Improve time to chest X-ray.

During the admission, was the patient seen by any of the following?

Table 2.1	National audit (13414)	
Any specialty trainee/SpR (ST3+)	62%	7870/12652
A respiratory consultant	57%	7453/13030
Any other consultant physician (eg acute, geriatric, gastroenterology)	69%	8991/12939
A respiratory nurse/member of the COPD/respiratory team	62%	7883/12740
Seen by either a respiratory consultant or a respiratory nurse/member of the COPD/respiratory team	79%	10387/13075
Seen by either a respiratory consultant or any other consultant physician (eg acute, geriatric, gastroenterology)	93%	12383/13279

Audit response options were 'Yes', 'Not seen by' and 'Not recorded'. Denominators exclude those 'Not recorded'.

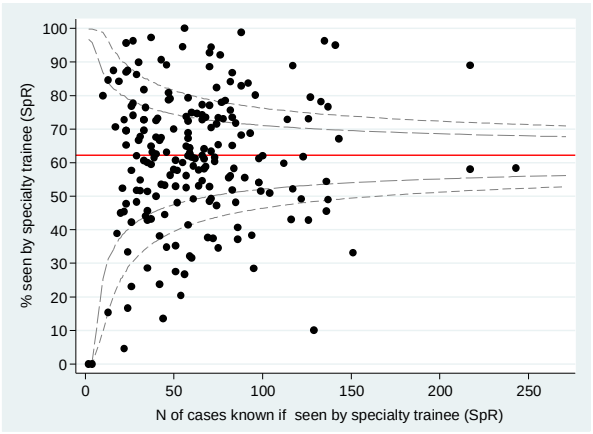
Note that audit data indicating that the patient had been seen earlier than 24 hours before admission or after the index discharge date was cleaned from 'Yes' (ie seen by) to 'Not seen by'.

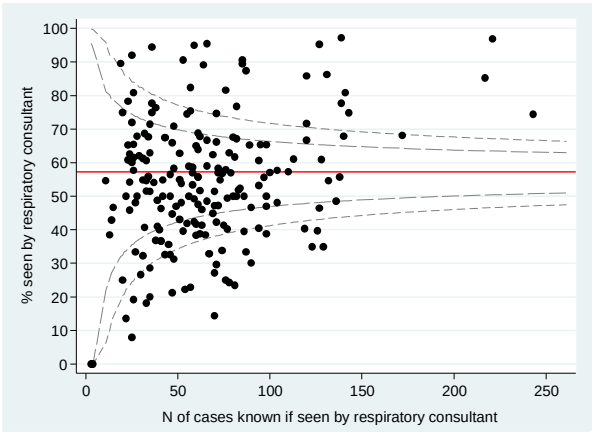
Table 2.2	Seen by either a respiratory consultant or a respiratory nurse/member of the COPD/respiratory team			
LOS (discharged patients)	Yes	Not seen by	Not known	Total
0 days	3% (283)	17% (422)	10% (31)	6% (736)
1 day	12% (1170)	25% (640)	19% (63)	15% (1873)
2 days	13% (1271)	16% (411)	17% (56)	14% (1738)
3 days	12% (1164)	10% (266)	11% (35)	11% (1465)
4-7 days	32% (3171)	20% (517)	25% (80)	29% (3768)
8-14 days	19% (1847)	8% (202)	11% (37)	16% (2086)
15+ days	10% (1033)	4% (93)	7% (24)	9% (1150)
Total cases	9939	2551	326	12816
LOS >7 days*	29% (2880)	12% (295)	19% (61)	25% (3236)
Median (IQR) LOS**	5 (2-8)	2 (1-4)	3 (1-6)	4 (2-8)

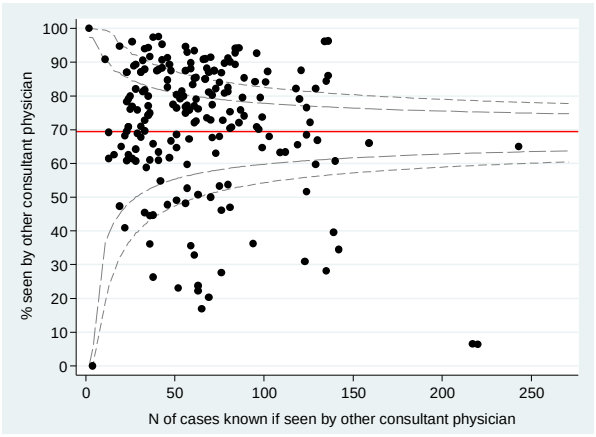
*Chi-squared test: P<0.001, **Kruskal–Wallis test: P<0.001

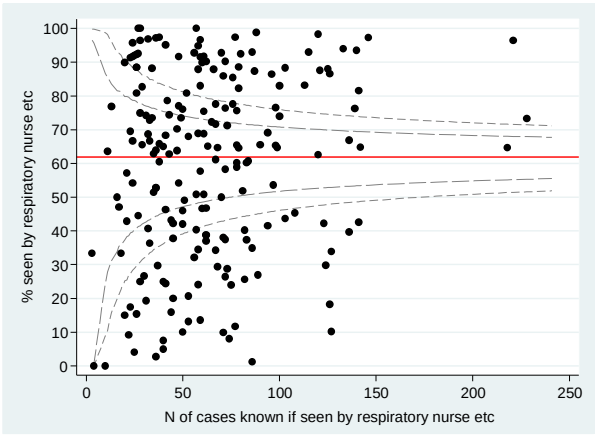
Forty-two per cent (1062/2515) of patients who were discharged after a length of stay less than or equal to 1 day were not seen by the respiratory team. Thirty-nine per cent (3888/9939) of the patients seen by the respiratory team were discharged within 3 days.

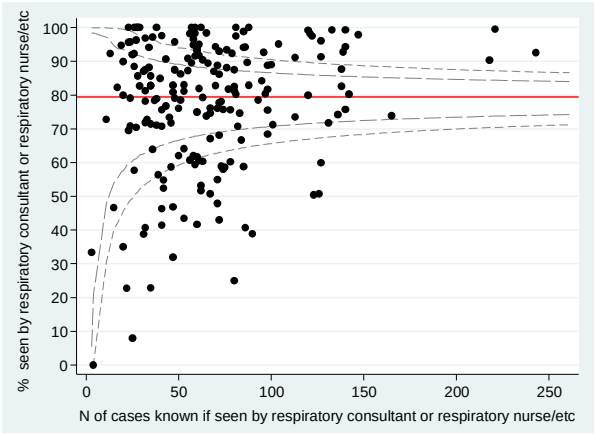
Site variation











When seen (for cases where both date and time are known)

Table 2.3	Any specialty trainee/SpR (ST3+) (6566/7870)		A respiratory consultant (5730/7453)		Any other consultant physician (7356/8991)		A respiratory nurse/member of the COPD/respiratory team (6260/7883)		A respiratory consultant OR a respiratory nurse/member of the COPD/respiratory team (8884/10387)	
Before admission:										
≥12 but <24 hours	1.0%	65	0.2%	10	0.4%	32	<0.1%	5	0.2%	13
<12 hours	3.3%	216	1.1%	65	2.4%	176	1.0%	65	1.4%	122
After admission:										
Up to 1 hour	13.2%	867	1.0%	57	3.9%	289	1.3%	83	1.6%	145
>1 but ≤4 hours	24.5%	1606	6.5%	374	16.2%	1193	2.4%	152	5.5%	491
>4 but ≤6 hours	10.2%	669	4.2%	243	11.6%	853	2.1%	130	3.8%	333
>6 but ≤12 hours	12.1%	796	12.2%	697	22.6%	1660	8.2%	516	11.9%	1061
>12 but ≤18 hours	4.5%	294	15.3%	875	18.3%	1349	15.2%	953	17.3%	1536
>18 but ≤24 hours	5.2%	339	13.3%	760	9.4%	690	15.9%	998	15.7%	1394
>24 but ≤48 hours	10.0%	659	19.5%	1119	8.2%	606	22.1%	1384	19.7%	1751
>48 hours	16.1%	1055	26.7%	1530	6.9%	508	31.5%	1974	22.9%	2038
Median (IQR) hours from admission	5.5 (1.9-26)		22 (12-52)		10 (4.4-18)		26 (16-62)		21 (12-45)	
Key summary statistic	Up to 4 hours		Up to 24 hours		Up to 24 hours		Up to 24 hours		Up to 24 hours	
	41.9%	2754	53.8%	3081	84.9%	6242	46.4%	2902	57.4%	5095

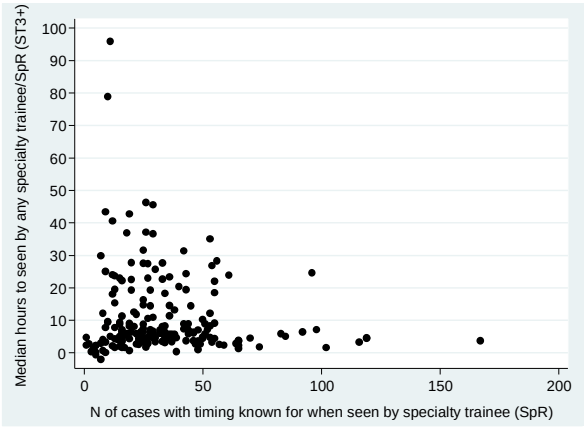
Of the excluded cases for any specialty trainee/SpR (ie 7870-6566=1304) both date and time were missing for 28% (361/1304) – otherwise just time was missing. For respiratory consultant: 16% (270/1723); any other consultant physician: 27% (443/1635); a respiratory nurse/member of the COPD/respiratory team: 19% (304/1623).

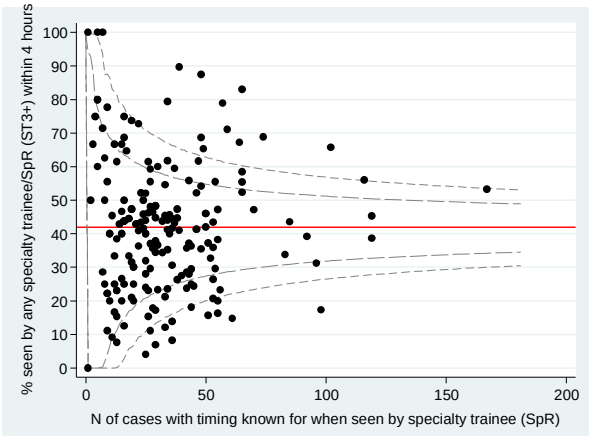
Any specialty trainee/SpR (ST3+)

Table 2.4	Day of week of admission						
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Seen*	62% 1374/2208	62% 1204/1928	60% 1068/1767	63% 1077/1714	62% 1020/1641	64% 1040/1627	62% 1087/1767
Median (IQR) hours**	6.8 (2.1-30)	5.1 (1.7-22)	5.6 (1.8-26)	5.2 (2.0-25)	5.2 (2.0-31)	5.0 (1.8-27)	5.6 (2.1-25)
If seen, was seen ≤4 hours***	38% 431/1146	45% 444/983	42% 381/907	42% 384/914	43% 359/839	45% 388/872	41% 367/905

*Chi-squared test: p=0.54, **Kruskal–Wallis test: p=0.04, ***Chi-squared test: p=0.01

Site variation



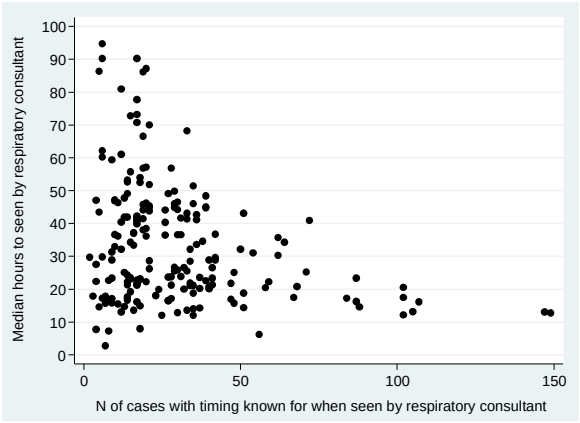


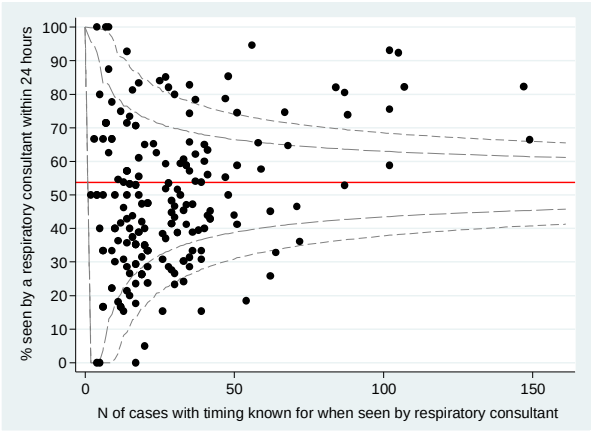
A respiratory consultant

Table 2.5	Day of week of admission						
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Seen*	55% 1253/2265	58% 1178/2027	57% 1024/1806	58% 1021/1768	58% 964/1675	58% 959/1666	58% 1054/1823
Median (IQR) hours**	22 (13-47)	22 (12-45)	23 (13-44)	22 (12-86)	30 (12-71)	27 (12-51)	19 (10-40)
If seen, was seen ≤24 hours***	57% 544/959	54% 489/901	53% 418/784	58% 442/766	47% 351/752	47% 353/746	59% 484/822

*Chi-squared test: p=0.57, **Kruskal–Wallis test: p<0.001, ***Chi-squared test: p<0.001

Site variation



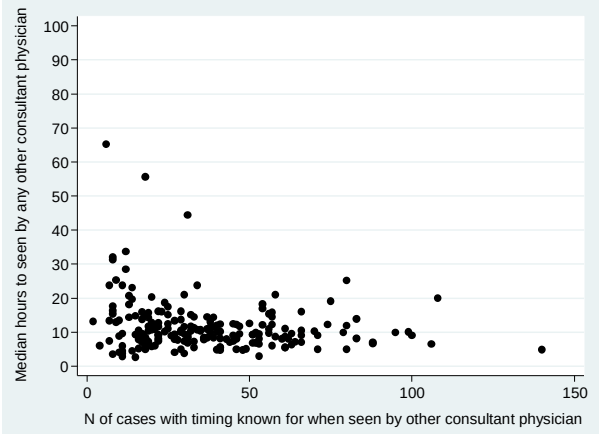


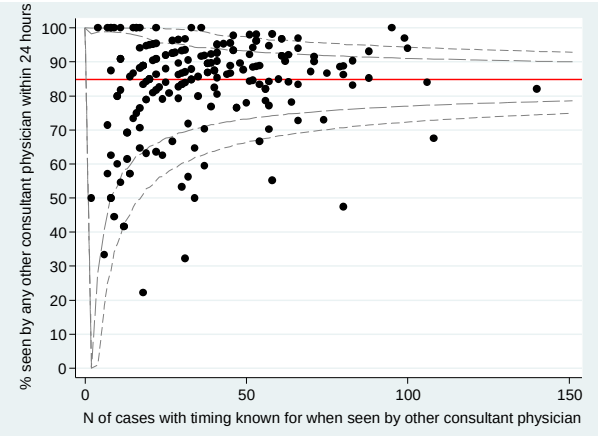
Any other consultant physician (eg acute, geriatric, gastroenterology)

Table 2.6	Day of week of admission						
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Seen*	71% 1606/2262	68% 1359/1999	70% 1269/1807	69% 1208/1741	70% 1151/1656	70% 1164/1655	68% 1234/1819
Median (IQR) hours**	9.8 (3.8-18)	10.3 (4.4-18)	8.9 (3.8-16)	8.8 (3.7-17)	9.2 (4.3-18)	11.8 (5.8-21)	10.8 (5.6-19)
If seen, was seen ≤24 hours***	85% 1109/1301	86% 961/1119	87% 922/1056	86% 857/992	84% 800/949	79% 747/945	85% 846/994

*Chi-squared test: p=0.24, **Kruskal–Wallis test: p<0.001, ***Chi-squared test: p<0.001

Site variation



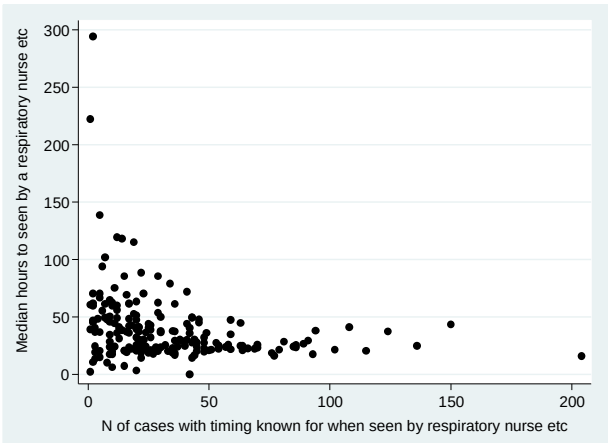


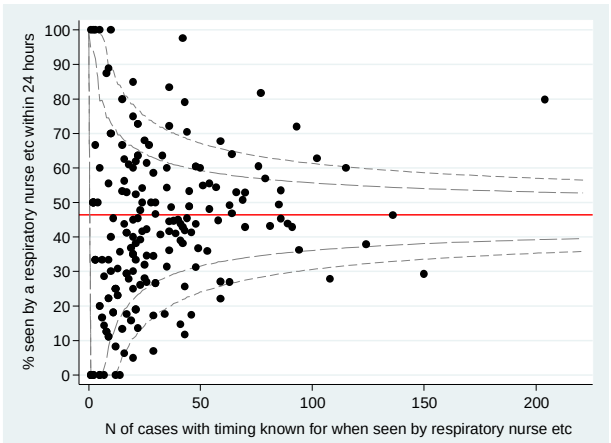
A respiratory nurse/member of the COPD/respiratory team

Table 2.7	Day of week of admission						
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Seen*	65% 1457/2228	65% 1283/1983	64% 1140/1786	62% 1067/1711	55% 896/1623	54% 884/1625	65% 1156/1784
Median (IQR) hours**	23 (16-46)	23 (14-45)	22 (14-45)	22 (15-89)	66 (16-87)	49 (39-72)	26 (17-50)
If seen, was seen ≤24 hours***	52% 594/1138	53% 540/1019	56% 514/912	57% 493/870	33% 227/687	16% 112/690	45% 422/944

*Chi-squared test: p<0.001, **Kruskal–Wallis test: p<0.001, ***Chi-squared test: p<0.001

Site variation



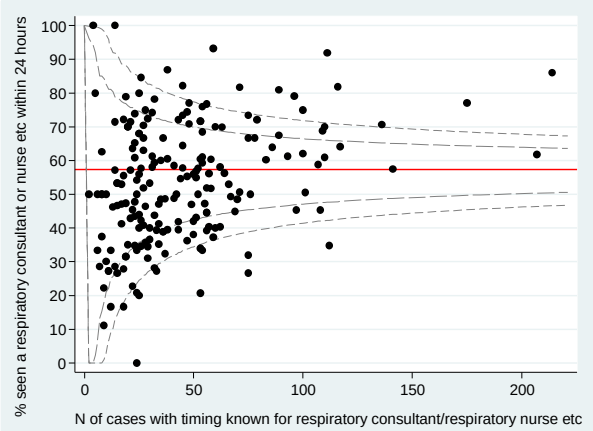


A respiratory consultant OR a respiratory nurse/member of the COPD/respiratory team

Table 2.8	Day of week of admission						
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Seen*	81% 1841/2286	81% 1641/2026	80% 1464/1821	80% 1410/1771	76% 1277/1676	77% 1273/1661	81% 1481/1834
Median (IQR) hours**	20 (13-40)	19 (11-38)	20 (12-36)	19 (12-33)	27 (11-71)	39 (15-54)	21 (13-38)
If seen, was seen ≤24 hours***	62% 971/1572	62% 877/1412	63% 788/1247	66% 794/1210	47% 505/1075	39% 420/1084	58% 740/1284

*Chi-squared test: p<0.001, **Kruskal–Wallis test: p<0.001, ***Chi-squared test: p<0.001

Site variation



First chest X-ray during the patient's admission

Table 2.9	National audit (13414)	
Yes	96.3%	12917
Did not have	3.7%	497
If the patient had a chest X-ray for the index admission (12917), does the chest X-ray demonstrate consolidation?		
Yes	18%	2337
No	77%	9940
Not known/no answer	5%	640

Note that audit data indicating that the patient had had an X-ray earlier than 24 hours before admission (171 cases) or after the index discharge date (143 cases) was cleaned from 'Yes' to 'Did not have' with regard to the index admission.

***2008 audit**: changes consistent with pneumonia 16%, not known/no answer 10%*

Of those with chest X-ray consolidation, 6.8% (158/2,337) died as an inpatient compared with 3.6% (357/9940) of those without consolidation (p<0.001); also 6.6% (42/640) of those where it was unknown whether they had a chest X-ray and 3.8% (19/497) of those without a chest X-ray died as an inpatient.

If seen by either a respiratory consultant or respiratory nurse/member of COPD/respiratory team, then 3.1% (324/10387) did not have a chest X-ray, compared with 5.7% (153/2688) of those not seen by either (p<0.01); also 5.9% (20/339) if unsure whether seen by either did not have a chest X-ray.

If seen by either a respiratory consultant or respiratory nurse/member of COPD/respiratory team, then 18% (1857/10063) of chest X-rays demonstrated consolidation; if not seen by either, then this was 17% (427/2535) and if not sure whether seen, then this was also 17% (53/319).

When given (for cases where both date and time are known)

Table 2.10	First chest X-ray (10964/12917)	
Before admission:		
≥12 but <24 hours	1.2%	130
<12 hours	21.3%	2333
After admission:		
Up to 1 hour	22.2%	2437
>1 but ≤4 hours	40.6%	4450
>4 but ≤6 hours	5.2%	574
>6 but ≤12 hours	4.1%	448
>12 but ≤18 hours	1.7%	191
>18 but ≤24 hours	1.4%	152
>24 but ≤48 hours	0.9%	104
>48 hours	1.3%	145
Median (IQR) hours from admission	1.3 (0.2-2.7) hours	
Within 4 hours	85.3%	9350

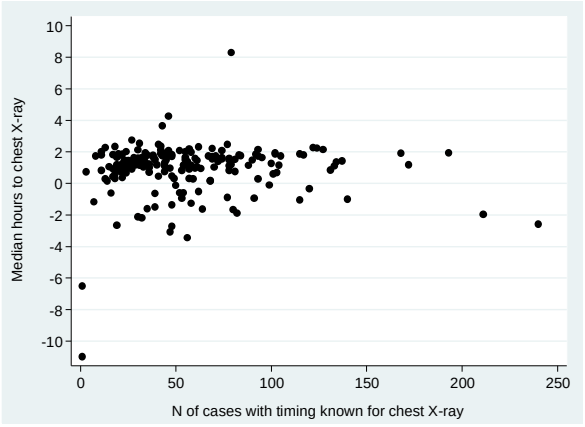
Of the excluded cases (12917-10964=1953), the date seen was given but the time of day was not given for 1322, while neither dates nor times were given for 631.

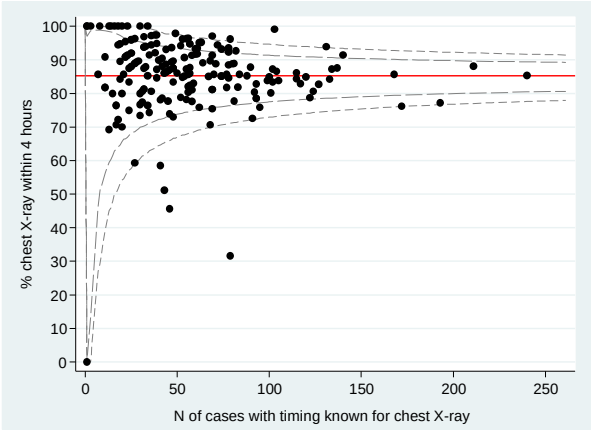
By day of admission

Table 2.11	Day of week of admission						
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Taken*	96% 2254/2343	96% 1995/2073	96% 1792/1868	96% 1732/1811	96% 1655/1721	96% 1654/1720	98% 1835/1878
Median (IQR) hours**	1.4 (0.3-3.1)	1.3 (0.1-2.7)	1.2 (0-2.6)	1.3 (0.3-2.8)	1.4 (0.3-2.9)	1.1 (0-2.5)	1.2 (0.1-2.5)
Taken ≤4 hours***	82% 1537/1867	86% 1457/1703	86% 1328/1540	85% 1255/1482	83% 1151/1386	88% 1267/1435	87% 1355/1551

*Chi-squared test: p=0.03, **Kruskal–Wallis test: p<0.001, ***Chi-squared test: p<0.001

Site variation





Excludes 1 unit with 1 case of 690 hours.

Was a first dose of antibiotic given within the first 24 hours?

Table 2.12	National audit (13414)	
Yes – dose given within 24 hours of admission	86%	11529
No – dose given but outside the first 24 hours	2%	305
Did not have	10%	1344
Not known	2%	236

***2008 audit**: 80% in first 24 hours, 1% not known.*

Was a first dose of oral/IV steroids given within 24 hours?

Table 2.13	National audit (13414)	
Yes – dose given within 24 hours of admission	88%	11799
No – dose given but outside the first 24 hours	3%	382
Did not have	7%	919
Not known	2%	314

The 2008 and 2003 audits asked whether the patient received systemic corticosteroids for more than 24 hours as an inpatient – 2008: 86% yes, 13% no, 1% not known; 2003: 82% yes, 15% no, 3% not known.

Section 3: Recording key clinical information

KEY FINDINGS

- Thirty-two per cent of patients did not have oxygen prescribed on the medication chart but, when it was (55%), a target saturation (of 88-92%) was stipulated in 84% of cases, while 8% had a target saturation specifically stipulated as 94-98%.
- Patients seen by a member of the respiratory team were more likely to have had oxygen prescribed (60% compared with 42%).
- Thirty-seven per cent of admitted patients continue to smoke (32% in 2008 and 40% in 2003).
- Of those current smokers, only 58% had evidence of smoking cessation advice being given, and there was wide variation across sites.
- Patients seen by a member of the respiratory team were more likely to have been offered smoking cessation (64% compared with 32%).
- The MRC dyspnoea score was recorded in only 61% of cases (ie not known for four out of every ten patients, with marked site variation), although this was an improvement from 46% in 2008.
- The MRC dyspnoea score was more likely to be available if patients were seen by a member of the respiratory team (65% versus 46%, p<0.001).
- Seventy per cent of patients scored four or five on the MRC dyspnoea scale, unchanged from 2008.
- Only 46% of patients had evidence of spirometry being recorded in the notes during the last 5 years, compared with 54% in 2008 and 55% in 2003 (there was again wide site variation).
- Spirometry was more likely to be recorded in the notes if patients had been seen by a member of the respiratory team (49% versus 32%, p<0.001).
- The median predicted FEV_1 was 40% (ie severe disease) for those in whom spirometry was recorded.
- The recording of BMI has improved to 41%, from 27% in both 2008 and 2003, but still 59% of patients had no record of BMI. There is wide site variation in the recording of BMI.
- BMI was more likely to be recorded in patients seen by a member of the respiratory team (44% versus 32%, p<0.001)
- The DECAF score was predictive of both mortality and length of stay, but there was poor recording of variables needed for its calculation.

AREAS IDENTIFIED AS NEEDING IMPROVEMENT

- Improve oxygen prescribing.
- Improve smoking cessation support.
- Improve recording of MRC dyspnoea score.
- Improve recording of spirometry.
- Improve recording of BMI.

Was the patient known to have COPD prior to this admission?

Table 3.1		National audit (13414)
Yes	93%	12520
No	7%	894

Of those with known COPD, 4.4% (556/12,520) died as an inpatient, compared with 2.2% (20/894) of those with first-time COPD (p=0.002).

Of those with known COPD, 80% (9,730/12,203) were seen by either a respiratory consultant or respiratory nurse/member of COPD/respiratory team, compared with 75% (657/872) of those with first-time COPD (also p=0.002).

Was oxygen prescribed on the medication chart or equivalent during this admission?

Table 3.2	National audit (13414)	
Yes	55%	7434
No	32%	4313
Not required	12%	1667
If oxygen was prescribed (7434):		
Target stipulated 94-98%	8%	563
Target stipulated 88-92%	84%	6251
Other target stipulated	3%	230
Target range not stipulated	2%	183
Not recorded	2%	116
No answer	1%	91

Oxygen prescription, by whether seen by the respiratory team

Table 3.3 Was oxygen prescribed on the medication chart or equivalent during this admission?	Seen by either a respiratory consultant or a respiratory nurse/member of the COPD/respiratory team					
	Yes (10387)		Not seen by (2688)		Not recorded (339)	
Yes	60%	6189	42%	1127	35%	118
No	30%	3118	38%	1028	49%	167
Not required	10%	1080	20%	533	16%	54

Smoking status

Table 3.4	National audit (13414)	
Known	92%	12390
If known (12390):		
Current smoker	37%	4528
Ex-smoker (stopped prior to hospital admission)	61%	7552
Never smoked	3%	310

***2008 audit**: recorded 94%. If recorded: current smoker 32%, ex-smoker (stopped >3 months) 64%, life-long non-smoker 3%.*
***2003 audit**: recorded 95%. If recorded: current smoker 40%, ex-smoker (stopped >3 months) 56%, life-long non-smoker 4%.*

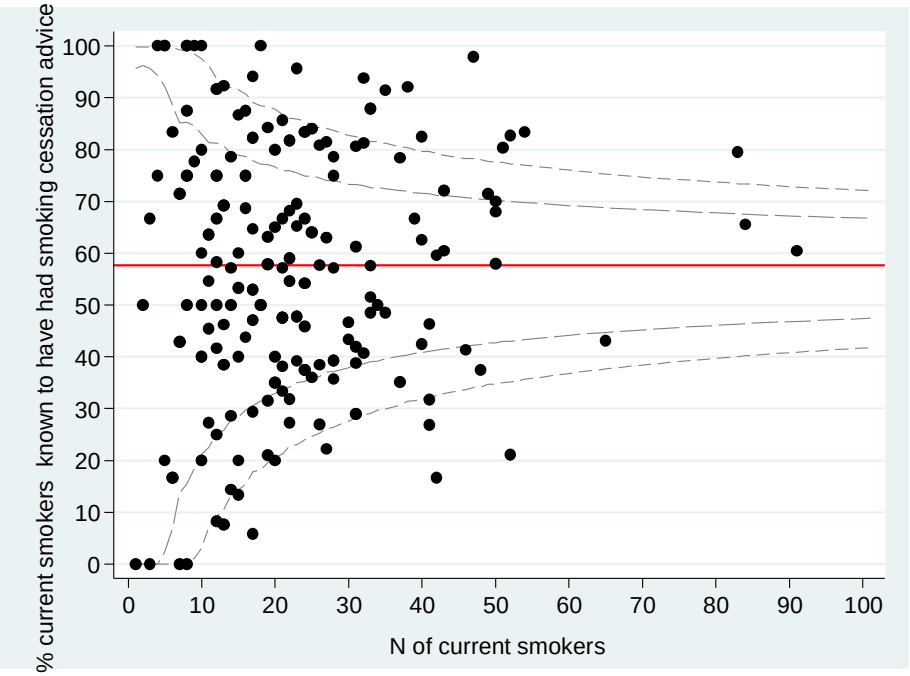
If a current smoker, was the patient given smoking cessation advice during the admission?

Table 3.5	National audit (4528 current smokers)	
Yes	58%	2610
No	11%	490
Not applicable	5%	217
Not recorded/not clear from notes	25%	1138
No answer=blank	2%	73

Table 3.6 If a current smoker, was the patient given smoking cessation advice during the admission?	Seen by either a respiratory consultant or respiratory nurse/member of COPD/respiratory team					
	Yes (3600)		No (827)		Unsure (101)	
Yes	64%	2308	32%	266	36%	36
No	8%	305	21%	177	8%	8
Not applicable	5%	184	4%	31	2%	2
Not recorded/not clear from notes	21%	746	41%	341	51%	51
No answer=blank	2%	57	1%	12	4%	4

Table 3.7 LOS	Smoking cessation advice given during admission (4377 current smokers discharged)	
0 days	45%	124/277
1 day	56%	383/686
2 days	58%	375/645
3 days	61%	317/521
4-7 days	63%	820/1296
8-14 days	60%	380/629
≥15 days	58%	188/323
Total	59%	2587/4377

Site variation: smoking cessation advice to current smokers



Does the patient have any other significant medical conditions? (multiple responses possible)

Table 3.8	National audit (13414)	
Alcohol-related condition	3%	456
Atrial fibrillation	12%	1553
Cor pulmonale	3%	427
Dementia/confusion	4%	575
Diabetes	16%	2142
Hearing impairment	0.9%	124
Hypertension	31%	4215
Ischaemic heart disease (IHD)	21%	2798
Kidney disease	7%	916
Left heart failure (LVF)	6%	845
Locomotor problems	11%	1517
Lung cancer	2%	335
Mental health disorder	11%	1447
Neurological condition	5%	725
Osteoporosis	7%	949
Stroke	7%	900
Thromboembolic disease (pulmonary embolism (PE), deep-vein thrombosis (DVT))	4%	573
Visual impairment	2%	326
Other respiratory disease	13%	1804
Other cardiovascular disease	11%	1504
Other endocrine disorder	7%	893
Other gastrointestinal condition	12%	1555
Other malignant disease	8%	1047

Note that there was a considerable amount of data cleaning required of the free-text entries, as it was apparent that some auditors gave free text that should have been recorded as one of the listed options – locomotor problems, mental health disorder, other respiratory and other cardiovascular were the groups particularly affected. After data cleaning, there remained 1097 cases with free-text entries, most of which appeared not to be of significance. Of particular note were 139 cases with benign prostatic disease, 116 cases with anaemia and 192 with high cholesterol.

***2008 audit**: IHD 25%, diabetes 12%, locomotor problems 12%, cardiac arrhythmia eg AF 10%, left heart failure (LVF) 6%, psychiatric condition 7%, stroke 7%, neurological condition 5%, alcohol-related condition 2%, cor pulmonale 3%, lung cancer 2%, thromboembolic disease – pulmonary embolism, DVT 3%, visual impairment 2%, other cardiovascular disease 20%, other gastrointestinal condition 9%, other endocrine disorder 5%, other malignant disease 6%, other 15%.*

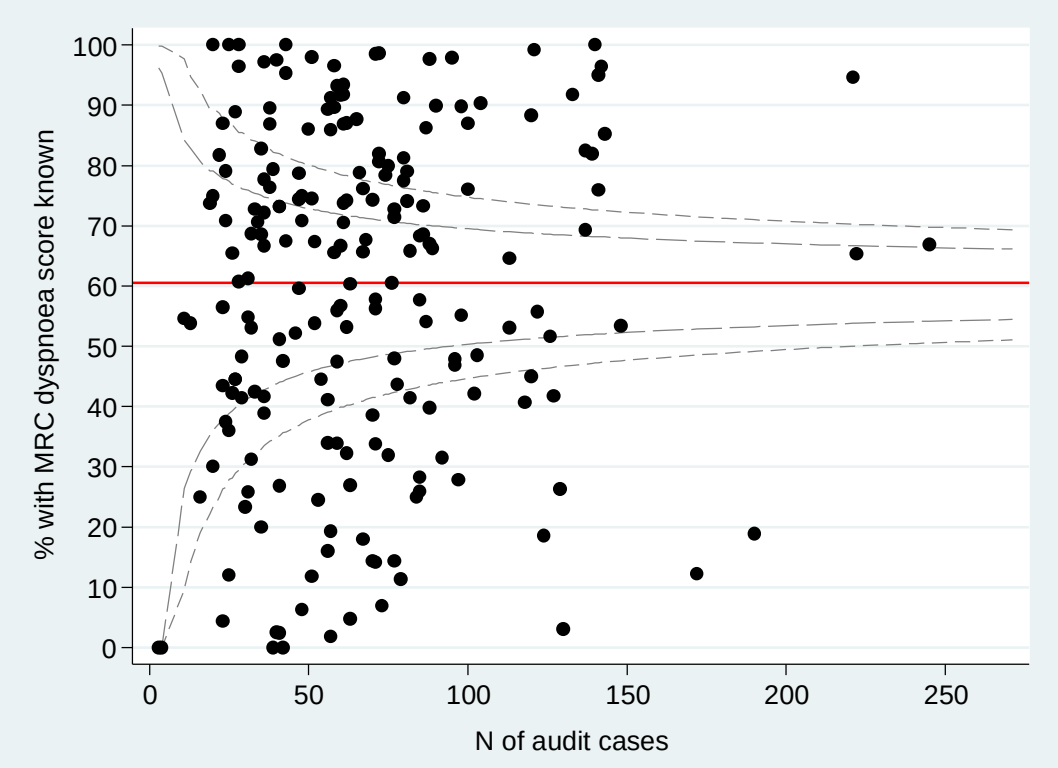
***2003 audit**: heart disease 37%, stroke 6%, other chest problems 11%, diabetes 10%, locomotor problems 12%, visual impairment 3%.*

What was the estimated MRC dyspnoea score in the weeks prior to this admission with COPD (ie excluding this exacerbation)?

Table 3.9	National audit (13414)	
Recorded	61%	8118
If recorded:		
Grade 1 – Not troubled by breathlessness except on strenuous exercise	4%	343
Grade 2 – Short of breath when hurrying or walking up a slight hill	9%	722
Grade 3 – Walks slower than contemporaries on level ground because of breathlessness or has to stop for breath when walking at own pace	17%	1385
Grade 4 – Stops for breath after walking about 100 metres (109 yards) or after a few minutes on level ground	35%	2818
Grade 5 – Too breathless to leave the house or breathless when dressing or undressing	35%	2850

***2008 audit**: What was the patient's Medical Research Council (MRC) dyspnoea score in the stable state before this exacerbation? 46% recorded; if recorded, 6% Grade 1, 10% Grade 2, 18% Grade 3, 35% Grade 4, 31% Grade 5.*

Site variation in availability of MRC dyspnoea scores



Sixty-five per cent (6746/10387) of those seen by either a respiratory consultant or respiratory nurse/member of COPD/respiratory team had an MRC dyspnoea score known, compared with 46% (1236/2688) of those not seen (p<0.001); also an MRC dyspnoea score was known for 40% (136/339) if unsure whether seen by either.

Table 3.10 What was the estimated MRC dyspnoea score in the weeks prior to this admission with COPD (ie excluding this exacerbation)?	Seen by either a respiratory consultant or a respiratory nurse/member of the COPD/respiratory team	
Grade 1 – Not troubled by breathlessness except on strenuous exercise	74%	248/334
Grade 2 – Short of breath when hurrying or walking up a slight hill	83%	579/699
Grade 3 – Walks slower than contemporaries on level ground because of breathlessness or has to stop for breath when walking at own pace	84%	1135/1358
Grade 4 – Stops for breath after walking about 100 metres (109 yards) or after a few minutes on level ground	85%	2351/2779
Grade 5 – Too breathless to leave the house or breathless when dressing or undressing	87%	2433/2812
MRC dyspnoea score not known/not recorded	71%	3641/5093
Total	79%	10387/13075

Table 3.11 What was the estimated MRC dyspnoea score in the weeks prior to this admission with COPD (ie excluding this exacerbation)?	Inpatient mortality	
Grade 1 – Not troubled by breathlessness except on strenuous exercise	0.6%	2/343
Grade 2 – Short of breath when hurrying or walking up a slight hill	1.2%	9/722
Grade 3 – Walks slower than contemporaries on level ground because of breathlessness or has to stop for breath when walking at own pace	1.7%	24/1385
Grade 4 – Stops for breath after walking about 100 metres (109 yards) or after a few minutes on level ground	2.9%	83/2818
Grade 5 – Too breathless to leave the house or breathless when dressing or undressing	8.0%	229/2850
MRC dyspnoea score not known/not recorded	4.3%	229/5296
Total	4.3%	576/13414

Importance of recording MRC score

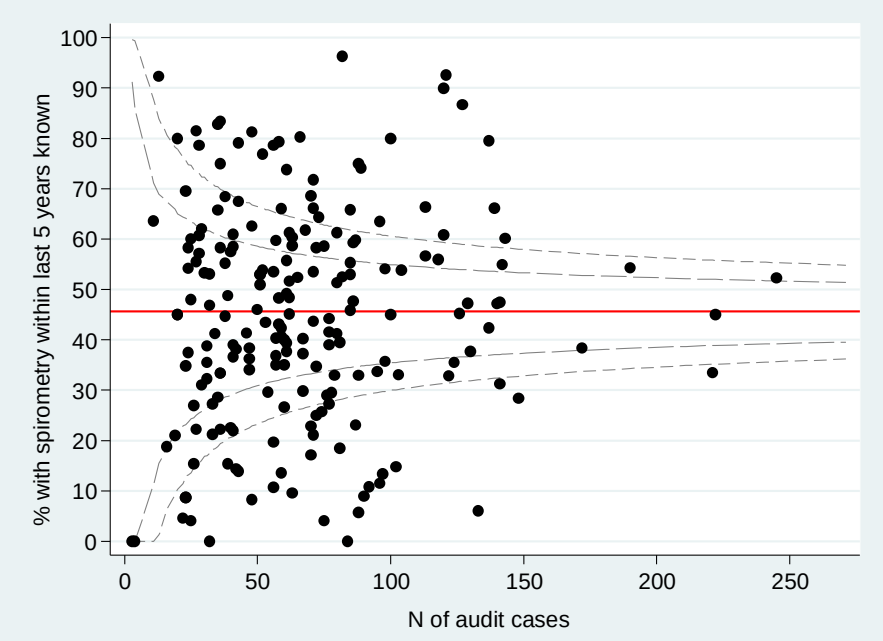
Table 3.12 What was the estimated MRC dyspnoea score in the weeks prior to this admission with COPD (ie excluding this exacerbation)?		Length of admission (days) (calculated field) Discharges only	LOS discharges >7 days	% inpatient mortality
Grade 1 – Not troubled by breathlessness except on strenuous exercise	Mean Median N	4.25 3.00 339	12% 41/339	0.6% 2/343
Grade 2 – Short of breath when hurrying or walking up a slight hill	Mean Median N	4.77 3.00 712	18% 130/712	1.2% 9/722
Grade 3 – Walks slower than contemporaries on level ground because of breathlessness or has to stop for breath when walking at own pace	Mean Median N	5.36 3.00 1361	20% 271/1361	1.7% 24/1385
Grade 4 – Stops for breath after walking about 100 metres (109 yards) or after a few minutes on level ground	Mean Median N	5.99 4.00 2729	24% 656/2729	2.9% 83/2818
Grade 5 – Too breathless to leave the house or breathless when dressing or undressing	Mean Median N	8.05 5.00 2616	36% 933/2616	8.0% 229/2850
Grade not known/not recorded	Mean	5.94	24% 1205/5059	4.3% 229/5296

Has spirometry been recorded within the notes/case record during the last 5 years?

Table 3.13	National audit (13414)	
Yes	46%	6123
Males	47%	3087/6572
Females	44%	3036/6842

***2008 audit**: spirometry recorded in the last 5 years – 54% with results.*
***2003 audit**: 55% FEV_1 (most recent in last 5 years) known.*

Site variation in availability of spirometry data



Forty-nine per cent (5129/10387) of those seen by either a respiratory consultant or respiratory nurse/member of COPD/respiratory team had spirometry known, compared with 33% (884/2688) of those not seen (p<0.001); also spirometry was known for 32% (110/339) if unsure whether seen by either.

Most recent FEV_1, % predicted FEV_1, FVC

Table 3.14			National audit (13414)
Males	**FEV_1** (litres) known		2973
	Median (IQR)	1.04	(0.76-1.44)
	% predicted FEV_1 known		2806
	Median (IQR)	37%	(27-52)%
	FVC (litres) known		2875
	Median (IQR)	2.40	(1.86-3.01)
Females	**FEV_1** (litres) known		2902
	Median (IQR)	0.80	(0.61-1.09)
	% predicted FEV_1 known		2754
	Median (IQR)	44%	(33-58)%
	FVC (litres) known		2776
	Median (IQR)	1.70	(1.32-2.11)
All	**FEV_1** (litres) known		5875
	Median (IQR)	0.91	(0.67-1.26)
	% predicted FEV_1 known		5560
	Median (IQR)	40%	(30-55)%
	FVC (litres) known		5651
	Median (IQR)	2.00	(1.52-2.60)

Mann–Whitney test, p<0.001 for male vs female in % predicted FEV_1

GOLD stage for % predicted FEV_1

Table 3.15	National audit					
	Male		Female		All	
Stage I: Mild ≥80%	5%	128	6%	174	5%	302
Stage II: Moderate 50-79%	23%	658	32%	892	28%	1550
Stage III: Severe 30-49%	41%	1142	43%	1177	42%	2319
Stage IV: Very severe <30%	31%	878	19%	511	25%	1389
	100%	2806	100%	2754	100%	5560

Table 3.16 What was the estimated MRC dyspnoea score in the weeks prior to this admission with COPD (ie excluding this exacerbation)?		Seen by either a respiratory consultant or a respiratory nurse/member of the COPD/respiratory team
Stage I: Mild ≥80%	74%	213/287
Stage II: Moderate 50-79%	81%	1227/1518
Stage III: Severe 30-49%	87%	1996/2283
Stage IV: Very severe <30%	90%	1229/1368
Total	86%	4665/5456

What were the values of the following within the first 24 hours of admission?

Serum albumin level (g/L)

Table 3.17	National audit (13414)	
Recorded	74%	9868
Median (IQR)	38	(34-42)
<34 g/L	20%	1974

***2008 audit**: recorded 74%, if recorded then 18% <34 g/L.*
***2003 audit**: recorded 67%, if recorded then 20% <34 g/L.*

Blood urea level (mmol/L)

Table 3.18	National audit (13414)	
Recorded	89%	11917
Median (IQR)	5.9	(4.4-8.2)
>7.1 mmol/L	35%	4119

***2008 audit**: recorded 91%, if recorded then 38% >7.1 mmol/L.*
***2003 audit**: recorded 91%, if recorded then 36% >7.1 mmol/L.*

Eosinophil (10^9/L)

Table 3.19	National audit (13414)	
Recorded	83%	11110
Median (IQR)	0.10	(0.00-0.20)
>0.45 10^9/L	10%	1089
0.01-0.45 10^9/L	61%	6729
<0.01 10^9/L	30%	3282

C-reactive protein (CRP) (mg/L: if less than 5, please record 0)

Table 3.20	National audit (13414)	
Recorded	84%	11330
Median (IQR)	28	(8-77)
≥10.0 mg/L	72%	8148

Does the ECG demonstrate atrial fibrillation (AF)?

Table 3.21	National audit (13414)	
Yes	14%	1617
No	86%	10103
Not recorded		770
There is no ECG from the admission		924

DECAF score

A modified DECAF score was computed for 5583, or 42%, of the total of 13414.

This modified score ranges from 0-5 instead of the recommended 0-6, and this is because we could not distinguish between MRC dyspnoea grade 5a (score 1) and grade 5b (score 2), and hence a score of 1 was given to all MRC grade 5. Missing data for any component of the DECAF score meant that the score could not be computed – the component most affected was MRC dyspnoea score, which was unknown for four out of every ten patients.

DECAF score (range 0-5):

Score 1 if MRC dyspnoea grade 5
Score 1 if eosinophil count <0.05
Score 1 if chest X-ray demonstrated consolidation
Score 1 if pH on admission <7.3
Score 1 if atrial fibrillation comorbidity
Otherwise do not score

DECAF score (5583)

Table 3.22						
Score	0	1	2	3	4	5
	26% (1449)	41% (2263)	24% (1342)	8% (446)	1% (79)	0.1% (4)

Table 3.23						
Score	0	1	2	3	4	5
Inpatient mortality	1% (14/1449)	3% (70/2263)	8% (102/1342)	14% (64/446)	28% (22/79)	50% (2/4)

Inpatient mortality for those with a DECAF score was 4.9% (274/5583), and for those without a DECAF score it was 3.9% (302/7831).

Length of stay and DECAF score (5306)

Table 3.24						
Score	0	1	2	3	4	5
LOS 0-3 days	55% (793)	40% (883)	32% (393)	18% (70)	4% (2)	-
LOS 4-7 days	28% (395)	32% (709)	33% (408)	35% (132)	37% (21)	-
LOS 8-14 days	12% (168)	19% (406)	21% (263)	28% (108)	35% (20)	50% (1)
LOS ≥15 days	6% (79)	9% (192)	14% (176)	19% (72)	25% (14)	50% (1)
Total	1435	2190	1240	382	57	2
Median (IQR) LOS	3 (2-6)	4 (2-8)	5 (3-10)	7 (4-12)	8 (6-15)	15 (-)

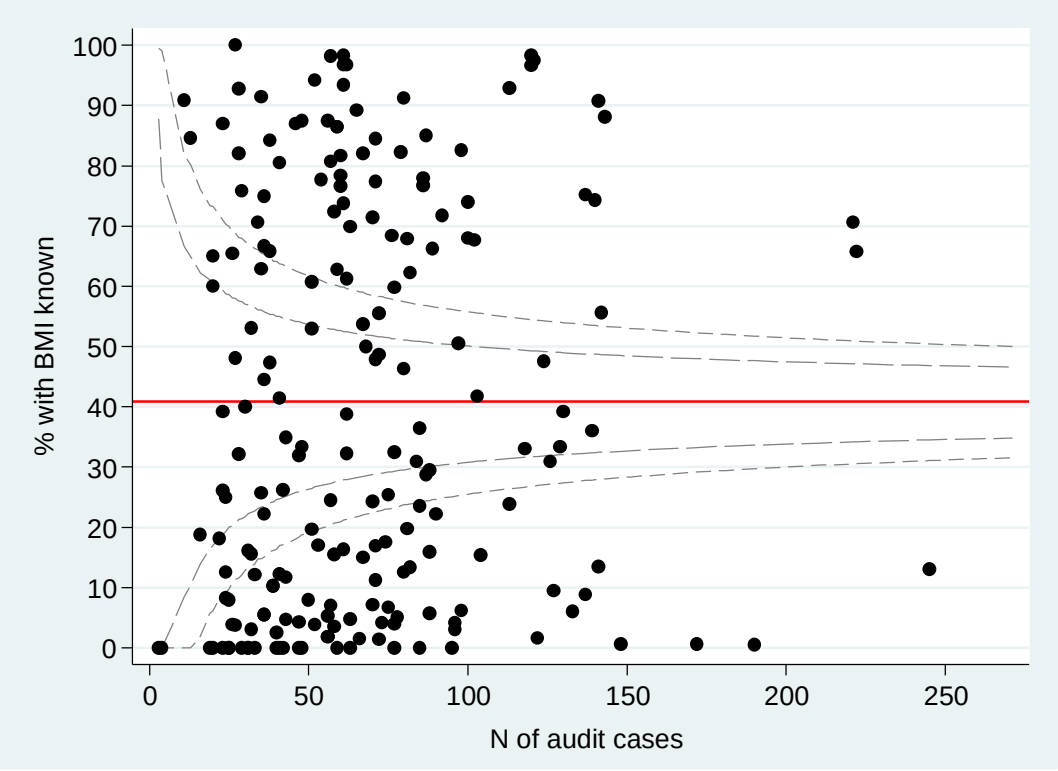
Median (IQR) for those with a DECAF score was 4 (2-8), n=5306; and for those without a DECAF score it was 4 (2-7), n=7510.

Has the patient's body mass index (BMI) been recorded in the notes?

Table 3.25		National audit (13414)
Yes	41%	5481
No	59%	7933

***2008 audit**: recorded 27%.*
***2003 audit**: known 27%.*

Site variation in availability of BMI data



Forty-four per cent (4544/10387) of those seen by either a respiratory consultant or respiratory nurse/member of COPD/respiratory team had BMI known, compared with 32% (853/2688) of those not seen (p<0.001); also BMI was known for 25% (84/339) if unsure whether seen by either.

Section 4: Managing respiratory failure

KEY FINDINGS

Blood gases

- Seventy-eight per cent of patients had an arterial blood gas (ABG) taken (compared with 86% in 2008 and 83% in 2003), of which 83% were taken within 4 hours of admission.
- There has been a gradual reduction in median arterial pO_2, measured at the first blood gas, to 8.3 kPa in 2014 from 8.9 kPa in 2008 and 9.2 kPa in 2003.
- The number of patients with a high pO_2 measured on their initial blood gas (ie >13 kPa, indicating possible treatment with high-flow oxygen) was substantially reduced to 8% in 2014 from 16% in 2008 and 19% in 2003.
- FiO_2 was recorded in 72% and 75% respectively for patients who had a first or second blood gas taken.
- The median time from admission to the first blood gas was 1.1 hours.
- Thirty-four per cent of patients had a second blood gas taken, compared with 41% in 2003, 35% within 2 hours of the first blood gas.
- A second ABG was taken for 95% of those with a first ABG pH <7.26, for 81% of those with pH 7.26-7.34 and 31% for pH ≥7.35 ($p<0.001$).
- The median time from the first to the second ABG was 1.6 hours for those whose first ABG pH was <7.26, 2.4 hours for pH 7.26-7.34 and 6.5 hours for pH ≥7.35 ($p<0.001$).
- The median time from the first to the second blood gas was 3.5 hours, but there was a gap of more than 12 hours between the first and second blood gases in 26% of patients.

NIV

- Of the patients having a single blood gas with pH <7.26, 77% received NIV. If patients had two blood gases both showing pH <7.26, then 85% received NIV.
- The percentage of patients treated with NIV, at 12.0% in 2014, is similar to the 11.4% noted in 2008, but higher than the 8.5% in 2003.
- The median time from admission to treatment with NIV was 4.1 hours.
- Of those patients treated with NIV, more than half (58%) received it beyond 3 hours after admission, and nearly a fifth (19%) received NIV after 24 hours.
- Twenty-five patients did not receive NIV because it was unavailable.

Ceiling of care

- There was no decision on the ceiling of care recorded in 53% of cases.
- Where a decision on the ceiling of care had been made, there was evidence that the patient and/or family had been involved in this decision in only 14% and 10% of cases respectively (although there was family involvement in 21% of cases in severely acidotic cases where the arterial pH was <7.26).
- Where a decision on the ceiling of care was made, 38% (1412) of these 3741 cases were designated for full escalation and 32% (1198) for escalation to NIV only.
- The doctors involved in decisions on ceiling of care were of predominantly consultant and/or SpR grade.

Intensive treatment/therapy unit (ITU) involvement

- Seven per cent of patients were assessed by the ITU team during admission, of whom 29% were subsequently transferred under their care. Less than 1% (0.8%) overall were intubated and mechanically ventilated.

AREAS IDENTIFIED AS NEEDING IMPROVEMENT

- Improve time to second blood gas.
- Improve recording of FiO_2.
- Continue to improve time to application of NIV.
- Improve documentation of ceiling of care.
- Improve patient involvement in decisions about ceiling of care.

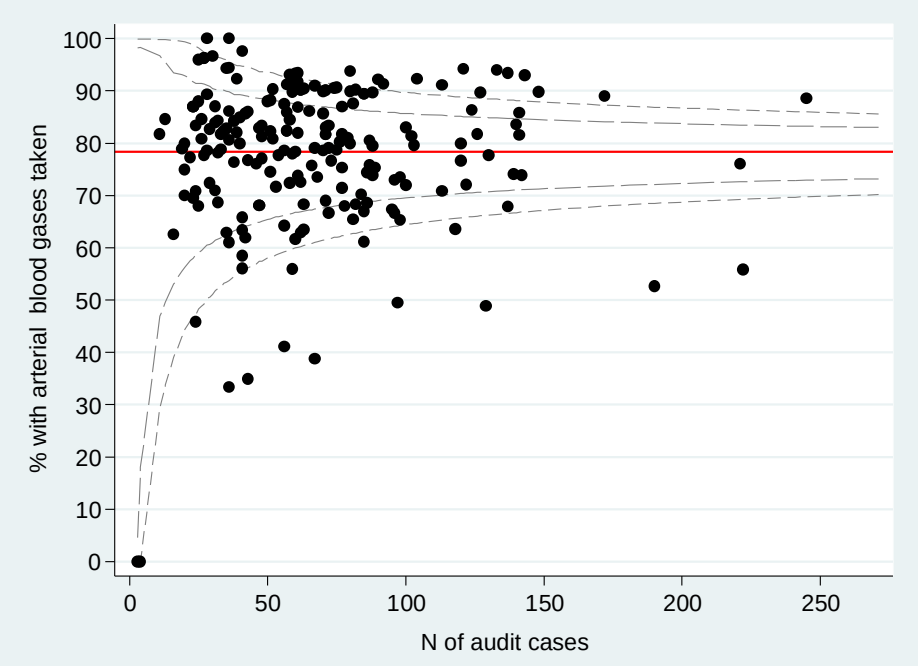
Was a first arterial blood gas taken?

Table 4.1	National audit (13414)	
Yes	78%	10517
No	22%	2897

Note that audit data indicating that the patient had blood gases taken more than 24 hours before admission (n=116) or after the index discharge date (n=75) was cleaned from 'Yes' (ie taken) to 'No' (ie not taken) with regard to the index admission.

***2008 audit**: Were arterial blood gases taken on admission: taken 86%.*
***2003 audit**: Were arterial blood gases taken on admission: taken 83%.*

Site variation in % with arterial blood gases taken



When was the first arterial blood gas taken? (for cases where both date and time are known)

Table 4.2	First arterial blood gas (9282/10517)	
Before admission		
≥12 but <24 hours	0.8%	77
<12 hours	19.1%	1776
After admission:		
Up to 1 hour	28.8%	2671
>1 but ≤4 hours	34.5%	3204
>4 but ≤6 hours	4.7%	439
>6 but ≤12 hours	4.6%	430
>12 but ≤18 hours	1.8%	167
>18 but ≤24 hours	1.4%	126
>24 but ≤48 hours	1.5%	136
>48 hours	2.8%	256
Median (IQR) hours from admission	1.1 (0.2-2.7) hours	
Within 4 hours	83.2%	7728

Of the excluded cases (10517-9282=1235), the date seen was given but the time of day was not given for 785, while neither dates nor times were given for 450.

Median (IQR) time to first ABG was 0.3 (-0.1 to 1.2) hours for those whose first pH was <7.26; 0.7 (0.1 to 2.3) hours for pH 7.26-7.34; and 1.2 (0.3 to 2.9) hours for pH ≥7.35 (p<0.001, Kruskal–Wallis test).

Table 4.3

Hours to first arterial blood gas revised	pH <7.26 (593)		pH 7.26-7.34 (1473)		pH ≥7.35 (7144)	
Before admission:						
≥12 but <24 hours	0.5%	3	1.0%	14	0.8%	60
<12 hours	27.8%	165	20.5%	302	18.1%	1295
After admission:						
Up to 1 hour	44.9%	266	36.2%	533	25.9%	1853
>1 but ≤4 hours	15.2%	90	28.2%	415	37.4%	2672
>4 but ≤6 hours	0.8%	5	4.4%	65	5.2%	368
>6 but ≤12 hours	4.9%	29	4.3%	64	4.7%	334
>12 but ≤18 hours	1.4%	8	1.2%	17	2.0%	139
>18 but ≤24 hours	0.8%	5	1.0%	14	1.5%	105
>24 but ≤48 hours	1.0%	6	1.5%	22	1.5%	106
>48 hours	2.7%	16	1.8%	27	3.0%	212

By day of admission

Table 4.4

	Day of week of admission						
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Taken*	76% 1781/2343	78% 1621/2073	79% 1475/1868	78% 1420/1811	77% 1321/1721	81% 1391/1720	80% 1508/1878
Median (IQR) hours**	1.2 (0.2-2.9) n=1579	1.0 (0.1-2.5) n=1468	1.0 (0.1-2.6) n=1311	1.1 (0.2-2.7) n=1235	1.2 (0.2-2.9) n=1144	1.0 (0.1-2.7) n=1211	1.0 (0.2-2.8) n=1334

*Chi-squared test: p=0.002, **Kruskal–Wallis test: p=0.006

First arterial blood gas results

Table 4.5		National audit	
pH	10315 cases		
	<7.26	6%	657
	7.26-7.34	16%	1629
	7.35+	78%	8029
	Median (IQR)	7.41	7.36-7.44
HCO_3 (Bic)	9909 cases		
	<23	16%	1574
	23-30	63%	6274
	>30	21%	2061
	Median (IQR)	26.3	24.0-29.3
pCO_2	10325 cases		
	≤6.0	56%	5784
	>6.0	44%	4541
	Median (IQR)	5.8	4.9-7.2
pO_2	10301 cases		
	<7.3	29%	2940
	7.3-8.0	17%	1730
	8.1-13.0	47%	4801
	>13.0	8%	830
	Median (IQR)	8.3	7.1-9.8

2008 audit: *median pH 7.41, Bic 26, pCO_2 5.8, pO_2 8.9*

pH: 7% <7.26, 14% 7.26-7.34, 79% ≥7.35
Bic: 14% <23, 66% 23-30, 20% >30
pCO_2: 56% ≤6.0, 44% >6.0
pO_2: 21% <7.3, 14% 7.3-8.0, 50% 8.1-13.0, 16% >13.0

2003 audit: *median pH 7.40, Bic 27, pCO_2 5.8, pO_2 9.2.*

pH: 7% <7.26, 15% 7.26-7.34, 78% ≥7.35
Bic: 12% <23, 66% 23-30, 22% >30
pCO_2: 54% ≤6.0, 46% >6.0
pO_2: 20% <7.3, 12% 7.3-8.0, 49% 8.1-13.0, 19% >13.0

Was the FiO_2 recorded?

Table 4.6	National audit (10517 gases taken)	
Yes	72%	7520
No	24%	2556
Not known	4%	441

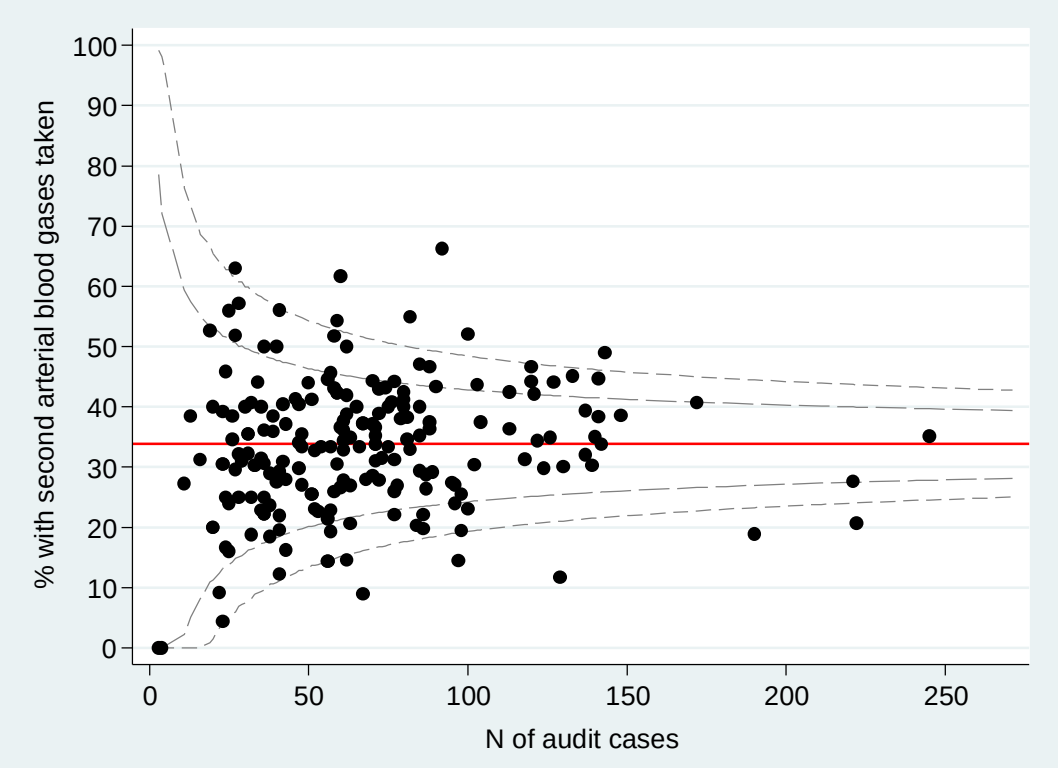
Was a second arterial blood gas taken?

Table 4.7	National audit (13414)	
Yes	34%	4548
No	66%	8866

Note that audit data indicating that the patient had blood gases taken more than 24 hours before admission (n=27) or after the index discharge date (n=45) was cleaned from 'Yes' (ie taken) to 'No' (ie not taken) with regard to the index admission.

2008 audit*: not asked*
2003 audit*: second set taken – 41%*

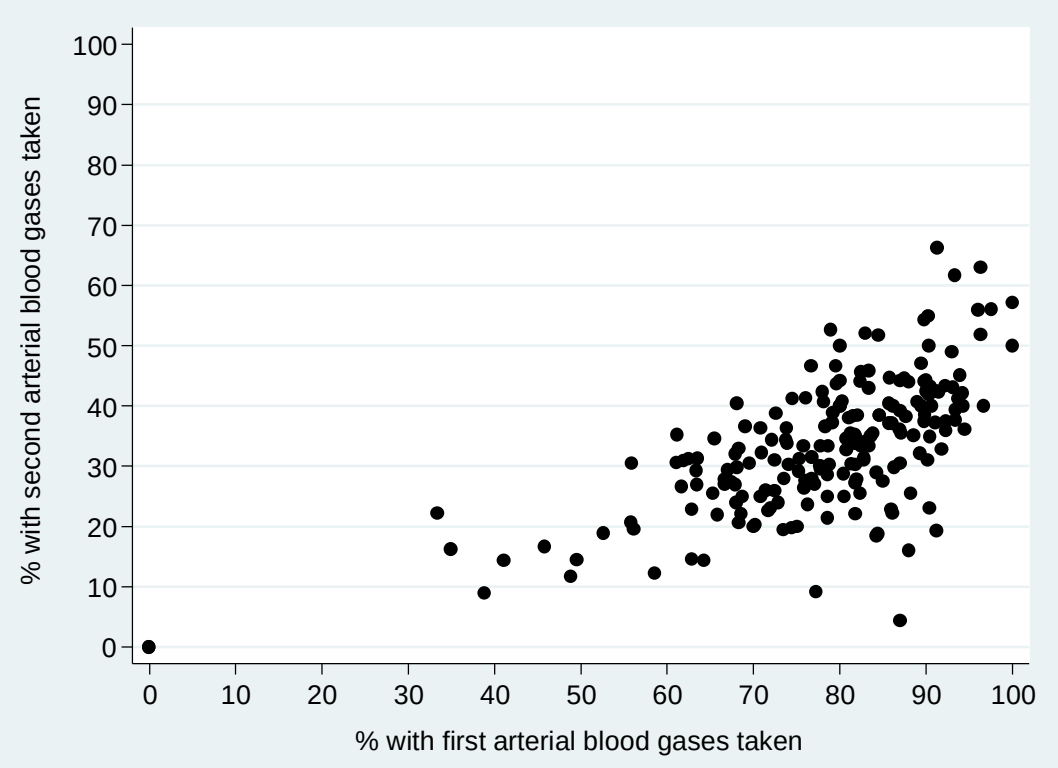
Site variation in % with second arterial blood gases taken



A second ABG was taken for 95% (627/657) of those with a first ABG pH <7.26; for 81% (1316/1629) of those with pH 7.26-7.34; and 31% (2473/8029) for pH ≥7.35 (p<0.001, Chi-squared test).

Median (IQR) time from first to second ABG was 1.6 (1.0 to 2.7) hours for those whose first ABG pH was <7.26; 2.4 (1.2-5.6) hours for pH 7.26-7.34; and 6.5 (2.1-28.1) hours for pH ≥7.35 (p<0.001, Kruskal–Wallis test).

Site variation in % with first and second arterial blood gases taken



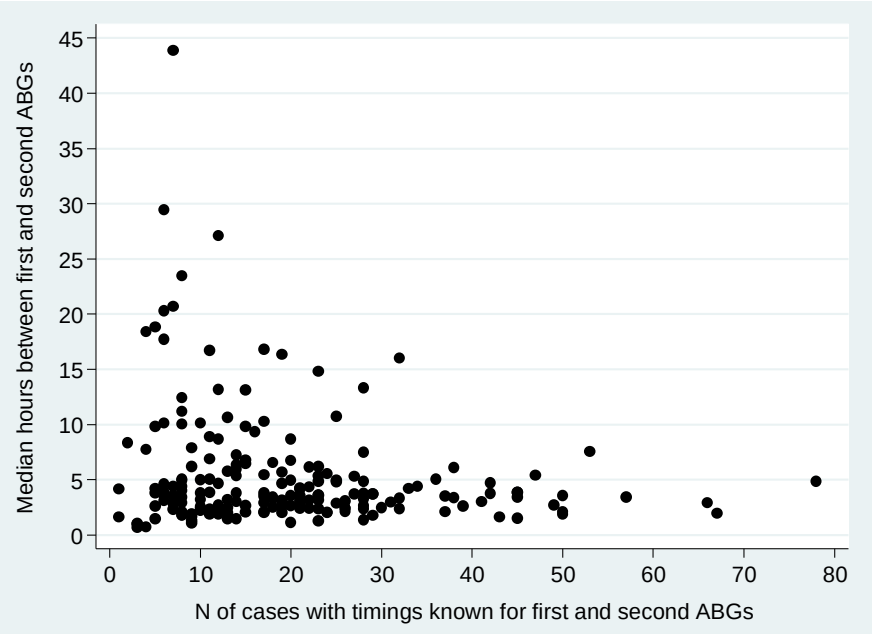
When was the second arterial blood gas taken? (for cases where both date and time are known for both first and second gases)

Table 4.8		
Minutes between first and second arterial blood gases	Second arterial blood gas (3803/4548)	
≤30 minutes	4.7%	180
31-60	10.7%	406
61-120	19.6%	747
121-240	18.4%	700
241-360	9.0%	343
361-720	11.1%	423
>720 minutes	26.4%	1004
Median (IQR) hours	3.5 (1.5-13.3) hours	
Within 2 hours of first ABG	35%	1333

By day of admission

Table 4.9	Day of week of admission						
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Median (IQR) hours between 1st and 2nd ABGs*	4.0 (1.7-16) n=619	3.3 (1.5-13) n=593	4.0 (1.5-17) n=528	3.4 (1.2-13) n=517	3.4 (1.5-14) n=476	3.2 (1.4-12) n=499	3.2 (1.3-10) n=571

*Kruskal–Wallis test: p=0.07



Second arterial blood gas results

Table 4.10		National audit	
pH	4411 cases		
	<7.26	11%	500
	7.26-7.34	27%	1205
	7.35+	61%	2706
	Median (IQR)	7.37	7.31-7.42
HCO_3 (Bic)	4263 cases		
	<23	14%	603
	23-30	54%	2314
	>30	32%	1346
	Median (IQR)	27.5	24.6-31.2
pCO_2	4420 cases		
	≤6.0	35%	1548
	>6.0	65%	2872
	Median (IQR)	6.8	5.6-8.5
pO_2	4405 cases		
	<7.3	30%	1324
	7.3-8.0	17%	744
	8.1-13.0	46%	2047
	>13.0	7%	290
	Median (IQR)	8.1	7.0-9.7

***2008 audit**: second ABG not asked – this 2008 audit asked for the lowest pH and for the other gas values recorded at that time.*

***2003 audit**: median pH 7.39, Bic 28, pCO_2 6.5, pO_2 8.8*

pH: 10% <7.26, 20% 7.26-7.34, 70% ≥7.35
Bic: 10% <23, 55% 23-30, 34% >30
pCO_2: 41% ≤6.0, 59% >6.0
pO_2: 24% <7.3, 13% 7.3-8.0, 51% 8.1-13.0, 13% >13.0

Was the FiO_2 recorded?

Table 4.11	National audit (4548 second gases taken)	
Yes	75%	3397
No	19%	875
Not known	6%	276

Was the patient treated with NIV?

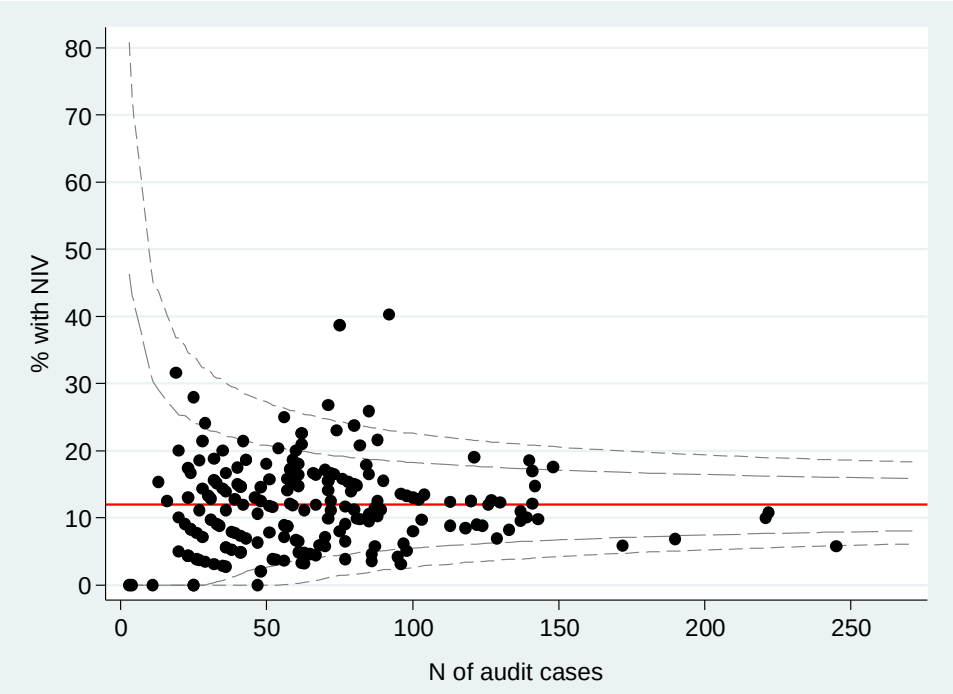
Table 4.12	National audit (13414)	
Yes	12.0%	1612
No – not clinically indicated	83.1%	11146
No – patient declined	0.8%	104
No – NIV not available	0.2%	25
No – reason unclear	2.4%	325
Patient intubated directly	0.2%	30
Not known	1.3%	172

Note that audit data indicating that the patient had NIV more than 24 hours before admission (n=15) or after the index discharge date (n=16) was cleaned from 'Yes' (ie NIV) to 'No – reason unclear' with regard to the index admission.

***2008 audit**: NIV 11.4%*
***2003 audit**: NIV 8.5%*

Of the 1612 receiving NIV, 1513 had a second ABG, and times between ABGs were known for 1261. In 168 (13%), the time gap between ABGs was more than 12 hours.

Site variation in % treated with NIV



pH results and % treated with NIV

Table 4.13	Treated with NIV	
First/only ABG:		
pH <7.26	77%	507/657
pH 7.26-7.34	40%	646/1629
pH ≥7.35	5%	412/8029
Only one ABG:		
pH <7.26	37%	15/41
pH 7.26-7.34	5%	15/323
pH ≥7.35	1%	59/5612
First and second ABG pH:		
pH <7.26 & pH <7.26	85%	260/307
pH <7.26 & pH 7.26-7.34	80%	189/235
pH <7.26 & pH ≥7.35	58%	43/74
pH 7.26-7.34 & pH <7.26	80%	81/101
pH 7.26-7.34 & pH 7.26-7.34	60%	406/679
pH 7.26-7.34 & pH ≥7.35	27%	144/526
pH ≥7.35 & pH <7.26	64%	53/83
pH ≥7.35 & pH 7.26-7.34	43%	118/275
pH ≥7.35 & pH ≥7.35	9%	182/2059

When was NIV given? (for cases where both date and time are known)

Table 4.14	NIV (1191/1612)	
Before admission:		
≥12 but <24 hours	0.7%	8
<12 hours	7.3%	87
After admission:*		
<30 minutes	5.8%	69
30-59 minutes	7.1%	85
60-179 minutes	21.5%	256
3-24 hours	39.0%	465
>24 hours	18.6%	221
Median (IQR) hours from admission	4.1 (1.3-15.3) hours	
Within 3 hours of admission	42.4%	505

Of the excluded cases (1612-1191=421), the date seen was given but the time of day was not given for 314, while neither dates nor times were given for 107.

**Time categories were chosen to match the category options offered in the 2008 audit, for which the results were: <30 minutes 12%, 30-59 minutes 13%, 60-179 minutes 25%, 3-24 hours 31%, >24 hours 18%.*

Table 4.15	First ABG pH					
Time to NIV given	pH <7.26 (371)		pH 7.26-7.34 (501)		pH ≥7.35 (297)	
Before admission:						
≥12 but <24 hours	0.5%	2	0.8%	4	0.7%	2
<12 hours	13%	48	6%	30	2%	7
After admission:						
<30 minutes	10%	36	4%	20	3%	10
30-59 minutes	13%	49	6%	28	2%	7
60-179 minutes	29%	106	24%	121	8%	25
3-24 hours	29%	108	45%	223	43%	129
>24 hours	6%	22	15%	75	39%	117
Median (IQR) hours from admission	1.7 (0.6-5.0)		4.0 (1.6-11.5)		16.9 (5.2-41.3)	
Median (IQR) hours from first ABG	1.2 (0.3-2.8)		2.7 (1.0-8.3)		12.6 (3.6-33.2)	

For those with two ABGS:

First ABG pH <7.26

Table 4.16	Second ABG pH					
Time to NIV given	pH <7.26 (192)		pH 7.26-7.34 (140)		pH ≥7.35 (31)	
Before admission:						
≥12 but <24 hours	1.0%	2	0%	0	0%	0
<12 hours	11%	21	14%	20	16%	5
After admission:						
<30 minutes	9%	18	9%	13	16%	5
30-59 minutes	11%	22	16%	22	16%	5
60-179 minutes	34%	65	24%	33	16%	5
3-24 hours	29%	56	29%	41	29%	9
>24 hours	4%	8	8%	11	6%	2
Median (IQR) hours from admission	1.7 (0.7-4.2)		1.7 (0.6-6.5)		1.1 (0.2-5.0)	
Median (IQR) hours from first ABG	1.4 (0.4-2.4)		1.0 (0.3-3.3)		0.7 (0.3-2.1)	
Median (IQR) hours from second ABG	0.1 (-0.9 to 0.9)		-0.8 (-1.7 to 2.2)		-2.0 (-5.9 to -1.1)	

First ABG pH 7.26-7.34

Table 4.17	Second ABG pH					
Time to NIV given	pH <7.26 (67)		pH 7.26-7.34 (323)		pH ≥7.35 (102)	
Before admission:						
≥12 but <24 hours	0%	0	0.9%	3	0%	0
<12 hours	4%	3	6%	20	7%	7
After admission:						
<30 minutes	7%	5	3%	9	6%	6
30-59 minutes	4%	3	5%	15	9%	9
60-179 minutes	30%	20	24%	79	20%	20
3-24 hours	40%	27	46%	148	42%	43
>24 hours	13%	9	15%	49	17%	17
Median (IQR) hours from admission	3.4 (1.3-13.0)		4.1 (1.8-11.1)		4.7 (1.2-13.7)	
Median (IQR) hours from first ABG	2.5 (1.3-5.5)		2.9 (1.2-8.7)		2.4 (0.4-8.8)	
Median (IQR) hours from second ABG	0.4 (-0.1 to 2.0)		0.9 (-0.5 to 4.5)		0.0 (-3.0 to 5.1)	

First ABG pH ≥7.35

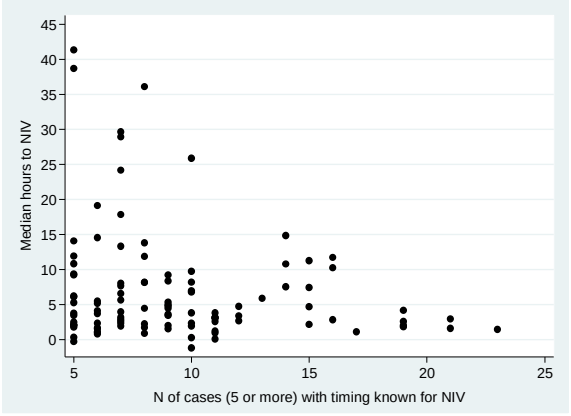
Table 4.18	Second ABG pH					
Time to NIV given	pH <7.26 (44)		pH 7.26-7.34 (99)		pH ≥7.35 (128)	
Before admission:						
≥12 but <24 hours	0%	0	1%	1	0.8%	1
<12 hours	2%	1	2%	2	2%	2
After admission:						
<30 minutes	0%	0	0%	0	5%	6
30-59 minutes	0%	0	3%	3	2%	2
60-179 minutes	5%	2	8%	8	11%	14
3-24 hours	30%	13	53%	52	39%	50
>24 hours	64%	28	33%	33	41%	53
Median (IQR) hours from admission	39.8 (14.0-92)		14.6 (5.3-30.3)		17.4 (5.3-48.3)	
Median (IQR) hours from first ABG	36.4 (12.6-124)		9.6 (4.8-28.2)		12.7 (2.8-41.4)	
Median (IQR) hours from second ABG	0.9 (0.2-2.0)		2.0 (0.4-6.9)		5.9 (-0.8 to 27.0)	

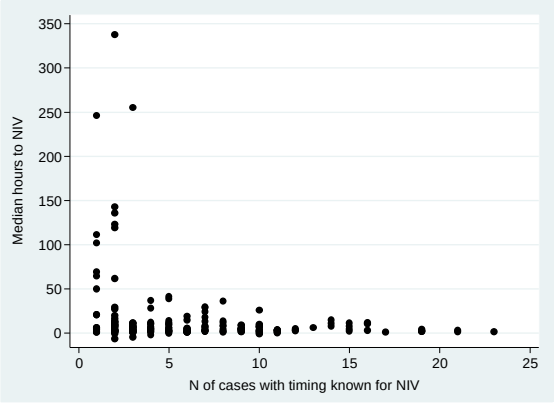
By day of admission:

Table 4.19	Day of week of admission						
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
NIV given*	11.9% 279/2343	11.7% 242/2073	10.4% 195/1868	13.0% 236/1811	10.8% 186/1721	12.7% 218/1720	13.6% 256/1878
Median (IQR) hours**	5.8 (1.4-17) n=202	4.2 (1.4-14) n=177	3.6 (1.1-14) n=138	5.1 (1.4-20) n=176	3.6 (1.1-14) n=142	4.3 (1.2-13) n=161	3.4 (1.0-11) n=195

*Chi-squared test: p=0.002, **Kruskal–Wallis test: p=0.30

Site variation





Decision on ceiling of care (including cardiopulmonary resuscitation – CPR) documented in notes within 24 hours of admission (multiple answers possible)

Table 4.20	National audit (13414)	
a. Yes – full escalation	11%	1412
b. Yes – escalation to NIV not for intubation	9%	1198
c. Yes – no cardiopulmonary resuscitation	11%	1529
d. Yes – not for NIV	1%	161
e. No record of decision on ceiling of care	53%	7121
f. Not applicable	14%	1862
None of the above selected = no answer	7%	905

Decision on ceiling of care made within 24 hours – individuals involved

(multiple answers possible)

Table 4.21	National audit (3741 yes from previous table)	
Respiratory consultant	30%	1134
Other consultant	45%	1667
SpR/ST3+	24%	904
CT1/CT2	6%	242
FY1/2	3%	122
Other healthcare professional	4%	146
Patient	14%	507
Family	10%	380
Not recorded	2%	88
Not applicable	2%	87
None of the above selected = no answer	5%	176

Table 4.22	First ABG pH					
Decision on ceiling of care made within 24 hours – individuals involved	pH <7.26 (484)		pH 7.26-7.34 (810)		pH ≥7.35 (1973)	
Respiratory consultant	31%	149	31%	255	31%	604
Other consultant	43%	207	41%	330	45%	894
SpR/ST3	44%	215	31%	254	18%	358
CT1/CT2	7%	36	7%	58	6%	113
FY1/2	3%	14	3%	26	4%	71
Other healthcare professional	7%	33	3%	27	4%	71
Patient	13%	65	16%	132	13%	248
Family	21%	100	12%	101	8%	150

Was the patient assessed by the ITU team during admission?

Table 4.23	National audit (13414)	
Yes	7%	882
No	91%	12267
Not known	2%	265
If assessed by the ITU team (882), was the patient transferred to care of the ITU team?		
Yes	29%	257
Assessed but ITU team deemed inappropriate to transfer care	65%	569
Blank = not known	6%	56

Table 4.24		Under whose care was the patient initially admitted?							
		Respiratory consultant	Care-of-elderly consultant	Acute medicine consultant	Nurse consultant	Other physician	GP	Not recorded	Total
Was the patient assessed by the ITU team during admission?	Yes	162 (7%)	85 (8%)	519 (6%)	0	112 (8%)	0	4 (4%)	882 (7%)
	Not assessed by ITU team	2164	1003	7765	43	1218	1	73	12267
	Not known	31	15	194	0	9	0	16	265
Total		2357	1103	8478	43	1339	1	93	13414
If YES, transferred to care of ITU team	Yes	49 (30%)	17 (20%)	139 (27%)	-	50 (45%)	-	2 (50%)	257 (29%)
	Assessed but ITU team deemed inappropriate to transfer care	100	66	341	-	60	-	2	569
	Not known/blank	13	2	39	-	2	-	-	56

Table 4.25		Seen by either a respiratory consultant or a respiratory nurse/member of the COPD/respiratory team			
		Yes	Not seen by	Not recorded	Total
Was the patient assessed by the ITU team during admission?	Yes	792 (8%)	73 (3%)	17 (5%)	882 (7%)
	Not assessed by ITU team	9402	2579	286	12267
	Not known	193	36	36	265
Total		10387	2688	339	13414
If YES, transferred to care of the ITU team	Yes	230 (29%)	21 (29%)	6 (35%)	257 (29%)
	Assessed but ITU team deemed inappropriate to transfer care	511	49	9	569
	Not known/blank	51	3	2	56

Was the patient intubated/treated with mechanical ventilation?

Table 4.26	National audit (13414)	
Yes – intubated and mechanically ventilated	0.8%	104
No	97%	13018
Not known	2%	292

***2008 audit**: invasive ventilator support 1.3%*
***2003 audit**: invasive ventilation 1.1%*

Section 5: Inpatient stay

KEY FINDINGS

- Eighty-one per cent of patients were managed on an MAU/admissions ward for at least part of their admission.
- Thirty-one per cent of all the 13414 patients were managed solely on an MAU/admissions ward.
- Only 42% (5670/13414) of the patients were managed on a respiratory ward.
- However, of the patients with pH <7.26, 73% were managed on a respiratory ward and/or medical/respiratory high-dependency unit (HDU), compared with 62% of those with pH 7.26-7.34 and 44% of those with pH >7.35.
- Of those patients seen by a respiratory consultant/nurse/member of the COPD/respiratory team, only 54% were managed on a respiratory ward and/or medical/respiratory HDU.
- Ninety-six per cent of those managed on a respiratory ward and/or medical/respiratory HDU were seen by someone from the respiratory team.
- Two per cent of patients (293, from 102 units) were managed on a surgical or non-medical ward.

AREAS IDENTIFIED AS NEEDING IMPROVEMENT

- Increase the number of patients admitted to a respiratory ward.
- Increase the respiratory bed base.
- Increase the number of patients under the care of the respiratory team.

On what ward(s) was the patient managed during the admission?

(multiple answers possible)

Table 5.1	National audit (13414)	
Medical assessment unit (MAU)/admissions ward	81%	10924
Respiratory ward	42%	5670
Surgical/non-medical ward	2%	293
Medical/respiratory HDU	4%	505
Other medical ward (general/geriatric/non-respiratory)	21%	2788
Not known	1%	187
Other*	3%	411
Respiratory ward and/or medical/respiratory HDU	44%	5927

*These included 233 short stay ward/unit, 87 ITU/ICU, 30 Accident and Emergency Department (AED) and 41 nurse-led (Rotherham Community COPD Unit) respiratory ward.

Thirty-one per cent (4197) of all the 13414 patients were managed solely on the MAU/admissions ward.

Table 5.2 First ABG pH	Managed on respiratory ward and/or medical/respiratory HDU	
pH <7.26	73%	481/657
pH 7.26-7.34	62%	1002/1629
pH ≥7.35	44%	3504/8029

Chi-squared test: p<0.001

Table 5.3 Seen by either a respiratory consultant or a respiratory nurse/member of the COPD/respiratory team	% managed on respiratory ward and/or medical/respiratory HDU	
WAS seen	54%	5605/10387
WAS NOT seen	10%	262/2688

Ninety-six per cent (5605/5867) of those managed on a respiratory ward and/or medical/respiratory HDU were seen by someone from the respiratory team.

WAS seen by either a respiratory consultant or a respiratory nurse/member of the COPD/respiratory team

Table 5.4 First ABG pH	% managed on respiratory ward and/or medical/respiratory HDU	
pH <7.26	79%	459/582
pH 7.26-7.34	68%	955/1406
pH ≥7.35	52%	3322/6371

WAS NOT seen by either a respiratory consultant or a respiratory nurse/member of the COPD/respiratory team

Table 5.5 First ABG pH	% managed on respiratory ward and/or medical/respiratory HDU	
pH <7.26	28%	20/71
pH 7.26-7.34	18%	34/185
pH ≥7.35	10%	147/1471

The worse the first ABG pH, the more likely that a patient was managed on a respiratory ward and/or medical/respiratory HDU. This was so both for whether a patient was seen by someone from the respiratory team or if they were not seen by someone from the respiratory team (see tables 5.4 and 5.5 directly above this paragraph).

Section 6: Integrating care

KEY FINDINGS

- Only 51% of the patients were under the care of a respiratory consultant when the decision was made to discharge or transfer to an early/supported discharge scheme (compared with 54% in 2008).
- When analysed according to initial blood gas pH, 75% of those with pH <7.26, 66% of those with pH 7.26-7.35 and 51% of those with pH >7.35 were under the care of a respiratory consultant when the decision was made to discharge or transfer to an early/supported discharge scheme.
- By contrast, 10% (12% in 2008) of patients were under the care of a care-of-elderly consultant and 31% were under an acute physician when the decision was made to discharge or transfer to the care of an early/supported discharge scheme.
- Forty per cent of patients were discharged under the care of an early/supported discharge scheme (18% in 2008).
- Eighty-one per cent of the patients discharged under the care of an early/supported discharge team were managed at some point during their admission on an MAU/admissions ward
- Forty-four per cent of patients had no assessment of suitability for pulmonary rehabilitation at the time of discharge.

AREAS IDENTIFIED AS NEEDING IMPROVEMENT

- Increase the number of patients discharged under the care of respiratory consultants.
- Increase the number of patients referred to early/supported discharge schemes.
- Increase the number of patients assessed and referred for pulmonary rehabilitation.

Under whose care when decision to discharge or transfer to early/supported discharge scheme (multiple answers possible)

Table 6.1	National audit (12838 discharged)	
Acute medicine consultant	31%	4033
Respiratory consultant	51%	6537
Care-of-elderly consultant	10%	1291
GP	0.4%	47
Other*	6%	736
No to everything above = no answer	3%	377

*Includes 152 gastroenterology, 151 endocrinology, 100 cardiology, 39 respiratory nurse consultant, 32 renal, 18 rheumatology, 18 infectious disease, and 164 non-specific – general physician/medical consultant.

2008: Whose care was the patient under when discharged: respiratory consultant 54%, COE physician 12%, general physician 33%, not recorded 2%, other 0.5%.

Table 6.2	Under whose care when decision to discharge or transfer to early discharge scheme (EDS)					
First ABG pH	Acute medicine consultant		Respiratory consultant		Care-of-elderly consultant	
pH <7.26	14%	95/657	75%	491/657	5%	33/657
pH 7.26-7.34	21%	337/1629	66%	1070/1629	8%	123/1629
pH ≥7.35	31%	2500/8029	51%	4073/8029	10%	812/8029

Table 6.3 Seen by either a respiratory consultant or a respiratory nurse/member of the COPD/respiratory team	Under whose care when decision to discharge or transfer to EDS					
	Acute medicine consultant		Respiratory consultant		Care-of-elderly consultant	
WAS seen	24%	2450/10387	63%	6546/10387	7%	740/10387
WAS NOT seen	57%	1521/2688	8%	214/2688	21%	570/2688

WAS seen by either a respiratory consultant or a respiratory nurse/member of the COPD/respiratory team

Table 6.4	Under whose care when decision to discharge or transfer to EDS					
First ABG pH	Acute medicine consultant		Respiratory consultant		Care-of-elderly consultant	
pH <7.26	11%	62/582	82%	476/582	3%	16/582
pH 7.26-7.34	17%	233/1406	73%	1033/1406	6%	82/1406
pH ≥7.35	25%	1601/6371	61%	3916/6371	7%	454/6371

WAS NOT seen by either a respiratory consultant or a respiratory nurse/member of the COPD/respiratory team

Table 6.5	Under whose care when decision to discharge or transfer to EDS					
First ABG pH	Acute medicine consultant		Respiratory consultant		Care-of-elderly consultant	
pH <7.26	44%	31/71	18%	13/71	24%	17/71
pH 7.26-7.34	48%	88/185	14%	26/185	20%	37/185
pH ≥7.35	56%	817/1471	7%	26/185	23%	335/1471

Evidence patient discharged under the care of a COPD team or early/supported discharge service or equivalent

Table 6.6	National audit (12838 discharged)	
Yes	40%	5179
Reviewed by early discharge scheme but not accepted	8%	1081
Not suitable for referral to early discharge scheme	11%	1399
Not recorded	27%	3469
Not available	13%	1710

Both the 2003 and 2008 audits asked whether the patient was accepted by an early discharge (or hospital at home) scheme.

2008 audit discharges: 18% yes, 78% no, 4% not known
2003 audit discharges: 16% yes, 79% no, 5% not known

Eighty-one per cent (4191/5179) of those discharged under the care of a COPD team/early supported discharge service or equivalent scheme were managed during the admission on an MAU/admissions ward.

Where was the patient discharged to:

Table 6.7	National audit (12838 discharged)	
Community hospital/rehab ward or equivalent	2%	226
Residential placement	4%	555
Sheltered accommodation	2%	259
House/flat alone	31%	3924
House/flat with another person	51%	6542
Not recorded	6%	737
Other*	2%	201
No to everything above = no answer	3%	394

*Includes 49 nurse-led respiratory unit (Rotherham), 13 psychiatric/mental health, 15 hospice, 11 self-discharge, 3 prison.

Table 6.8

Patient discharged to:	Age							
	<65		65-74		75-84		85+	
Community hospital/rehab ward or equivalent	1%	29	1%	61	2%	77	4%	59
Residential placement	1%	42	2%	107	5%	188	15%	218
Sheltered accommodation	1%	38	2%	84	2%	82	4%	54
House/flat alone	28%	889	30%	1278	32%	1253	35%	504
House/flat with another person	57%	1791	54%	2350	49%	1898	34%	502
Not recorded	7%	227	6%	247	5%	203	4%	60
Other	2%	66	2%	68	1%	53	1%	14
No answer	3%	87	3%	135	3%	127	3%	45
Total		3169		4330		3881		1456

Table 6.9

Patient discharged to:	English IMD quintiles rank (where 1 is most deprived)									
	1-6496		6497-12993		12994-19489		19490-25985		25986-32482	
Community hospital/rehab ward or equivalent	1%	54	2%	48	2%	46	2%	41	2%	19
Residential placement	4%	141	4%	113	4%	85	6%	110	5%	64
Sheltered accommodation	2%	80	2%	58	2%	50	2%	40	1%	16
House/flat alone	34%	1310	30%	841	29%	637	27%	461	28%	335
House/flat with another person	48%	1871	50%	1401	52%	1127	53%	906	55%	662
Not recorded	6%	245	7%	183	5%	113	5%	89	4%	47
Other	2%	59	2%	52	2%	35	1%	23	1%	13
No answer	3%	106	3%	90	3%	70	3%	52	4%	43
Total		3866		2786		2163		1722		1199

Table 6.10

Patient discharged to:	Welsh WIMD quintiles rank (where 1 is most deprived)									
	1-379		380-758		759-1138		1139-1517		1518-1896	
Community hospital/rehab ward or equivalent	1%	3	1%	3	2%	2	3%	3	0%	0
Residential placement	4%	10	3%	6	5%	7	2%	2	3%	2
Sheltered accommodation	2%	4	1%	3	1%	1	0%	0	0%	0
House/flat alone	32%	86	30%	63	28%	36	28%	27	29%	20
House/flat with another person	52%	138	55%	116	57%	74	48%	47	57%	40
Not recorded	5%	13	6%	12	4%	5	9%	9	9%	6
Other	1%	2	2%	5	0%	0	5%	5	0%	0
No answer	4%	11	1%	3	4%	5	5%	5	3%	2
Total		267		211		130		98		70

Was suitability for pulmonary rehabilitation considered at the time of discharge?

Table 6.11	National audit (12838 discharged)	
Yes – assessed and referred	15%	1881
Yes – assessed but referral declined	9%	1149
Yes – assessed but not suitable for referral	16%	2107
No assessment made	44%	5652
Other*	2%	296
Not known	14%	1753

*The audit did not ask for details.

Table 6.12 Was suitability for pulmonary rehabilitation considered at the time of discharge	Seen by either a respiratory consultant or a respiratory nurse/member of the COPD/respiratory team			
	Yes	Not seen by	Not recorded	Total
Yes – assessed and referred	1814 (18%)	58 (2%)	9 (3%)	1881
Yes – assessed but referral declined	1123 (11%)	25 (1%)	1 (0.3%)	1149
Yes – assessed but not suitable for referral	2011 (20%)	82 (3%)	14 (4%)	2107
No assessment made	3510 (35%)	1956 (77%)	186 (57%)	5652
Other	261 (3%)	33 (1%)	2 (0.6%)	296
Not known	1236 (12%)	403 (16%)	114 (35%)	1753
Total	9955	2557	326	12838

3. Improvement planning

Quality improvement (QI)

We recommend that units begin to develop improvement plans that are relevant to their site-specific needs, guided by their site-specific data and recommendations within the national audit reports. Discussions should take place not only within a unit's management, governance and improvement groups, but also with managerial and clinical colleagues in primary care. Units should develop an improvement plan, agreed by the multidisciplinary team and supported formally at trust board, CCG and/or health board level, based upon the recommendations within the national and their site-specific report. The plan should contain clear timelines for change, and provide the basis for successful re-audit.

The National COPD Audit Programme has collated a limited range of materials to assist with local improvement work. A selection of these is listed below, and further resources will be available on our website (www.rcplondon.ac.uk/copd) in due course.

Respiratory Futures

- Respiratory Futures is a virtual networking and information platform, seed funded by the British Thoracic Society and NHS England, that builds on the legacy of the Department of Health Respiratory Programme Board, NHS Improvement's Lung Improvement Programme, Improving and Integrating Respiratory Services (IMPRESS), Interactive Health Atlas for Lung Conditions in England (INHALE) and Respiratory Alliance. A beta version of the Respiratory Futures website has recently launched, and in 2015 it will grow to include content and develop activities such as opinion leader editorials, topical webinar debates and innovative knowledge sharing to demonstrate best practice in respiratory health care: www.respiratoryfutures.org.uk/.

Planning templates

- BTS clinical audit action plan: www.brit-thoracic.org.uk/audit-and-quality-improvement/bts-audit-programme-reports/
- Australian Children's Education & Care Quality Authority QI plans: www.acecqa.gov.au/quality-improvement-plan_1
- NHS Improvement (archived site) service improvement tools and techniques: http://webarchive.nationalarchives.gov.uk/20130221101407/http://www.improvement.nhs.uk/lung/ServiceImprovementTools/tabid/92/Default.aspx
- Suite of tools available from the NHS Institute for Innovation and Improvement: www.institute.nhs.uk/quality_and_service_improvement_tools/quality_and_service_improvement_tools/quality_and_service_improvement_tools_for_the_nhs.html
- The NHS Improvement System: http://improvementsystem.nhsiq.nhs.uk/ImprovementSystem/Login.aspx?ReturnUrl=%2fImprovementSystem%2fdefault.aspx.

Resources on 7-day working

- NHS Improving Quality: www.nhsiq.nhs.uk/improvement-programmes/acute-care/seven-day-services.aspx
- NHS Improving Quality 7-day service case studies (www.nhsiq.nhs.uk/resource-search/publications/nhs-imp-seven-days.aspx), particularly respiratory studies:
    - Guy's and St Thomas' NHS Foundation Trust www.nhsiq.nhs.uk/media/2396792/respiratory_guys.pdf
    - South Tees Hospitals NHS Foundation Trust www.nhsiq.nhs.uk/media/2396797/respiratory_southtees.pdf.

Smoking cessation

- BTS materials, including a return on investment calculator, and links to the NICE smoking cessation guidelines and quality standards: www.brit-thoracic.org.uk/clinical-information/smoking-cessation/
- BTS *Recommendations for hospital smoking cessation services for commissioners and health care professionals* (Stop Smoking Champions): www.brit-thoracic.org.uk/document-library/clinical-information/smoking-cessation/bts-recommendations-for-smoking-cessation-services/
- BTS Stop Smoking Champions, *The case for change*: www.brit-thoracic.org.uk/document-library/clinical-information/smoking-cessation/bts-case-for-change/.

Integrating care

- NHS Improving Quality, *Pioneering integrated care and support*: www.nhsiq.nhs.uk/resource-search/publications/integrated-care-leaflet.aspx.

Oxygen toxicity

- NHS Improvement's emergency oxygen resources (archived site): http://webarchive.nationalarchives.gov.uk/20130221101407/http://www.improvement.nhs.uk/lung/NationalImprovementProjects/Emergencyoxygen.aspx.

COPD general

- NHS Improvement's COPD resources – including a Model for Improvement (archived site): http://webarchive.nationalarchives.gov.uk/20130221101407/http://www.improvement.nhs.uk/lung/NationalProjects/ManagingCOPD/Howtogetstarted/tabid/191/Default.aspx.

Care bundles

- Care bundle resources: www.brit-thoracic.org.uk/audit-and-quality-improvement/bts-care-bundles-for-cap-and-copd/
- Care bundle reports: www.brit-thoracic.org.uk/publication-library/bts-reports/.

4. Appendices:

- **Appendix A**
  - Audit methodology
  - Recruitment
  - Development of the audit questions
  - Definitions
  - Information governance
  - Data collection period
  - Data collection
  - Telephone and email support
- **Appendix B**
  - Participating and non-participating NHS acute units
- **Appendix C**
  - BTS online audit tool
- **Appendix D**
  - National COPD Audit Programme governance
  - National COPD Audit Programme board members
  - National COPD Audit Programme steering group members
  - National COPD Audit Programme secondary care workstream group
- **Appendix E**
  - NICE COPD Quality Standards (2011)
- **Appendix F**
  - Glossary of terms and abbreviations
- **Appendix G**
  - References

Appendix A

Audit methodology

The secondary care audit 2014 built on the previous audits of COPD care undertaken in 1997, 2003 and 2008. It comprised two distinct elements:

- an audit of all cases of acute COPD exacerbations admitted to units in England and Wales between 1 February and 30 April 2014
- a snapshot audit of the resourcing and organisation of COPD services at these units during the period of clinical case ascertainment.

The 2014 national COPD secondary care audit differed from previous audits in scope and size. Firstly, the audit was commissioned by HQIP as part of the National Clinical Audit Programme (NCA) for England and Wales; therefore it did not cover the whole of the UK as in previous audits. Secondly, to achieve sufficient case numbers for meaningful site comparisons, participating units were instructed to audit all eligible cases of acute COPD exacerbation (AECOPD) admitted between 1 February and 30 April 2014, rather than a fixed sample (up to 60 cases) as occurred in 2008. As in previous years, the second element of the audit comprised a comprehensive survey of the resourcing and organisation of care at the units admitting patients with AECOPD.

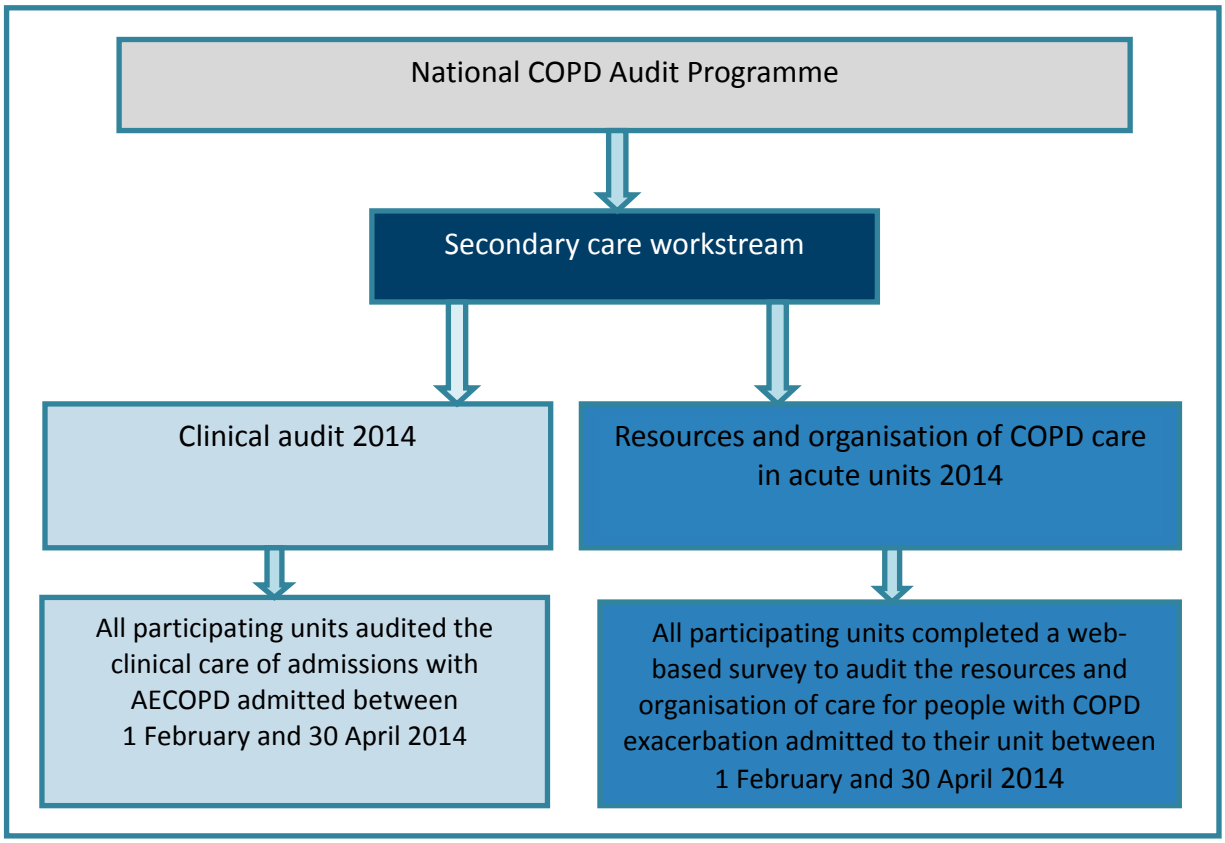


Fig 1: National Secondary Care COPD Audit methodology

Recruitment

Efforts to raise awareness and ensure a high participation rate began in early 2013, ie a year before the data collection period. The audit was promoted via the RCP and BTS websites, flyers were distributed at specialist conferences, and information was disseminated widely to respiratory colleagues via global emails from BTS. A letter was sent to the chief executive officers and medical

directors of all NHS acute trusts / health boards in November 2013, requesting the support of both respiratory and clinical audit colleagues, and reminding them that the National COPD Audit Programme forms part of their trust's quality accounts. The letter outlined plans for the forthcoming audit and sought 'registration' via a short form identifying two local lead contacts.

Concerted efforts were made throughout December 2013 and January 2014 to contact individuals at trusts / health boards that had not yet registered, until 100% of eligible trusts / health boards and units were confirmed participants. Subsequently, nearly 100% of registered units submitted data for the clinical audit (148/148 trusts / health boards, 199/200 units).

Development of the audit questions

The organisational and clinical datasets were developed by the secondary care workstream group, in consultation with COPD experts across England and Wales. Copies of both datasets are available to download from the programme website: www.rcplondon.ac.uk/COPD. The datasets take account of recent changes in the NHS structure, the new NHS domains and more recently published COPD quality standards from NICE.

A scoping exercise was undertaken by the workstream group to determine the key interventions, processes and resources from which the questions should be drawn. Questions were ordered broadly around several domains of care, to ensure that general data were collected but also information about specific areas including the admissions process, the application of specialist care, management of respiratory failure, the management of discharge and integration of care. The group ensured that the questions mapped to existing standards and the five NHS domains.

A consultation exercise was then undertaken, the datasets being sent to the NHS COPD leads and individual COPD specialists within NHS trusts / health boards in England and Wales. Further feedback was invited as part of the clinical dataset pilot that took place in September 2013. Subsequent modifications were made to both datasets, including a significant reduction in length. The pilot also led to improvements in the functionality of the online web tool.

Definitions

'Unit'

- The term 'unit' was used to describe each organisation that participated in the audit. For the purposes of the audit, a 'unit' was defined as 'a hospital that admits acute unselected emergency COPD admissions'.

- Trusts with more than one hospital, where acute COPD admissions were being managed separately at each hospital, were encouraged to treat each site as a separate 'unit'. However, there were instances where patients were regularly managed by more than one hospital within a trust, and/or a trust preferred to collect and present its data collectively. In these cases, two or more hospitals entered data as one 'unit' (Appendix B shows participating units, and those linked sites preferring to enter data as one unit).

'Admission'

- An admission was defined as 'an episode in which a patient with an acute COPD exacerbation was admitted to a ward and stayed for 4 hours or more (this includes emergency medicine centres, medical admission units, clinical decision units or similar, but excludes accident and emergency units)'. A stay in hospital of less than 4 hours would be classed as a non-admission and would not be included.

Information governance

To enable the collection of patient identifiable data items without obtaining explicit individual patient consent, Section 251 approval was gained via the Confidentiality Advisory Group (CAG). This would allow 30- and 90-day outcome data to be extracted and linked centrally by the Health and Social Care Information Centre (HSCIC) without the need for units to carry out any subsequent notes audit. It also meant that data could be linked across the other National COPD Audit Programme workstreams.

Additionally, to support the flow/transfer of identifiable data from individual units to the National COPD audit team, Caldicott Guardian approval was obtained from each participating unit before access to the online audit web tool was given to local unit staff.

Data collection period

Participating units were instructed to collect data for all eligible cases of acute COPD exacerbation admitted between 1 February and 30 April 2014. Online data submission for the clinical audit took place from 1 February to 31 May 2014 and included patients admitted during the data collection period who were discharged (or had died) before 31 May 2014.

Data collection

Units were asked to prospectively identify all cases of patients admitted with an exacerbation of COPD during the audit period and data were collected by clinical and audit staff at each participating unit.

Data for each element of the national COPD secondary care audit were submitted via the BTS web-based audit data collection system, developed in 2009 by Westcliff Solutions Ltd. The tool was accessible via the BTS website (Appendix C).

A number of documents designed to support participation in the audit were posted on the RCP National COPD Audit Programme website (www.rcplondon.ac.uk/projects/secondary-care-workstream), including copies of the audit protocol, data collection instructions, frequently asked questions and the clinical dataset with help notes. Regular email updates were also sent to audit participants throughout the audit period, to encourage them to enter and commit data for the clinical audit in advance of the closing date for data entry (31 May 2014).

Throughout the audit BTS ran regular reports to check for obvious errors in the data and contacted units and asked them to make any necessary corrections e.g. dates of birth that seemed unlikely or impossible. At the end of the data collection period, the BTS made contact with the units that had records that had not been submitted, to ensure that they were finalised and included in the national dataset.

Telephone and email support

The BTS project team provided dedicated support to deal with queries or comments from participants throughout the audit: a telephone helpline was available from Monday to Friday during office hours, and queries could be emailed directly to the BTS project team. Where similar queries were being raised frequently, they were added to the frequently asked questions, or the online help notes were updated as appropriate. Queries were also logged for future learning.

Appendix B: Participating and non-participating NHS acute units

Participating NHS acute units

Hospitals that opted to submit data as a single unit are highlighted in blue.

Trust	Unit
Abertawe Bro Morgannwg University Health Board	Morriston Hospital
	Princess of Wales Hospital
	Singleton Hospital
Aintree University Hospitals NHS Foundation Trust	Aintree University Hospital
Airedale NHS Foundation Trust	Airedale General Hospital
Aneurin Bevan University Health Board	Nevill Hall Hospital
	Royal Gwent Hospital
	Ysbyty Ystrad Fawr
Ashford and St Peter's Hospitals NHS Foundation Trust	St Peter's Hospital
Barking, Havering and Redbridge University Hospitals NHS Trust	Queen's Hospital
Barnet and Chase Farm Hospitals NHS Trust	Barnet Hospital
Barnsley Hospital NHS Foundation Trust	Barnsley Hospital
Barts Health NHS Trust	Newham University Hospital
	Royal London Hospital
	Whipps Cross University Hospital
Basildon and Thurrock University Hospitals NHS Foundation Trust	Basildon University Hospital
Bedford Hospital NHS Trust	Bedford Hospital
Betsi Cadwaladr University Health Board	Glan Clwyd Hospital
	Wrexham Maelor Hospital
Blackpool Teaching Hospitals NHS Foundation Trust	Blackpool Victoria Hospital
Bolton NHS Foundation Trust	Royal Bolton Hospital
Bradford Teaching Hospitals NHS Foundation Trust	Bradford Royal Infirmary
Brighton and Sussex University Hospitals NHS Trust	Princess Royal Hospital
	Royal Sussex County Hospital
Buckinghamshire Healthcare NHS Trust	Stoke Mandeville Hospital
Burton Hospitals NHS Foundation Trust	Queen's Hospital
Calderdale and Huddersfield NHS Foundation Trust	Calderdale Royal Hospital
	Huddersfield Royal Infirmary
Cambridge University Hospitals NHS Foundation Trust	Addenbrooke's Hospital
Cardiff and Vale University Health Board	University Hospital Llandough
	University Hospital of Wales
Central Manchester University Hospitals NHS Foundation Trust	Manchester Royal Infirmary
	Trafford General Hospital

Trust	Unit
Chelsea and Westminster Hospital NHS Foundation Trust	Chelsea and Westminster Hospital
Chesterfield Royal Hospital NHS Foundation Trust	Chesterfield Royal Hospital
City Hospitals Sunderland NHS Foundation Trust	Sunderland Royal Hospital
Colchester Hospital University NHS Foundation Trust	Colchester General Hospital
Countess of Chester Hospital NHS Foundation Trust	Countess of Chester Hospital
County Durham and Darlington NHS Foundation Trust	Darlington Memorial Hospital
	University Hospital of North Durham
Croydon Health Services NHS Trust	Croydon University Hospital
Cwm Taf University Health Board	Prince Charles Hospital
	Royal Glamorgan Hospital
Dartford and Gravesham NHS Trust	Darent Valley Hospital
Derby Hospitals NHS Foundation Trust	Royal Derby Hospital
Doncaster and Bassetlaw Hospitals NHS Foundation Trust	Bassetlaw District General Hospital
	Doncaster Royal Infirmary
Dorset County Hospital NHS Foundation Trust	Dorset County Hospital
Ealing Hospital NHS Trust	Ealing Hospital
East and North Hertfordshire NHS Trust	Lister Hospital and Queen Elizabeth II Hospital
East Cheshire NHS Trust	Macclesfield District General Hospital
East Kent Hospitals University NHS Foundation Trust	Kent and Canterbury Hospital
	Queen Elizabeth The Queen Mother Hospital
	William Harvey Hospital
East Lancashire Hospitals NHS Trust	Royal Blackburn Hospital
East Sussex Hospitals NHS Trust	Conquest Hospital
	Eastbourne District General Hospital
Epsom and St Helier University Hospitals NHS Trust	Epsom Hospital
	St Helier Hospital
Frimley Park Hospital NHS Foundation Trust	Frimley Park Hospital
Gateshead Health NHS Foundation Trust	Queen Elizabeth Hospital
George Eliot Hospital NHS Trust	George Eliot Hospital
Gloucestershire Hospitals NHS Foundation Trust	Cheltenham General Hospital
	Gloucestershire Royal Hospital
Great Western Hospitals NHS Foundation Trust	The Great Western Hospital
Guy's and St Thomas' NHS Foundation Trust	St Thomas' Hospital
Hampshire Hospitals NHS Foundation Trust	Basingstoke and North Hampshire Hospital
	Royal Hampshire County Hospital
Harrogate and District NHS Foundation Trust	Harrogate District Hospital
Heart of England NHS Foundation Trust	Birmingham Heartlands Hospital
	Good Hope Hospital
	Solihull Hospital
Heatherwood and Wexham Park Hospitals NHS Foundation Trust	Wexham Park Hospital
Hinchingbrooke Health Care NHS Trust	Hinchingbrooke Hospital

Trust	Unit
Homerton University Hospital NHS Foundation Trust	Homerton Hospital
Hull and East Yorkshire Hospitals NHS Trust	Hull Royal Infirmary and Castle Hill Hospital
Hywel Dda University Health Board	Bronglais General Hospital
	Prince Philip Hospital
	Glangwili General Hospital
	Withybush General Hospital
Imperial College Healthcare NHS Trust	Charing Cross Hospital
	Hammersmith Hospital
	St Mary's Hospital
Ipswich Hospital NHS Trust	Ipswich Hospital
Isle of Wight NHS Trust	St Mary's Hospital
James Paget University Hospitals NHS Foundation Trust	James Paget University Hospital
Kettering General Hospital NHS Foundation Trust	Kettering General Hospital
King's College Hospital NHS Foundation Trust	King's College Hospital
	Princess Royal University Hospital
Kingston Hospital NHS Trust	Kingston Hospital
Lancashire Teaching Hospitals NHS Foundation Trust	Chorley and South Ribble Hospital
	Royal Preston Hospital
Lewisham and Greenwich NHS Trust	Lewisham Hospital
	Queen Elizabeth Hospital
Luton and Dunstable University Hospital NHS Foundation Trust	Luton and Dunstable Hospital
Maidstone and Tunbridge Wells NHS Trust	Maidstone Hospital
	Tunbridge Wells Hospital
Medway NHS Foundation Trust	Medway Maritime Hospital
Mid Cheshire Hospitals NHS Foundation Trust	Leighton Hospital
Mid Essex Hospital Services NHS Trust	Broomfield Hospital
Mid Staffordshire NHS Foundation Trust	Stafford Hospital
Milton Keynes Hospital NHS Foundation Trust	Milton Keynes Hospital
Norfolk and Norwich University Hospitals NHS Foundation Trust	Norfolk and Norwich University Hospital
North Bristol NHS Trust	Frenchay Hospital and Southmead Hospital
North Cumbria University Hospitals NHS Trust	Cumberland Infirmary
	West Cumberland Hospital
North Middlesex University Hospital NHS Trust	North Middlesex University Hospital
North Tees and Hartlepool NHS Foundation Trust	University Hospital of North Tees
Northampton General Hospital NHS Trust	Northampton General Hospital
Northern Devon Healthcare NHS Trust	North Devon District Hospital
Northern Lincolnshire and Goole Hospitals NHS Foundation Trust	Diana, Princess of Wales Hospital
	Scunthorpe General Hospital

Trust	Unit
Northumbria Healthcare NHS Foundation Trust	Hexham General Hospital
	North Tyneside General Hospital
	Wansbeck General Hospital
Nottingham University Hospitals NHS Trust	Nottingham City Hospital
	Queens Medical Centre
Oxford Health NHS Foundation Trust	Abingdon Community Hospital
	Witney Community Hospital
Oxford University Hospitals NHS Trust	John Radcliffe Hospital, Churchill Hospital and Horton General Hospital
Peterborough and Stamford Hospitals NHS Foundation Trust	Peterborough City Hospital
Plymouth Hospitals NHS Trust	Derriford Hospital
Poole Hospital NHS Foundation Trust	Poole Hospital
Portsmouth Hospitals NHS Trust	Queen Alexandra Hospital
Royal Berkshire NHS Foundation Trust	Royal Berkshire Hospital
Royal Cornwall Hospitals NHS Trust	Royal Cornwall Hospital
Royal Devon and Exeter NHS Foundation Trust	Royal Devon and Exeter Hospital
Royal Free London NHS Foundation Trust	Royal Free Hospital
Royal Liverpool and Broadgreen University Hospitals NHS Trust	Royal Liverpool University Hospital
Royal Surrey County Hospital NHS Foundation Trust	Royal Surrey County Hospital
Royal United Hospital Bath NHS Trust	Royal United Hospital
Salford Royal NHS Foundation Trust	Salford Royal Hospital
Salisbury NHS Foundation Trust	Salisbury District Hospital
Sandwell and West Birmingham Hospitals NHS Trust	City Hospital
	Sandwell General Hospital
Sheffield Teaching Hospitals NHS Foundation Trust	Northern General Hospital
Sherwood Forest Hospitals NHS Foundation Trust	King's Mill Hospital
South Devon Healthcare NHS Foundation Trust	Torbay Hospital
South Tees Hospitals NHS Foundation Trust	Friarage Hospital
	The James Cook University Hospital
South Tyneside NHS Foundation Trust	South Tyneside District Hospital
South Warwickshire NHS Foundation Trust	Warwick Hospital
Southend University Hospital NHS Foundation Trust	Southend University Hospital
Southport and Ormskirk Hospital NHS Trust	Southport and Formby District General Hospital
St George's Healthcare NHS Trust	St George's Hospital
St Helens and Knowsley Teaching Hospitals NHS Trust	Whiston Hospital
Stockport NHS Foundation Trust	Stepping Hill Hospital
Surrey and Sussex Healthcare NHS Trust	East Surrey Hospital
Tameside Hospital NHS Foundation Trust	Tameside Hospital
Taunton and Somerset NHS Foundation Trust	Musgrove Park Hospital

Trust	Unit
The Dudley Group NHS Foundation Trust	Russells Hall Hospital
The Hillingdon Hospitals NHS Foundation Trust	Hillingdon Hospital
The Leeds Teaching Hospitals NHS Trust	St James's University Hospital
The Mid Yorkshire Hospitals NHS Trust	Dewsbury and District Hospital
	Pinderfields Hospital
The Newcastle upon Tyne Hospitals NHS Foundation Trust	Royal Victoria Infirmary and Freeman Hospital
The North West London Hospitals NHS Trust	Central Middlesex Hospital
	Northwick Park Hospital
The Pennine Acute Hospitals NHS Trust	Fairfield General Hospital
	North Manchester General Hospital
	The Royal Oldham Hospital
The Princess Alexandra Hospital NHS Trust	Princess Alexandra Hospital
The Queen Elizabeth Hospital King's Lynn NHS Foundation Trust	The Queen Elizabeth Hospital
The Rotherham NHS Foundation Trust	Rotherham Hospital
The Royal Bournemouth and Christchurch Hospitals NHS Foundation Trust	The Royal Bournemouth Hospital
The Royal Wolverhampton Hospitals NHS Trust	New Cross Hospital
The Shrewsbury and Telford Hospital NHS Trust	Princess Royal Hospital
	Royal Shrewsbury Hospital
The Whittington Hospital NHS Trust	The Whittington Hospital
United Lincolnshire Hospitals NHS Trust	Grantham and District Hospital
	Lincoln County Hospital
	Pilgrim Hospital
University College London Hospitals NHS Foundation Trust	University College Hospital
University Hospital of North Staffordshire NHS Trust	City General
University Hospital of South Manchester NHS Foundation Trust	Wythenshawe Hospital
University Hospital Southampton NHS Foundation Trust	Southampton General Hospital
University Hospitals Birmingham NHS Foundation Trust	Queen Elizabeth Hospital Birmingham
University Hospitals Bristol NHS Foundation Trust	Bristol Royal Infirmary
University Hospitals Coventry and Warwickshire NHS Trust	University Hospital
University Hospitals of Leicester NHS Trust	Glenfield Hospital
	Leicester Royal Infirmary
University Hospitals of Morecambe Bay NHS Foundation Trust	Furness General Hospital
	Royal Lancaster Infirmary
Walsall Healthcare NHS Trust	Manor Hospital
Warrington and Halton Hospitals NHS Foundation Trust	Warrington Hospital

Trust	Unit
West Hertfordshire Hospitals NHS Trust	Watford General Hospital
West Middlesex University Hospital NHS Trust	West Middlesex University Hospital
West Suffolk NHS Foundation Trust	West Suffolk Hospital
Western Sussex Hospitals NHS Foundation Trust	St Richard's Hospital
	Worthing Hospital
Weston Area Health NHS Trust	Weston General Hospital
Wirral University Teaching Hospital NHS Foundation Trust	Arrowe Park Hospital
Worcestershire Acute Hospitals NHS Trust	Alexandra Hospital
	Worcestershire Royal Hospital
Wrightington, Wigan and Leigh NHS Foundation Trust	Royal Albert Edward Infirmary
Wye Valley NHS Trust	Hereford County Hospital
Yeovil District Hospital NHS Foundation Trust	Yeovil District Hospital
York Teaching Hospital NHS Foundation Trust	Scarborough Hospital
	The York Hospital

Non-participating NHS acute unit

Trust	Unit
Betsi Cadwaladr University Health Board	Ysbyty Gwynedd

Appendix C: BTS online audit tool

Access to the BTS online audit tool was by individual username and password, after users had registered for access to the system and been approved by nominated BTS head office staff. The COPD audit web tool was only made available to users who had been specifically granted access to this audit.

Existing users of the BTS audit system who had registered for the COPD audit were granted access to the COPD audit tool upon receipt of approval from their Caldicott Guardian. Additional auditors were required to register as users for the BTS audit system, and were approved for access to the COPD audit tool on request (subject to receipt of Caldicott Guardian approval).

Audit participants (users) would normally only be able to access data for their unit. However, some users who participated in the audit for more than one unit within their trust were allowed to access more than one unit within their trust if necessary.

The landing page for the COPD audit set out the key instructions for the audit, and contained contact details for the BTS project team and the RCP website. Communication about the audit was primarily by email to those who had registered for the audit or subsequently registered for access to the COPD audit tool.

User from each unit would create new records using the 'Add a new record' function. Other registered users for that unit could access and edit the record, but only the auditor who created the record could commit or delete it.

Data entry comprised 'clicking' in the box next to the question being answered and typing the answer or selecting one or more appropriate answers from the lists provided. 'Help note' icons beside questions contained clarification and suggestions for sources of data, where appropriate.

The clinical audit questions were divided into six sections, indicated by tabs across the top of the screen: general information; provision of timely care; recording key clinical information; managing respiratory failure; inpatient stay; and integrating care..

Text in the section tabs turned from red, when data entry was incomplete, to black when the section had been completed. Users could move between sections using the 'Previous section' or 'Next section' icons, but if they tried to move on from a section that was incomplete, they would receive a warning message.

The record could be saved and returned to at any point by clicking the 'Save' or 'Save & close' icons. When the record was complete, this was confirmed by clicking 'Commit submissions'. Only committed data went forward for analysis.

After the record was committed, it could not be edited. However, BTS head office staff could uncommit records if corrections were needed. (BTS head office staff could commit or uncommit records on request, but they would not make any corrections or delete data.)

Appendix D

National COPD Audit Programme governance

The National COPD Audit Programme is led by the Clinical Effectiveness and Evaluation Unit of the Royal College of Physicians (RCP), working in partnership with the British Thoracic Society (BTS), the British Lung Foundation (BLF), the Primary Care Respiratory Society UK (PCRS-UK) and the Royal College of General Practitioners (RCGP).

The programme is guided by a programme board, consisting of programme delivery partners, and a wider programme steering group (membership listed below). Both groups are chaired by Professor Mike Roberts, overall clinical lead for the programme. Within the programme, each workstream is led by a dedicated clinical lead and workstream advisory group.

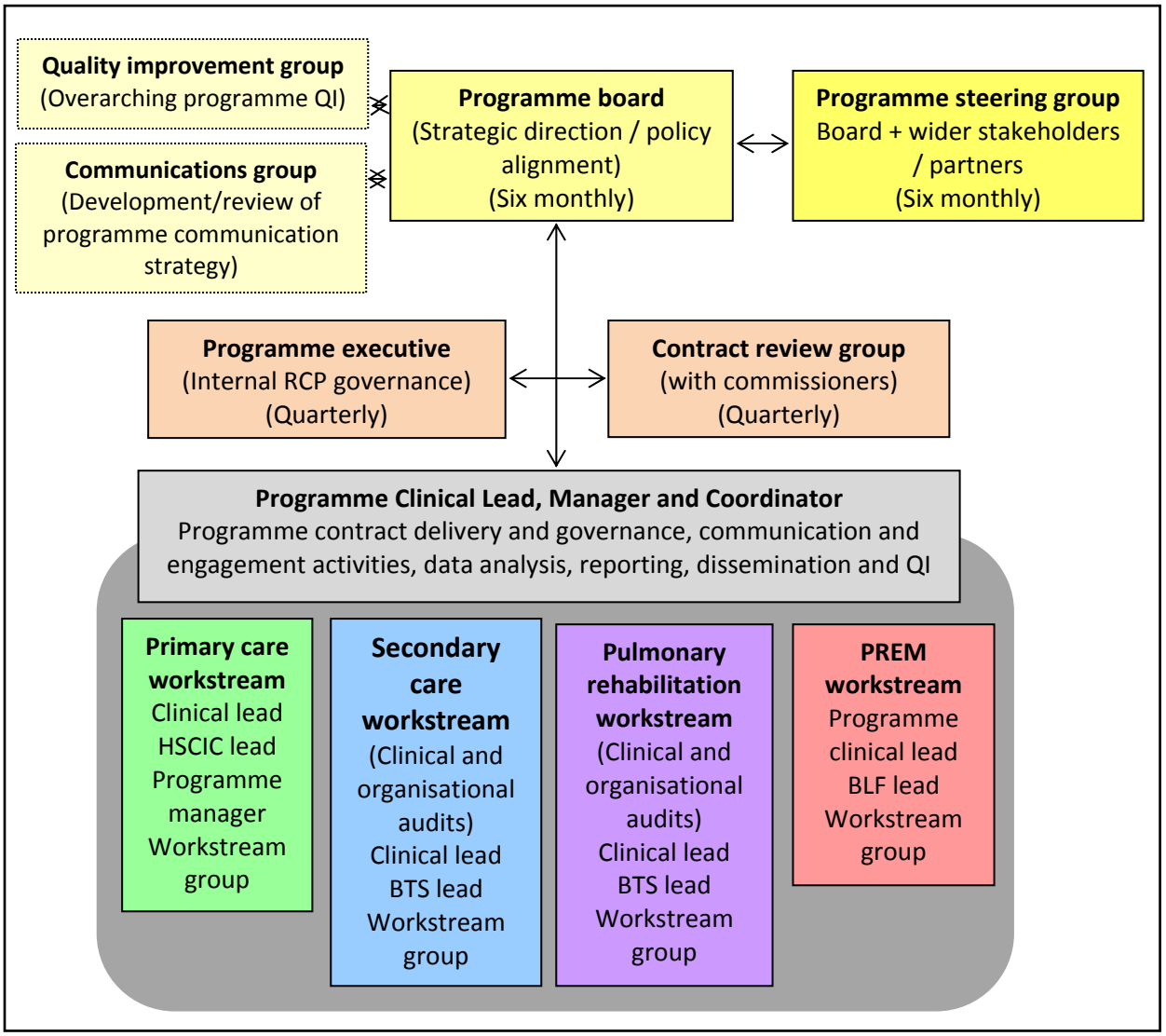


Fig 2: National COPD Audit Programme governance structure

- The programme board meets at least twice yearly, to provide strategic direction and to ensure that the National COPD Audit Programme achieves its objectives. It comprises the programme and workstream clinical leads, and representatives from the programme delivery team (RCP, BTS, BLF and HSCIC).

- The programme steering group meets twice yearly, to ensure the National COPD Audit Programme's relevance to those receiving and delivering COPD services in England and Wales. It comprises the programme strategic partners and wider representation from organisations such as the Royal College of Nursing (RCN), the Association of Respiratory Nurse Specialists (ARNS), NHS Wales and Picker Institute Europe.

- The workstream advisory groups are tasked with the development and day-to-day running of their specific element of the programme: thus the secondary care audit workstream group has developed, tested and implemented the clinical audit of COPD exacerbations admitted to acute units in England and Wales 2014, along with the organisational audit, drawing its membership from the steering group supported by expert representatives from respiratory medicine, nursing and NHS England Patient Experience. The workstream group meets quarterly or as necessary to monitor progress, and to support and direct the project. The BTS project team and secondary care clinical lead have met weekly throughout the project.

The National COPD Audit Programme is commissioned by the Healthcare Quality Improvement Partnership (HQIP) as part of the National Clinical Audit Programme (NCA).

Any enquiries in relation to the National COPD Audit Programme should be directed to COPD@rcplondon.ac.uk.

National COPD Audit Programme board members

Programme clinical leadership

- Professor C Michael Roberts, National COPD Audit Programme – Programme Clinical Lead; and Consultant Respiratory Physician, Whipps Cross University Hospital NHS Trust, Barts Health, Barts and The London School of Medicine and Dentistry, Queen Mary University of London
- Dr Rupert Jones, National COPD Audit Programme Clinical Lead – Primary Care Workstream; Clinical Research Fellow, Centre for Clinical Trials and Population Research, Plymouth University Peninsula School of Medicine and Dentistry; and General Practitioner
- Professor Michael Steiner, National COPD Audit Programme Clinical Lead – Pulmonary Rehabilitation Workstream; Honorary Clinical Professor at Loughborough University; and Consultant Respiratory Physician, Glenfield Hospital, Leicester
- Dr Robert A Stone, National COPD Audit Programme Clinical Lead – Secondary Care Workstream; and Consultant Respiratory Physician, Taunton and Somerset NHS Foundation Trust, Musgrove Park Hospital, Taunton

British Thoracic Society

- Miss Sally Welham, Deputy Chief Executive and BTS Project Lead for the National COPD Secondary Care Audit
- Ms Laura Searle, National COPD Audit Project Coordinator

British Lung Foundation

- Dr Penny Woods, Chief Executive
- Mr Mike McKevitt, Head of Patient Services

Health and Social Care Information Centre

- Mr Dominic Povey, Operations Manager, Clinical Audit Support Unit (CASU)

Royal College of Physicians

- Rhona Buckingham, Operations Director, Clinical Effectiveness and Evaluation Unit, Clinical

Standards Department
- Mr Ian Bullock, Clinical Standards Director, Clinical Standards Department; and Chief Operating Officer, National Clinical Guidelines Centre
- Ms Juliana Holzhauer-Barrie, National COPD Audit Programme Coordinator, Clinical Effectiveness and Evaluation Unit, Clinical Standards Department
- Mrs Emma Skipper, National COPD Audit Programme Manager, Clinical Effectiveness and Evaluation Unit, Clinical Standards Department
- Dr Kevin Stewart, Clinical Director, Clinical Effectiveness and Evaluation Unit, Clinical Standards Department

National COPD Audit Programme steering group members

Programme clinical leadership
- Professor C Michael Roberts, National COPD Audit Programme – Programme Clinical Lead; and Consultant Respiratory Physician, Whipps Cross University Hospital NHS Trust, Barts Health, Barts and The London School of Medicine and Dentistry, Queen Mary University of London
- Dr Rupert Jones, National COPD Audit Programme Clinical Lead – Primary Care Workstream; Clinical Research Fellow, Centre for Clinical Trials and Population Research, Plymouth University Peninsula School of Medicine and Dentistry; and General Practitioner
- Professor Michael Steiner, National COPD Audit Programme Clinical Lead – Pulmonary Rehabilitation Workstream; Honorary Clinical Professor, Loughborough University; and Consultant Respiratory Physician, Glenfield Hospital, Leicester
- Dr Robert A Stone, National COPD Audit Programme Clinical Lead – Secondary Care Workstream; and Consultant Respiratory Physician, Taunton and Somerset NHS Foundation Trust, Musgrove Park Hospital, Taunton.

Association of Chartered Physiotherapists in Respiratory Care
- Ms Catherine Thompson, Association of Chartered Physiotherapists in Respiratory Care (ACPRC) Chair; and Head of Patient Experience for Acute Services, NHS England

British Thoracic Society
- Ms Laura Searle, National COPD Audit Project Coordinator
- Dr Nick Hopkinson, Clinical Senior Lecturer, the National Heart and Lung Institute of Imperial College, London; Honorary Consultant Chest Physician, Royal Brompton Hospital, London; and Reader in Respiratory Medicine, Royal Brompton Hospital, London
- Miss Sally Welham, Deputy Chief Executive; and BTS Project Lead for the National COPD Secondary Care Audit

British Lung Foundation
- Dr Penny Woods, Chief Executive
- Mr Mike McKevitt, Head of Patient Services

Health and Social Care Information Centre
- Ms Emma Adams, Clinical Audit Project Lead, Clinical Audit Support Unit (CASU) (from May 2014)
- Mr Ala Uddin, Clinical Audit Project Lead, Clinical Audit Support Unit (CASU) (to May 2014)

Healthcare Quality Improvement Partnership
- Ms Yvonne Silove, National Clinical Audit Development Manager

NHS England

- Mr Alex Porter, Clinical Informatics Network Support Manager, Medical Directorate, NHS England

NHS Wales

- Dr Patrick Flood-Page, Welsh Health Boards Representative; Consultant Respiratory Physician, Royal Gwent Hospital; Chair of the British Lung Foundation in Wales; Lecturer at Cardiff University; Training Programme Director for Respiratory Medicine at the Wales Deanery; and part of the Royal College Specialist Advisory Committee for Respiratory Medicine

Patient Representative

- Ms Suzie Shepherd, Lay Chair of the RCP Patient Involvement Unit; Chair of Leeds Occupational Health Advisory Service; Patient Advisor to the Leeds Rheumatology Scientific Advisory Board; Vice Chair of the Clinical Accreditation Alliance; and Patient Lead on the RCP Future Hospitals Programme

Picker Institute Europe

- Mr Chris Graham, Director of Research and Policy

Primary Care Respiratory Society UK

- Dr Rupert Jones, Primary Care Respiratory Society UK Executive and Research Lead; National COPD Audit Programme Clinical Lead – Primary Care Workstream; Clinical Research Fellow, Centre for Clinical Trials and Population Research, Plymouth University Peninsula School of Medicine and Dentistry; and General Practitioner

Royal College of Nursing

- Ms Caia Francis, Senior Lecturer, Nursing and Midwifery Department, Faculty of Health and Applied Sciences, University of the West of England

Royal College of Physicians

- Rhona Buckingham, Operations Director, Clinical Effectiveness and Evaluation Unit, Clinical Standards Department
- Ms Jane Ingham, Clinical Standards Director, Clinical Standards Department (to November 2014)
- Mr Ian Bullock, Clinical Standards Director, Clinical Standards Department; and Chief Operating Officer, National Clinical Guidelines Centre (from April 2014)
- Ms Juliana Holzhauer-Barrie, National COPD Audit Programme Coordinator, Clinical Effectiveness and Evaluation Unit, Clinical Standards Department
- Professor Derek Lowe, Medical Statistician, Clinical Standards Department
- Mrs Emma Skipper, National COPD Audit Programme Manager, Clinical Effectiveness and Evaluation Unit, Clinical Standards Department
- Dr Kevin Stewart, Clinical Director, Clinical Effectiveness and Evaluation Unit, Clinical Standards Department

Royal College of General Practitioners

- Dr Kevin Gruffydd-Jones, Respiratory Clinical Lead, Royal College of General Practitioners; Honorary Lecturer at University of Bath; and General Practitioner
- Ms Megan Lanigan, Programme Manager, Clinical Innovation and Research Centre (CIRC)
- Dr Imran Rafi, Chair of the Clinical Innovation and Research Centre (CIRC); and Senior Lecturer in Primary Care Education, St George's University of London; and General Practitioner

National COPD Audit Programme secondary care workstream group

- Dr Colin Gelder, Consultant Respiratory Physician, University Hospital, Coventry
- Ms Juliana Holzhauer-Barrie, National COPD Audit Programme Coordinator, Clinical Effectiveness and Evaluation Unit, Clinical Standards Department, Royal College of Physicians, London
- Dr John Hurst, Consultant and Senior Clinical Lecturer, UCL Medical School
- Professor Derek Lowe MSc, C.Stat Medical Statistician, Clinical Standards Department, Royal College of Physicians, London
- Dr Gill Lowrey, Consultant Respiratory Physician, Royal Derby Hospital
- Mr Mike McKevitt, Head of Patient Services, British Lung Foundation
- Ms Sam Prigmore, Respiratory Nurse Consultant, St George's Hospital, London
- Dr Louise Restrick, Consultant Respiratory Physician, Whittington Hospital
- Professor C Michael Roberts, National COPD Audit Programme – Programme Clinical Lead; and Consultant Respiratory Physician, Whipps Cross University Hospital NHS Trust, Barts Health, Barts and The London School of Medicine and Dentistry, Queen Mary University of London
- Dr Georgina Russell, Clinical Fellow, London
- Ms Laura Searle, National COPD Audit Project Coordinator, British Thoracic Society, London
- Mrs Emma Skipper, National COPD Audit Programme Manager, Clinical Effectiveness and Evaluation Unit, Clinical Standards Department, Royal College of Physicians, London
- Professor Michael Steiner, National COPD Audit Programme Clinical Lead – Pulmonary Rehabilitation Workstream; Honorary Clinical Professor at Loughborough University; and Consultant Respiratory Physician, Glenfield Hospital, Leicester
- Dr Robert A Stone, National COPD Audit Programme Clinical Lead – Secondary Care Workstream; and Consultant Respiratory Physician, Taunton and Somerset NHS Foundation Trust, Musgrove Park Hospital, Taunton
- Miss Sally Welham, BTS Deputy Chief Executive; and BTS Project Lead for the National COPD Secondary Care Audit, the British Thoracic Society, London
- Dr Penny Woods, Chief Executive, British Lung Foundation

Appendix E: NICE COPD Quality Standards (2011) (1)

1. People with COPD have one or more indicative symptom recorded and have the diagnosis confirmed by post-bronchodilator spirometry carried out on calibrated equipment by healthcare professionals competent in its performance and interpretation.

2. People with COPD have a current individualized comprehensive management plan, which includes high-quality information and educational material about the condition and its management, relevant to stage of disease.

3. People with COPD are offered inhaled and oral therapies, in accordance with NICE guidance, as part of an individualized comprehensive management plan.

4. People with COPD have a comprehensive clinical psychosocial assessment, at least once a year or more frequently if indicated, which includes degree of breathlessness, frequency of exacerbations, validated measures of health status and prognosis, presence of hypoxaemia and co-morbidities.

5. People with COPD who smoke are regularly encouraged to stop and are offered the full range of evidence-based smoking cessation support.

6. People with COPD meeting appropriate criteria are offered an effective, timely and accessible multidisciplinary pulmonary rehabilitation programme.

7. People who have had an exacerbation of COPD are provided with individualized written advice on early recognition of future exacerbations, management strategies (including appropriate provision of antibiotics and corticosteroids for self-treatment at home) and a named contact.

8. People with COPD potentially requiring long-term oxygen therapy are assessed in accordance with NICE guidance by a specialist oxygen service.

9. People with COPD receiving long-term oxygen therapy are reviewed in accordance with NICE guidance, at least annually, by a specialist oxygen service.

10. People admitted to hospital with an exacerbation of COPD are cared for by a respiratory team, and have access to a specialist early-supported discharge scheme with appropriate community support.

11. People admitted to hospital with an exacerbation and with persistent acidotic ventilatory failure are promptly assessed for, and receive, non-invasive ventilation delivered by appropriately trained staff in a dedicated setting.

12. People admitted to hospital with an exacerbation are reviewed within 2 weeks of discharge.

13. People with advanced COPD, and their carers, are identified and offered palliative care that addresses physical, social and emotional needs.

Appendix F: Glossary of terms and abbreviations

Admission bundle	An admission protocol setting out a limited number of evidence-based actions, which, if implemented, is likely to improve outcomes
An outcomes strategy for chronic obstructive pulmonary disease (COPD) and asthma in England	Sets out the outcomes that need to be achieved in COPD and asthma to deliver the government's commitment to improve health outcomes and reduce inequalities: Department of Health. *An outcomes strategy for chronic obstructive pulmonary disease (COPD) and asthma in England*. London: DH, 2011. www.gov.uk/government/uploads/system/uploads/attachment_data/file/216139/dh_128428.pdf
Audit	A process that measures care against set criteria, to identify where changes can be made to improve the quality of care
CCG	Clinical commissioning group
Chronic obstructive pulmonary disease (COPD)	A collection of lung diseases including chronic bronchitis, emphysema and chronic obstructive airways disease, which cause difficulties with breathing, primarily due to narrowing of the airways
DECAF score	DECAF is the acronym for a clinical scoring system developed from a number of admission variables (**d**yspnoea, **e**osinopenia, **c**onsolidation and **a**trial **f**ibrillation). It is of interest because it may be of use in predicting length of stay and mortality; it is still undergoing formal evaluation.
Discharge bundle	A discharge protocol setting out a limited number of evidence-based actions, which, if implemented, improve outcomes
Domains	The NHS Outcomes Framework sets out five domains focusing on improving health and reducing health inequality that the NHS should be aiming to improve: **Domain 1** – Preventing people from dying prematurely **Domain 2** – Enhancing quality of life for people with long-term conditions **Domain 3** – Helping people to recover from episodes of ill health or following injury **Domain 4** – Ensuring that people have a positive experience of care **Domain 5** – Treating and caring for people in a safe environment and protecting them from avoidable harm
Early/supported discharge scheme (EDS)	A service providing enhanced support to COPD patients in the community so that their discharge from hospital can be expedited and their management continued in primary care
HDU	High-dependency unit

Health communities	The loose collective term used to describe a locality in which healthcare is provided by groups of professionals to patients and their carers
ICT	Information and communications technology
ICU	Intensive care unit
Integrated care	The coordination of care across different health settings, notably between the primary and secondary care sectors, particularly for patients with complex or long-term conditions
Interquartile range (IQR)	The IQR is the range between 25th and 75th centile which is equivalent to the middle half of all values
ITU	Intensive treatment/therapy unit
Kappa coefficient	In the context of this audit the Kappa coefficient of agreement is a statistic that measures the agreement between two auditors independently sourcing and entering categorical data. Kappa values of 0.61-0.80 are generally regarded as reflecting 'good' agreement and values 0.81-1.00 as 'very good' agreement. In practice, any value of kappa much below 0.50 will indicate inadequate agreement. Note that kappa can be negative, and although this is unlikely in practice, negative values would imply that agreement is worse than that expected by chance. The kappa statistic does not measure the nature of any disagreement between auditors, and for this the raw data tables need to be inspected. Any future attempt to improve on the reliability of any audit item (ie when planning a repeat audit) will bear most fruit if it focuses on the more frequent discrepancies in judgement.
Level 2 care	Care for patients requiring more detailed observation or intervention, including support for a single failing organ system or postoperative care, and those 'stepping down' from higher levels of care
MAU	Medical assessment unit/Medical admissions unit
Mean	The mean is the average value of the data (ie the data values are added together and then divided by the number of data items)
Median	The median is the middle point of a data set: half of the values are below this point, and half are above this point
Multidisciplinary team (MDT)	Several types of health professionals working together, eg physiotherapists, occupational therapists, dieticians, nurses and doctors
NICE guideline on COPD	Guidance for the care and treatment of people with COPD in the NHS in England and Wales: http://guidance.nice.org.uk/CG101 (NICE, 2010)
NICE quality standard for COPD	Defines clinical best practice within this topic area, covering the assessment, diagnosis and clinical management of COPD in adults: http://guidance.nice.org.uk/QS10 (NICE, 2011)
Non-invasive ventilation (NIV)	Breathing support provided in hospital or at home via a face

	mask that delivers a slightly pressurised airflow
Palliative care	Treating symptoms at the end of life
Primary care	Local healthcare delivered by GPs, NHS walk-in centres and others, which is provided and managed by CCGs
Pulmonary rehabilitation	A programme, typically including patient education, exercise training and advice, which is designed to improve the health of patients with chronic breathing problems including COPD
Respiratory ward	The area within a unit where patients with respiratory conditions are nursed and cared for by the respiratory team
Secondary care	Planned and unplanned care that is provided in hospitals
Specialist	A clinician whose practice is limited to a particular branch of medicine or surgery, especially one who is certified by a higher educational organisation
Spirometry	A test measuring lung function, specifically the amount (volume) and/or speed (flow) of air that can be exhaled, and which is used to diagnose COPD
SpR	Specialist registrar – a middle-grade doctor training to be a consultant
Unit	For the purposes of this audit, a hospital that admitted acute unselected emergency COPD admissions, although some hospitals submitted data jointly as a single unit
Whole-time equivalent (WTE)	A measurement of staff resource where 1 person working full time is 1 WTE, a person working 2 days per week is 0.4 WTE, etc

Appendix G: References

1. National Institute for Health and Clinical Excellence. *Chronic obstructive pulmonary disease quality standard (QS10)*. London: NICE, 2011. www.nice.org.uk/Guidance/QS10

2. Department of Health, Medical Directorate, Respiratory Team. *An outcomes strategy for chronic obstructive pulmonary disease (COPD) and asthma in England*. London: DH, 2011. www.gov.uk/government/publications/an-outcomes-strategy-for-people-with-chronic-obstructive-pulmonary-disease-copd-and-asthma-in-england

3. NHS England. *NHS Outcomes Framework – 5 domains resources* [accessed January 2015]. www.england.nhs.uk/resources/resources-for-ccgs/out-frwrk/

4. British Thoracic Society. *Guideline for emergency oxygen use in adult patients*. London: BTS, 2008. www.brit-thoracic.org.uk/guidelines-and-quality-standards/emergency-oxygen-use-in-adult-patients-guideline/

5. British Thoracic Society. *The use of non-invasive ventilation in the management of patients with chronic obstructive pulmonary disease admitted to hospital with acute type II respiratory failure*. London: BTS, 2008. www.brit-thoracic.org.uk/document-library/clinical-information/niv/niv-guidelines/the-use-of-non-invasive-ventilation-in-the-management-of-patients-with-copd-admitted-to-hospital-with-acute-type-ii-respiratory-failure/

6. British Thoracic Society. *BTS guideline on pulmonary rehabilitation in adults*. London: BTS, 2013. www.brit-thoracic.org.uk/guidelines-and-quality-standards/pulmonary-rehabilitation-guideline/

7. National Institute for Health and Clinical Excellence. *Chronic obstructive pulmonary disease: Management of chronic obstructive pulmonary disease in adults in primary and secondary care (partial update) (CG101)*. London: NICE, 2010. www.nice.org.uk/guidance/CG101

8. Stone RA, Holzhauer-Barrie J, Lowe D, Searle L, Skipper E, Welham S, Roberts CM. *COPD: Who cares? National Chronic Obstructive Pulmonary Disease (COPD) Audit Programme: Resources and organisation of care in acute NHS units in England and Wales 2014. National organisational audit report.* London: RCP, November 2014. www.rcplondon.ac.uk/sites/default/files/national_copd_secondary_care_organisational_audit_2014_national_report_web.pdf

9. Respiratory Futures. Working together for better lung health. 2014. www.respiratoryfutures.org.uk/ [accessed January 2015]

10. Steer J, Gibson J, Bourke SC. The DECAF score: predicting hospital mortality in exacerbations of chronic obstructive pulmonary disease. *Thorax* 2012;67:970–6. http://thorax.bmj.com/content/early/2012/08/14/thoraxjnl-2012-202103.abstract

For further information on the overall audit programme or any of the workstreams, please see our website or contact the national COPD team directly:

National Chronic Obstructive Pulmonary Disease (COPD) Audit Programme
Clinical Effectiveness and Evaluation Unit
Royal College of Physicians,
11 St Andrews Place,
Regent's Park, London NW1 4LE

Tel: +44 (020) 3075 1502
Email: copd@rcplondon.ac.uk
www.rcplondon.ac.uk/copd

#COPDaudit #COPDwhocares? #COPDwhocaresmatters

We also have a quarterly newsletter, so please send us your email address and contact details if you would like to join the mailing list.

Commissioned by:

HQIP
Healthcare Quality Improvement Partnership