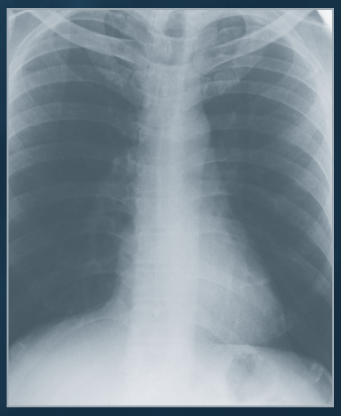
National COPD Audit Programme



COPD: Working together

National Chronic Obstructive Pulmonary Disease (COPD) Audit Programme: Clinical audit of COPD exacerbations admitted to acute hospitals in England and Wales 2017

Data analysis and methodology
April 2018

Prepared by:

Royal College of Physicians

Imperial College London

In partnership with:

PCRS Primary Care Respiratory Society UK

British Lung Foundation

British Thoracic Society

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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 over 34,000 fellows and members worldwide, the RCP advises and works with government, patients, allied healthcare professionals and the public to improve health and healthcare.

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

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Contents

How to use this report

This report presents the results from an extensive analysis of the data from the clinical component of the National Chronic Obstructive Pulmonary Disease (COPD) Audit Programme's secondary care audit. Details of the methodology employed are also provided (Appendix C).

The continuous audit, which captures the process and clinical outcomes of treatment in patients admitted to hospital in England and Wales with COPD exacerbations, launched on 1 February 2017. This report, which is the first report post launch of continuous data collection, presents the results of the cohort of patients discharged between the audit's launch date and 13 September 2017. In order for the report to be published in line with the National COPD Audit Programme's contract end date, the data were extracted prior to completion of a full year of data collection. Consequently, this report presents the results of a slightly truncated patient cohort.

References to the appropriate National Institute for Health and Care Excellence (NICE) quality statements[a,b] (Appendix D) and clinical guidelines[c] (Appendix E) are inserted throughout the key findings.

The data are presented largely in tabular form with explanatory notes where appropriate. Although these data are available to the interested reader, it is not necessary to review them to appreciate the key messages, which can be found in the national report (via www.rcplondon.ac.uk/working-together). Direct comparisons to 2014 audit data have been provided, where appropriate. Where in some instances data is not directly comparable, 2014 data have been presented in a separate table beneath the 2017 audit data.

Copies of our datasets, our good practice repository as well as the resources supplied for both the clinical and organisational audits can be found via our website: www.rcplondon.ac.uk/projects/outputs/secondary-care-audit-2017-resources.

The Best practice tariff (BPT) for COPD is in place for the financial years 2017/18 and 2018/19 for trusts in England. Publically available BPT quarterly and year to date reports can be downloaded online from: www.nacap.org.uk/nacap/welcome.nsf/reportsSC.html . In the future regional reports will also be made available on a six monthly basis.

If you would like to discuss any of the findings or recommendations in more detail with other participants, or you have ideas you would like to share, you can log into our audit forum on the Respiratory Futures website: www.respiratoryfutures.org.uk/copdsecondarycareauditforum/.

[a] National Institute for Health and Care Excellence. *Chronic obstructive pulmonary disease in adults*. NICE Quality standard 10 (QS10). London: NICE, 2016. www.nice.org.uk/Guidance/QS10 [Accessed December 2017].
[b] National Institute for Health and Care Excellence. *Chronic obstructive pulmonary disease in adults*. NICE Quality standard 10 (QS10). 2011 edition. London: NICE, 2011. www.nice.org.uk/Guidance/QS10 [Accessed December 2017].
[c] National Institute for Health and Care Excellence. *Chronic obstructive pulmonary disease in over 16s: diagnosis and management* (partial update). NICE Clinical Guideline 101 (CG101). London: NICE, 2010. www.nice.org.uk/guidance/CG101 [Accessed December 2017].

Section 1: General information

Back to contents

Key findings

Admissions/discharge

- The median **time from arrival to admission** was **3.4 hours**.[d]
    - **Admission rates** for COPD were **greater during weekdays** than at weekends. The **highest percentage** of admissions were on a **Monday (15.7%)**.[e]
- As per the results of the 2014 audit, **fewer patients** were **discharged on a weekend** (8.4% on a Saturday and 6.4% on a Sunday in 2017, 7% on a Saturday and 5% on a Sunday in 2014), in comparison to during the weekday (for example, 15.9% on a Monday and 17.8% on a Tuesday in 2017, 16% on a Monday and 19% on a Tuesday in 2014).

Length of stay

- The **median length of stay** remained unchanged from that reported in 2014, at **4 days**.

Mortality

- **Inpatient mortality fell** marginally (3.9% reported in 2017 vs 4.3% reported in 2014).

For the full key findings and recommendations, please see the national report COPD: Working together, available at www.rcplondon.ac.uk/working-together

Navigation

This section contains the following tables and graphs. If you are viewing this report on a computer, you can select the table that you wish to see from the list below.

1.1 Age

Age at admission	2017 (N=36,341)	2014 (N=13,414)
Mean	71.9	72
Standard deviation	10.7	11
Median	73.0	72
Interquartile range	65–80	65–80

[d] There is no comparative data from 2014, as only date and time of admission were captured in that audit (ie not of arrival).
[e] Comparative data from 2014 cannot be reported here as admission was calculated from time recorded of arrival to the unit.

1.2 Gender

Gender	2017 (N=36,341)	2014 (N=13,414)
Male	46.9% (17,046)	49% (6,572)
Female	53.1% (19,295)	51% (6,842)

1.3 Socioeconomic status

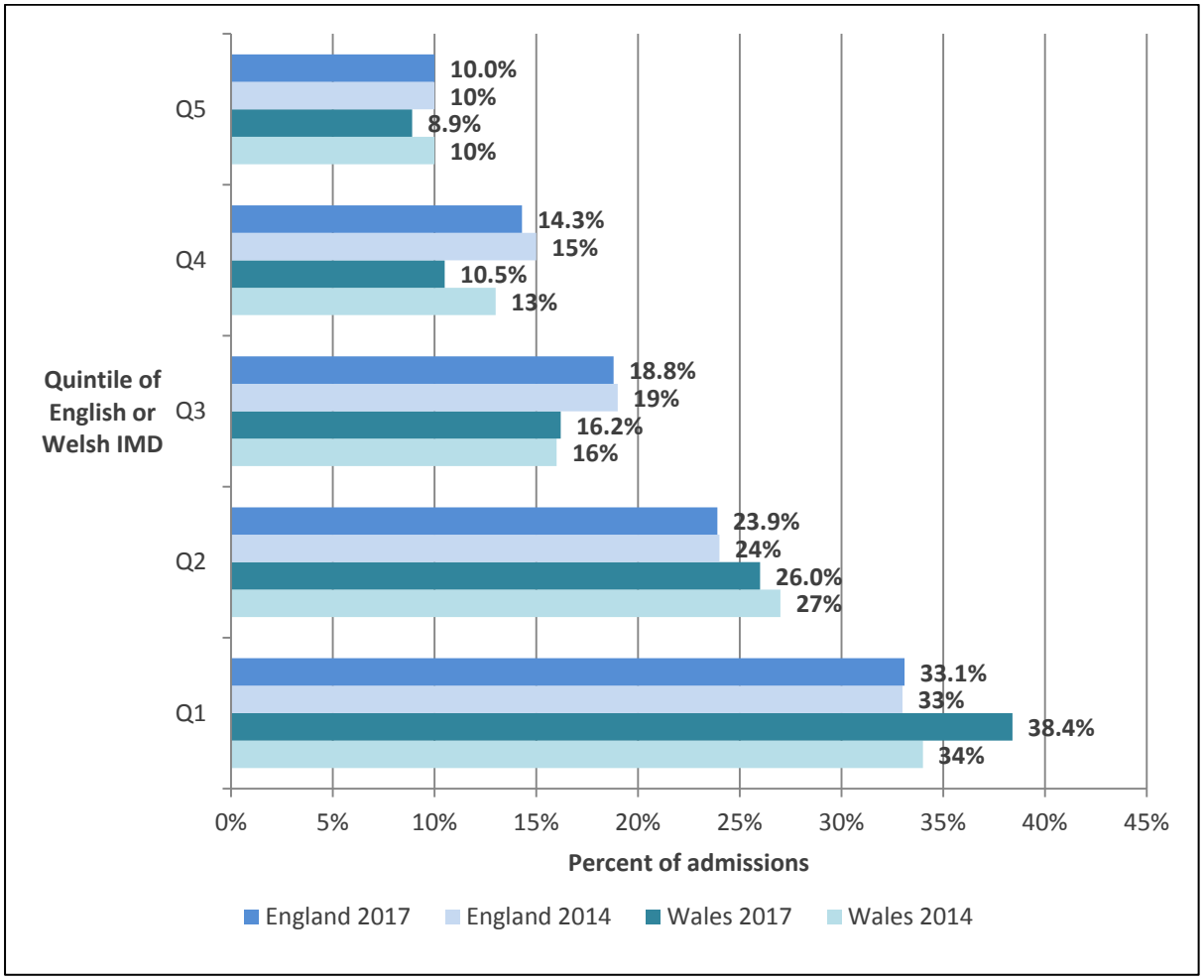
1.3.1 Index of Multiple Deprivation measures by national quintile in England

	% of audit sample living in an English Lower-layer Super Output Area (LSOA)				
Index of Multiple Deprivation	Q1 (Most deprived)	Q2	Q3	Q4	Q5 (Least deprived)
England 2017 (N=34,327)	33.1% (11,363)	23.9% (8,196)	18.8% (6,452)	14.3% (4,902)	10.0% (3,414)
England 2014 (N=12,245)	33% (4,006)	24% (2,895)	19% (2,282)	15% (1,804)	10% (1,258)

1.3.2 Index of Multiple Deprivation measures by national quintile in Wales

	% of audit sample living in a Welsh Lower-layer Super Output Area (LSOA)				
Index of Multiple Deprivation	Q1 (Most deprived)	Q2	Q3	Q4	Q5 (Least deprived)
Wales 2017 (N=1,664)	38.4% (639)	26.0% (433)	16.2% (269)	10.5% (175)	8.9% (148)
Wales 2014 (N=829)	34% (283)	27% (224)	16% (135)	13% (108)	10% (79)

Deprivation quintile of admissions to hospital with a COPD exacerbation in England and Wales



1.4 Admission[f]

1.4.1 Average number of admissions per hospital

Number of admissions	2017 (N=36,341)	2014 (N=13,414)
Mean	201.8	Not reported
Standard deviation	144.1	Not reported
Median	179	61
Interquartile range	94–263	38–85

1.4.2 Age at admission by gender

	2017 (N=36,341)		2014 (N=13,414)	
Age at admission by gender	**Male (N=17,046)**	**Female (N=19,295)**	**Male (N=6,572)**	**Female (N=6,842)**
Mean	72.1	71.8	72	72
Standard deviation	10.6	10.9	Not reported	Not reported

[f] Question 1.6 from the dataset was: Date of and time of [patient] arrival at your hospital, and question 1.7 was: Date and time of [patient] admission to the unit. Therefore 1.4 here combines questions 1.6 and 1.7 from the dataset.

1.4.3 Average time, in hours, between arrival and admission

Time of arrival to admission, in hours	2017 (N=36,341)
Mean	3.9
Standard deviation	3.6
Median	3.4
Interquartile range	1.2–5.1

1.4.4 Day and time of admission to hospital

	Day patient admitted (N=36,341)						
Time admitted	Monday (N=5,710)	Tuesday (N=5,463)	Wednesday (N=5,472)	Thursday (N=5,385)	Friday (N=5,260)	Saturday (N=4,433)	Sunday (N=4,618)
00.00–01.59	7.2% (409)	8.2% (447)	8.1% (442)	7.4% (396)	8.4% (442)	9.0% (397)	8.6% (396)
02.00–03.59	5.5% (312)	6.8% (373)	6.5% (356)	6.3% (341)	6.2% (325)	8.2% (363)	6.9% (320)
04.00–05.59	4.4% (250)	5.0% (274)	4.4% (241)	4.6% (250)	4.5% (238)	6.3% (277)	5.4% (250)
06.00–07.59	3.7% (210)	4.0% (219)	3.9% (214)	4.0% (213)	3.9% (206)	4.0% (177)	4.3% (198)
08.00–09.59	5.4% (308)	5.3% (289)	5.5% (300)	4.9% (266)	4.9% (255)	5.9% (262)	5.3% (243)
10.00–11.59	7.4% (423)	8.2% (447)	7.3% (398)	7.7% (414)	7.8% (410)	7.9% (349)	7.7% (355)
12.00–13.59	9.9% (566)	9.8% (534)	9.3% (509)	9.2% (495)	9.3% (490)	8.7% (386)	9.2% (423)
14.00–15.59	12.4% (710)	11.8% (644)	11.6% (637)	12.1% (652)	11.7% (617)	10.7% (474)	10.9% (504)
16.00–17.59	12.5% (716)	11.9% (649)	11.8% (647)	13.3% (717)	11.5% (604)	10.2% (452)	12.1% (557)
18.00–19.59	12.1% (692)	11.1% (608)	11.5% (629)	11.5% (619)	10.8% (566)	10.0% (442)	9.7% (450)
20.00–21.59	9.4% (537)	9.5% (521)	9.9% (539)	9.3% (502)	10.1% (532)	9.7% (431)	9.7% (450)
22.00–23.59	10.1% (577)	8.4% (458)	10.2% (560)	9.7% (520)	10.9% (575)	9.5% (423)	10.2% (472)

Section 2: Provision of timely care

Back to contents

Key findings

Acute physician review *(NICE [CG101] 1.1.8.2)*

- **82.3% of admissions** were reviewed by an acute physician of grade specialty trainee 3 (ST3) or above.[g]

Respiratory specialist review *(NICE [QS10], statement 10, 2011)*

- **78% of admissions** were reviewed by a member of the **respiratory team**.
- The median time from admission to review by a member of the specialist respiratory team has reduced (16.2 hours in 2017, compared to 21 hours in 2014[h]).
- There was an improvement in the number of admissions **reviewed by a member of the respiratory team within 24 hours** (54.8% in 2017, compared to 49% in 2014).

For the full key findings and recommendations, please see the national report COPD: Working together, available at www.rcplondon.ac.uk/working-together

Navigation

This section contains the following tables and graphs. If you are viewing this report on a computer, you can select the table that you wish to see from the list below.

2.1 Acute physician review

2.1.1 Has the patient been reviewed by an acute physician of grade ST3 or above?

Review by an acute physician of grade ST3 or above	2017 (N=36,341)
No	12.8% (4,635)
Yes	82.3% (29,919)
Not recorded	4.9% (1,787)

[g] This was a new question in the 2017 dataset and, therefore, there is no comparative data from the 2014 audit.
[h] Seen by a respiratory consultant or a respiratory nurse/member of the COPD/respiratory team.

2.2 Respiratory team review

2.2.1 Has a member of the respiratory team reviewed the patient during the admission?

Respiratory team review during admission	2017 (N=36,341)	2014 (N=13,414)
No	22.0% (7,981)	20% (2,688)
Yes	78.0% (28,360)	77% (10,387)[i]
Not recorded	Not asked	3% (339)

2.2.2 Average time, in hours, from admission to respiratory team review

Time, in hours, from admission to respiratory team review	2017 (N=36,341)	2014 (N=8,884)[j]
Mean	27.0	Not reported
Standard deviation	50.3	Not reported
Median	16.2	21
Interquartile range	7.0–30.4	12–45

2.2.3 Day and time of review by a member of the respiratory team

	Day of review (N=28,360)						
Time of review	Monday (N=5,550)	Tuesday (N=5,059)	Wednesday (N=4,389)	Thursday (N=4,510)	Friday (N=4,450)	Saturday (N=2,339)	Sunday (N=2,063)
00.00–01.59	0.7% (39)	0.6% (31)	0.6% (28)	0.9% (41)	0.6% (26)	1.2% (27)	1.7% (34)
02.00–03.59	0.4% (21)	0.6% (32)	0.6% (24)	0.4% (19)	0.5% (23)	1.2% (28)	0.8% (16)
04.00–05.59	0.4% (21)	0.4% (21)	0.6% (28)	0.4% (20)	0.4% (17)	1.0% (24)	1.3% (26)
06.00–07.59	0.7% (37)	0.9% (44)	0.6% (25)	0.8% (35)	0.7% (32)	1.3% (30)	1.8% (37)
08.00–09.59	21.7% (1,206)	22.5% (1,136)	21.7% (953)	20.1% (907)	23.3% (1,035)	25.4% (594)	27.1% (560)
10.00–11.59	40.8% (2,266)	38.8% (1,962)	39.0% (1,712)	40.2% (1,813)	37.2% (1,655)	32.0% (749)	28.4% (585)
12.00–13.59	13.2% (733)	12.4% (625)	12.2% (537)	12.2% (548)	12.9% (575)	12.7% (296)	12.3% (253)
14.00–15.59	11.5% (639)	12.5% (630)	12.6% (553)	12.4% (560)	12.7% (563)	9.7% (226)	9.6% (198)
16.00–17.59	6.0% (331)	6.4% (323)	6.2% (272)	6.6% (296)	5.9% (261)	6.3% (148)	8.2% (170)
18.00–19.59	2.6% (143)	2.9% (148)	3.3% (144)	3.8% (171)	2.9% (128)	5.2% (121)	5.0% (103)
20.00–21.59	1.4% (75)	1.3% (68)	1.6% (72)	1.1% (51)	2.0% (91)	2.7% (62)	2.1% (43)
22.00–23.59	0.7% (39)	0.8% (39)	0.9% (41)	1.1% (49)	1.0% (44)	1.5% (34)	1.8% (38)

[i] Seen by a respiratory consultant or a respiratory nurse/member of the COPD/respiratory team
[j] Seen by a respiratory consultant or a respiratory nurse/member of the COPD/respiratory team

2.2.4 Was the patient reviewed by a member of the respiratory team within 24 hours?

Respiratory team review within 24 hours of admission	2017 (N=36,341)	2014 (N=10,387)
No	45.2% (16,414)	37% (3,789)
Yes	54.8% (19,927)	49% (5,095)
No time seen recorded	Not asked	15% (1,503)

Section 3: Recording key clinical information

Back to contents

Key findings

Oxygen prescription *(NICE [CG101] 1.3.6/NICE [QS10] statement 6)*

- There was a marginal improvement in the number of admissions being prescribed oxygen; **57.3% in 2017**, compared to 55% in 2014.

Spirometry *(NICE [CG101] 1.1.2/NICE [QS10] statement 1)*

- A clear problem was identified with the recording/noting of spirometry. A **spirometry result** was available for only **39.7% of admissions in 2017**, compared to 46% in 2014.
- Importantly, 12.4% of patient admissions in whom spirometry was recorded had no evidence of airflow obstruction ($FEV_1/FVC \geq 0.7$), despite being managed for COPD exacerbation.

Smoking cessation *(NICE [CG101] 1.2.1)*

- The recording of **smoking status** has not improved (**9.1% of admissions** in 2017 were **not asked** about their smoking status/it was not recorded by hospitals, compared to 8% in 2014).
- There was a **reduction** in the number of **self-reported current smokers** (31.3% in 2017, compared to 34% in 2014).

For the full key findings and recommendations, please see the national report COPD: Working together, available at www.rcplondon.ac.uk/working-together

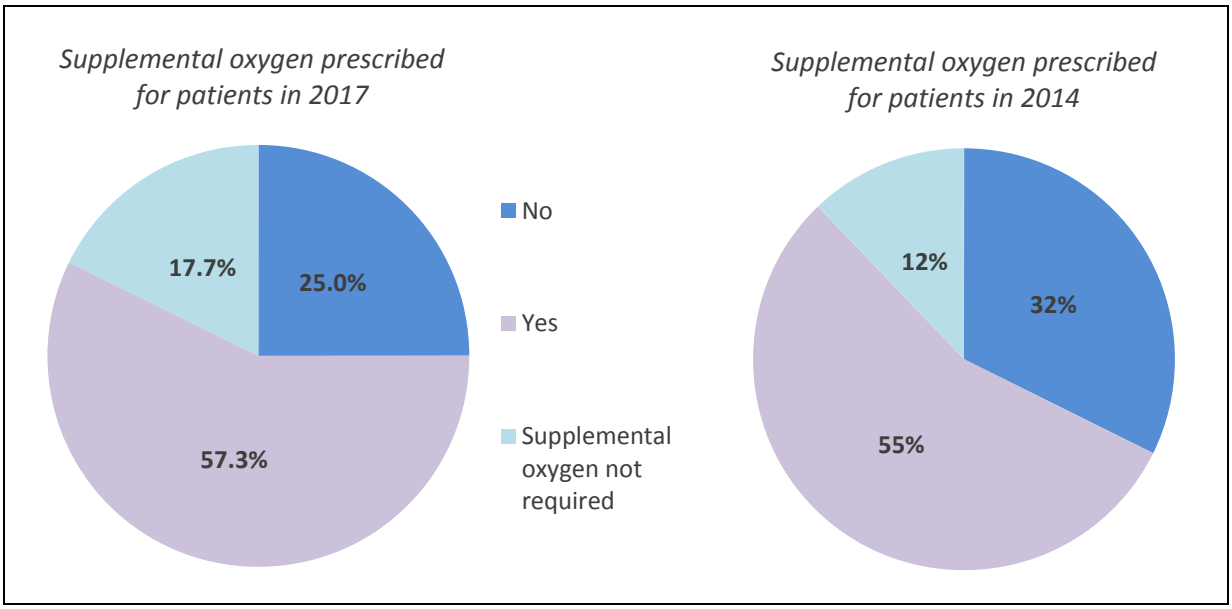
Navigation

This section contains the following tables and graphs. If you are viewing this report on a computer, you can select the table that you wish to see from the list below.

3.1. Oxygen

3.1.1 Was oxygen prescribed for this patient?

Oxygen prescribed	2017 (N=36,341)	2014 (N=13,414)[k]
No	25.0% (9,081)	32% (4,313)
Yes	57.3% (20,829)	55% (7,434)
Supplemental oxygen not required	17.7% (6,431)	12% (1,667)



3.1.2 If oxygen was prescribed was it to a stipulated target range?

Target range for oxygen prescription	2017 (N=20,829)	2014 (N=7,434)
88–92%	85.1% (17,733)	84% (6,251)
94–98%	8.2% (1,700)	8% (563)
Other	3.5% (729)	3% (230)
Target range not stipulated	3.2% (667)	2% (183)

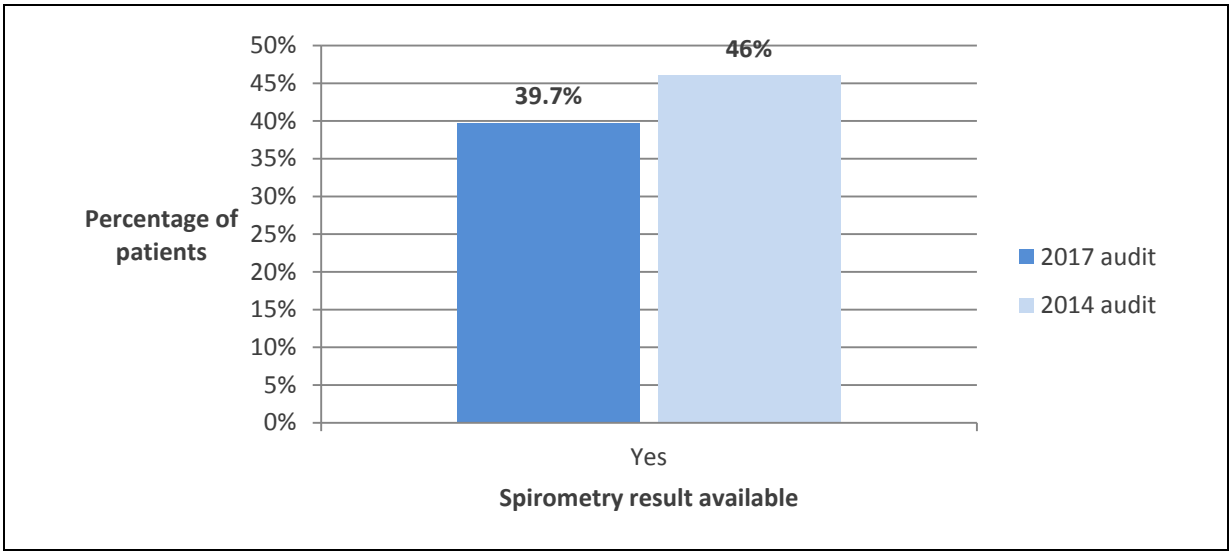
3.2 Spirometric evidence of COPD

3.2.1 Is a spirometry result available?

Spirometry result available	2017 (N=36,341)	2014 (N=13,414)
No	60.4% (21,931)	54% (7,291)
Yes	39.7% (14,410)	46% (6,123)

[k] In 2014 this question was asked as follows: *Was oxygen prescribed on the medication chart or equivalent during this admission?* The options to answer were: *yes, no,* and *not required*

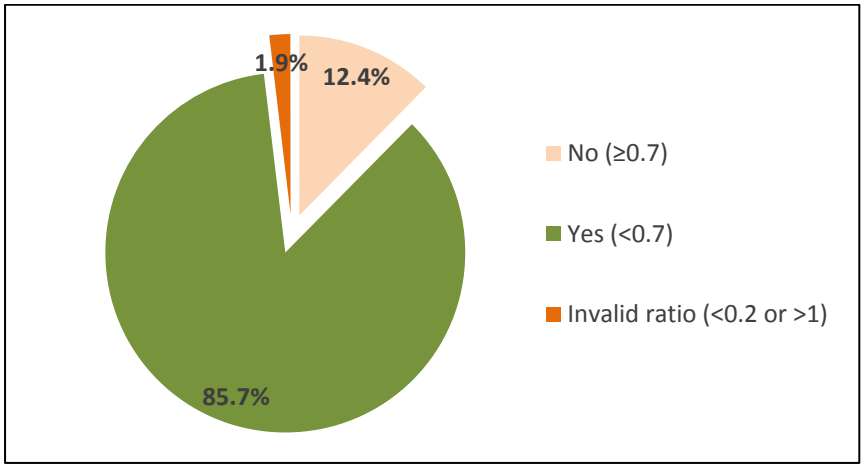
Availability of spirometry results for admissions in the 2017 and 2014 audits



3.2.2 Airflow obstruction[I]

Airflow obstruction (FEV_1/FVC ratio)	2017 (N=14,410)
No (≥0.7)	12.4% (1,783)
Yes (<0.7)	85.7% (12,354)
Invalid ratio (<0.2 or >1)	1.9% (273)

Evidence of airflow obstruction for those patients with a spirometry result recorded



3.2.3 If a spirometry result is available, what is the patients most recent FEV_1?

Patient's most recent FEV_1, in litres	2017 (N=14, 410)
Mean	1.1
Standard deviation	0.6
Median	0.9
Interquartile range	0.7–1.3

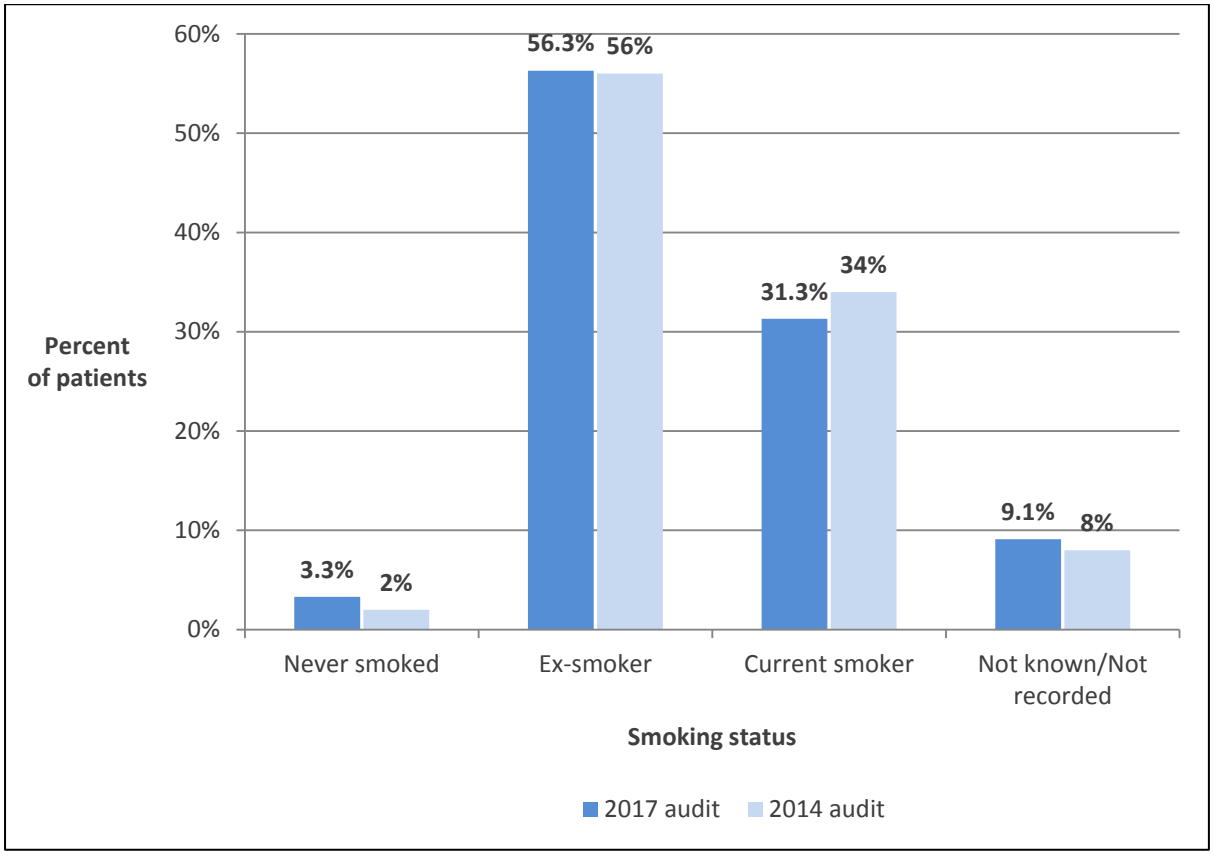
[I] Participants were asked in the dataset to record the value of the spirometric test: the patient's most recent FEV_1 as well as their most recent FVC. These have been used to calculate the FEV_1/FVC ratio (ie degree of airflow obstruction)

3.3. Smoking cessation

3.3.1 What was the smoking status for this patient, as documented for the current admission?

Smoking status	2017 (N=36,341)	2014 (N=13,414)
Never smoked	3.3% (1,213)	2% (310)
Ex-smoker	56.3% (20,466)	56% (7,552)
Current smoker	31.3% (11,370)	34% (4,528)
Not known/Not recorded	9.1% (3,292)	8% (1,024)

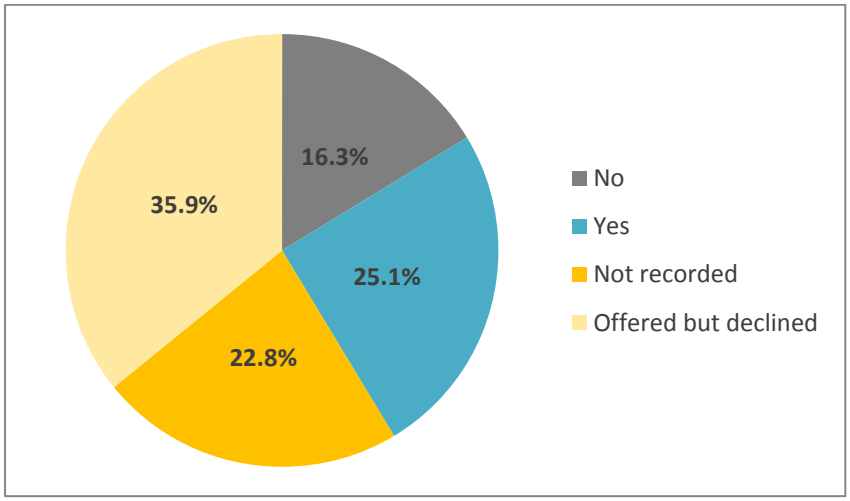
Smoking status for patients included in the 2017 and 2014 audits



3.3.2 If a current smoker, was the patient prescribed smoking-cessation pharmacotherapy during the current admission?

Prescribed smoking-cessation pharmacotherapy during the admission	2017 (N=11,370)
No	16.3% (1,848)
Yes	25.1% (2,855)
Not recorded	22.8% (2,590)
Offered but declined	35.9% (4,077)

Current smokers that were prescribed smoking cessation pharmacotherapy during their admission



3.4. Dyspnoea, eosinopenia, consolidation, acidaemia and atrial fibrillation (DECAF) score

3.4.1 Was a DECAF score recorded for this patient?

DECAF score	2017 (N=36,341)
No	83.5% (30,327)
Yes	14.5% (5,278)
Not clear	2.0% (736)

3.4.2 If yes, what was the recorded DECAF score?

DECAF score	0	1	2	3	4	5	6
2017 (N=5,278)	21.0% (1,109)	33.0% (1,741)	26.8% (1,412)	14.1% (742)	4.2% (224)	0.9% (47)	0.1% (3)
2014[m] (N=5,583)	26% (1,449)	41% (2,263)	24% (1,342)	8% (446)	1% (79)	0.1% (4)	Not applicable

[m] In the 2014 analysis a modified DECAF score was used as we could not distinguish between MRC dyspnoea grade 5a (score 1) and grade 5b (score 2) therefore a score of 1 was given to all MRC grade 5. For this reason the 2014 and 2017 scores should not be directly compared

Section 4: Non-invasive ventilation (NIV)

Back to contents

Key findings

- The median time from **arrival to acute treatment with NIV was 4.3 hours**.

For the full key findings and recommendations, please see the national report COPD: Working together, available at www.rcplondon.ac.uk/working-together

Navigation

This section contains the following tables and graphs. If you are viewing this report on a computer, you can select the table that you wish to see from the list below.

4.1 NIV

4.1.1 Did the patient receive acute treatment with NIV?

Acute treatment with NIV	2017 (N=36,341)	2014 (N=13,414)
No	89.1% (32,386)	87% (11,600)[n]
Yes	10.9% (3,955)	12% (1,612)
Patient intubated directly	Not asked	0.2% (30)
Not known	Not asked	1% (172)

4.1.2 If the patient received acute treatment with NIV, was it received within 3 hours of arrival?

Acute treatment with NIV received within 3 hours of arrival	2017 (N=3,955)
No	44.7% (1,766)
Yes	30.1% (1,191)
No time/date recorded	25.2% (998)

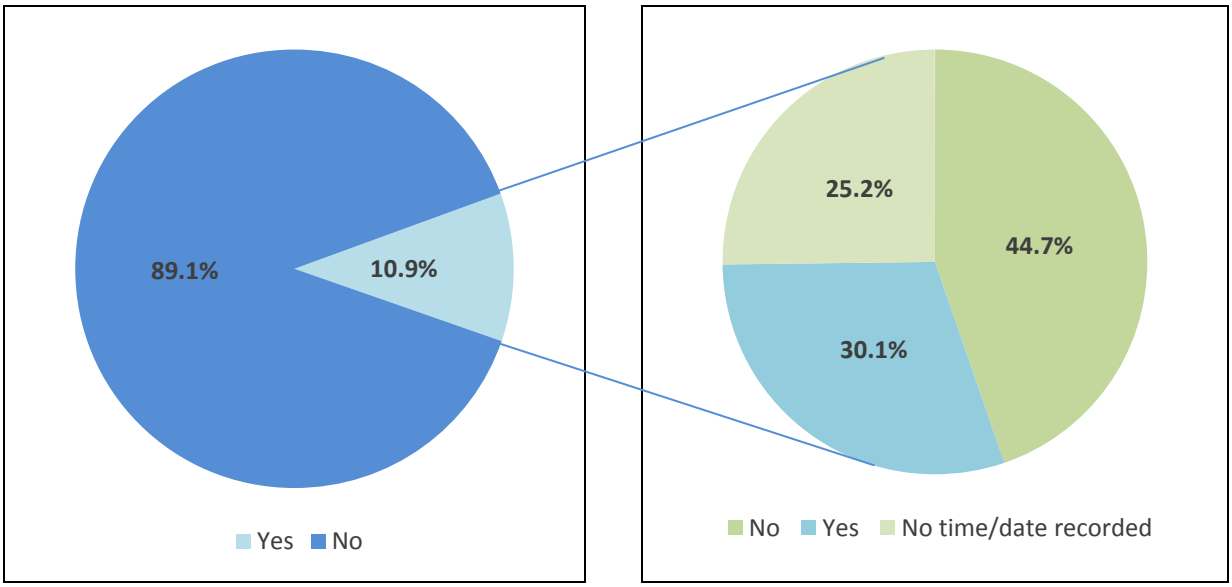
[n] Either not clinically indicated, patient declined, NIV not available or reason unclear

4.1.3 If the patient received acute treatment with NIV was it received within 3 hours from admission? (2014 clinical audit figures)[o]

Acute treatment with NIV received within 3 hours from admission	2014 (N=1,191*)
No	57.6% (686)
Yes	42.4% (505)

*421 cases (1612 minus 1191) were excluded as either the date seen or the time of day, or both were not given

Patients in the 2017 audit who received NIV (left) within 3 hours (right)



4.1.4 Average time from arrival at hospital to acute treatment with NIV

Time, in hours, from arrival at hospital to acute treatment with NIV	2017 (N=2,956)
Mean	19.7
Standard deviation	57.4
Median	4.3
Interquartile range	1.7–13.6

4.1.5 Time from arrival to acute treatment with NIV

Time, in hours, from arrival at hospital to acute treatment with NIV	2017 (N=2,956)
<3 hours	40.3% (1,191)
3–24 hours	42.7% (1,263)
>24 hours	17.0% (502)

[o] Results within table 4.1.3 have not been combined into table 4.1.2 as the metrics have been calculated and reported differently. In 2014 (4.1.3) it was NIV received within 3 hours of a patient's admission, whereas in 2017 (4.1.2) it was NIV received within 3 hours of a patient's arrival at hospital.

4.1.6 Time from admission to acute treatment with NIV (2014 clinical audit figures)[p]

Time, in hours, from admission at hospital to acute treatment with NIV	2014 (N=1,096)
<3 hours	37.4% (410)
3–24 hours	42.4% (465)
>24 hours	20.2% (221)

[p] Results within table 4.1.6 have not been combined into table 4.1.5 as the metrics have been calculated and reported differently. In 2014 (4.1.6) it was time from admission to acute treatment with NIV where as in 2017 (4.1.5) it was time from arrival to acute treatment with NIV.

Section 5: Discharge processes

Back to contents

Key findings

- Only **53%** of admissions received a **discharge bundle.** *(NICE [QS10] statement 8)*

For the full key findings and recommendations, please see the national report COPD: Working together, available at www.rcplondon.ac.uk/working-together

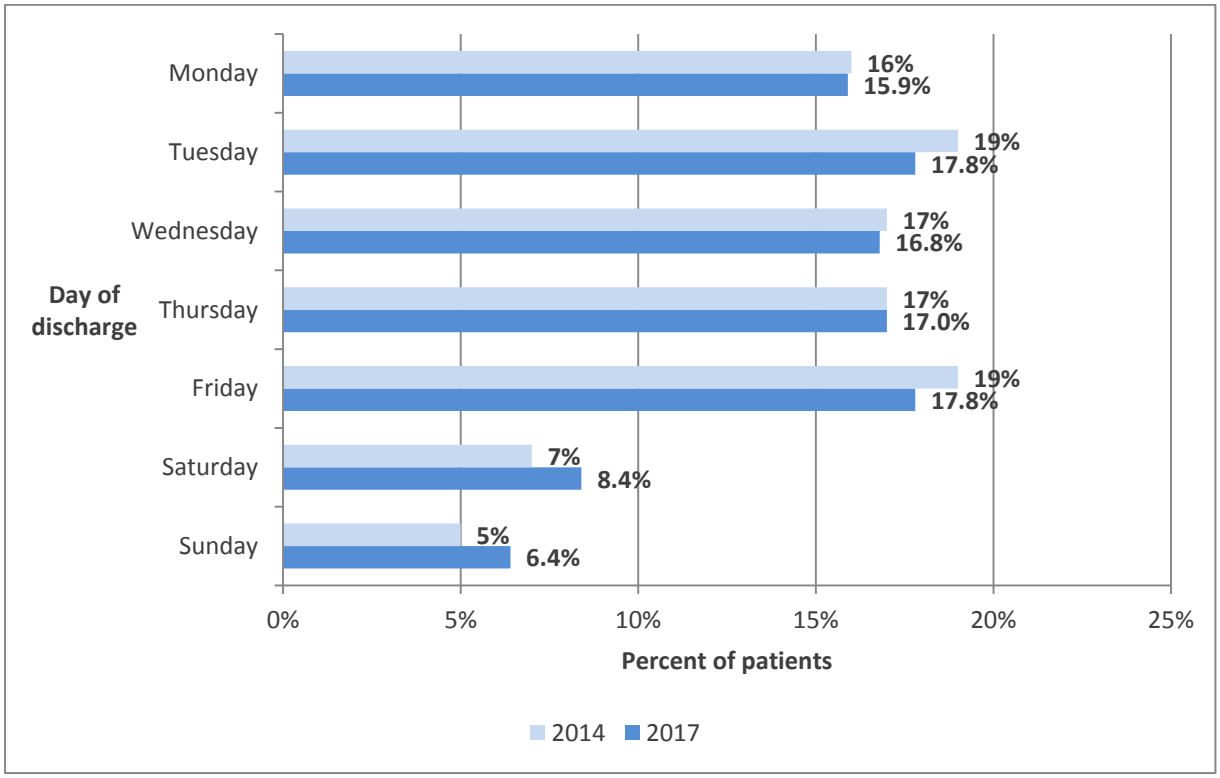
Navigation

This section contains the following tables and graphs. If you are viewing this report on a computer, you can select the table that you wish to see from the list below.

5.1 Day of discharge

	Day of discharge						
	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**
2017 (N=36,341)	15.9% (5,759)	17.8% (6,472)	16.8% (6,086)	17.0% (6,175)	17.8% (6,476)	8.4% (3,043)	6.4% (2,330)
2014 (N=12,838)	16% (2,090)	19% (2,390)	17% (2,180)	17% (2,193)	19% (2,384)	7% (905)	5% (674)

Day of patient discharge in 2017 and 2014



5.1.1 Average length of stay

Length of stay, days	2017 (N=36,341)	2014 (N=12,838)
Mean	5.8	Not reported
Standard deviation	7.8	Not reported
Median	4	4
Interquartile range	2–7	2–8

5.2 Did the patient die as an inpatient in your hospital?

Inpatient mortality	2017 (N=36,341)	2014 (N=13,414)
No	96.1% (34,926)	95.7% (12,838)
Yes	3.9% (1,415)	4.3% (576)

5.3 Has a British Thoracic Society (BTS), or equivalent, discharge bundle been completed for this admission?

Discharge bundle completed for this admission	2017 (N=36,341)
No	35.8% (13,008)
Yes	53.0% (19,275)
Not clear	4.7% (1,719)
Patient self-discharged	0.6% (213)
Patient died	3.9% (1,415)
Other	2.0% (711)

5.4 What follow-up arrangements have been made for this patient?

	2017 (N=34,926)
No arrangements apparent	18.8% (6,575)
Patient discharged under the care of an early/assisted discharge team or integrated care service	15.1% (5,276)
GP follow-up advised	16.6% (5,800)
GP follow-up arranged	2.7% (942)
Follow-up phone call scheduled	8.0% (2,786)
Community respiratory clinic follow-up advised	5.8% (2,016)
Community respiratory clinic follow-up arranged	14.4% (5,042)
Hospital respiratory clinic follow-up advised	5.9% (2,075)
Hospital respiratory clinic follow-up arranged	24.7% (8,614)
No follow-up arranged, as discharged to other healthcare facility	2.3% (787)
Discharged for end-of-life care	0.7% (249)
Other	12.5% (4,374)

Section 6: Sub-analyses[q]

Back to contents

This section contains sub-analyses of the 2017 data presented in the previous sections, and presents associations between various metrics and:

- time from arrival to acute treatment with NIV
- review by a member of the respiratory team
- weekend admission.

Navigation

This section contains the following tables and graphs. If you are viewing this report on a computer, you can select the table that you wish to see from the list below.

6.1 Associations with time from arrival to acute treatment with NIV

	Time from arrival to acute treatment with NIV			p-value[r]
	<3 hours (N=1,191)	3–24 hours (N=1,263)	>24 hours (N=502)	
Length of stay >4 days	67.3% (802)	69.4% (871)	84.5% (424)	<0.0001
Died as inpatient	10.4% (124)	10.9% (137)	24.7% (124)	<0.0001

Relative to patients who received acute treatment with **NIV in under 3 hours**:

- Patients who received **acute treatment with NIV more than 24 hours after arrival** were **2.6 times more likely** (odds ratio (OR): 2.63 [95% confidence interval (CI): 2.00–3.47]) to have a **length of stay greater** than the **median** of **4 days** (p<0.0001). **It should be noted that reverse causation is likely an issue with this query as patients that need to stay longer may end up requiring NIV later.**
- Patients who received **acute treatment with NIV more than 24 hours after arrival** were **2.8 times more likely** (OR: 2.82 [95% CI: 2.13–3.74]) **to die as an inpatient** (p<0.0001).
- Patients who received acute treatment with NIV between 3 and 24 hours from arrival were 10% more likely (OR: 1.10 [95% CI: 0.93–1.30]) to have a length of stay greater than the median of 4 days (p=0.2822).
- Patients who received acute treatment with NIV between 3 and 24 hours from arrival were 6% more likely (OR: 1.06 [95% CI: 0.82–1.36]) to die as an inpatient (p=0.6798).

6.2 Associations with review by a member of the respiratory team within 24 hours

	Specialist review within 24 hours		p-value[s]
	No	Yes	
Length of stay >4 days (N=36,341)	41.7% (6,846)	41.9% (8,355)	0.673
Died as an inpatient (N=36,341)	4.3% (706)	3.6% (709)	<0.001

[q] Due to all outcomes other than mortality being quite common, odds ratios will not approximate risk ratios
[r] X^2 test for trend
[s] X^2 test

Oxygen prescribed (N=29,910)	64.0% (8,496)	74.1% (12,333)	<0.001
Received NIV within 3 hours (N=3,955)	25.9% (324)	32.1% (867)	<0.001
Received smoking cessation pharmacotherapy (N=8,780)	69.4% (2,257)	84.6% (4,675)	<0.001
Received a discharge bundle (N=34,002)	37.6% (5,748)	72.3% (13,527)	<0.001

- Patients who **received a respiratory team review within 24 hours** (relative to those who didn't) were **18% less likely** (OR: 0.82 [95% CI: 0.74–0.91]) **to die as an inpatient**.
- Patients who received a respiratory team review within 24 hours and required oxygen were **61% more likely** (OR: 1.61 [95% CI: 1.53–1.70]) **to receive an oxygen prescription** than patients who did not receive a respiratory team review within 24 hours and required oxygen.
- Patients who received a respiratory team review within 24 hours and required NIV during their admission were **35% more likely** (OR: 1.35 [95% CI: 1.16–1.57]) **to receive NIV within 3 hours** than patients who did not receive a respiratory team review within 24 hours and required NIV during their admission.
- Patients who received a respiratory team review within 24 hours and were a current smoker were **2.4 times more likely** (OR: 2.42 [95% CI: 2.17–2.69]) **to receive smoking cessation pharmacotherapy** than patients who did not receive a respiratory team review within 24 hours and were a current smoker.
- Patients who received a respiratory team review within 24 hours and were discharged were **4.3 times more likely** (OR: 4.32 [95% CI: 4.11–4.53]) **to receive a discharge bundle** than patients who did not receive a respiratory team review within 24 hours and were discharged.

6.3 Associations with weekend admission

	Weekend admission		p-value[t]
	No	Yes	
Length of stay > 4 days (N=36,341)	42.9% (11,711)	38.6% (3,490)	<0.001
Died as an inpatient (N=36,341)	3.8% (1,039)	4.2% (376)	0.139
Oxygen prescribed (N=29,910)	69.7% (15,622)	69.5% (5,207)	0.779
Received NIV within 3 hours (N=3,955)	29.6% (866)	31.7% (325)	0.214
Received smoking cessation pharmacotherapy (N=8,780)	79.1% (5,217)	78.4% (1,715)	0.450
Received a discharge bundle (N=34,002)	57% (14,669)	55% (4,606)	<0.001

- Patients who were admitted at the weekend (relative to those admitted during the week) were **17% less likely** (OR: 0.83 [95% CI: 0.80–0.88]) to have a length of stay greater than the median of 4.
- Patients who were admitted at the weekend and were discharged were **11% less likely** (OR: 0.89 [95% CI: 0.85–0.94]) to receive a discharge bundle than patients who were admitted during the week and were discharged.

[t] X^2 test

Section 7: Web-tool run charts

Back to contents

During 2017 the National COPD Audit Programme undertook a phased release of run charts via the secondary care audit web-tool (www.nacap.org.uk). The charts were derived from the data entered by hospitals registered for the audit, and introduced to be used by clinical teams to help drive quality improvement by providing near real-time feedback on service quality and compliance with national care standards. The charts display hospital level data, benchmarked to the national average and are only available to be viewed by registered users of the web-tool.

The charts depicted that between February 2017 and February 2018 there was improvement in performance (notably so for the BPT items) across most of the key indicators:

Key indicator	February 2017	February 2018	Increase or decrease
Best practice tariff (BPT)[3] (released March 2017)			
Patients receiving a review by a member of the respiratory team during admission	72.7%	91.2%	↑
Patients receiving a review by a member of the respiratory team within 24 hours of admission	48.4%	69.3%	↑
Patients receiving a discharge bundle upon discharge	48.2%	81.5%	↑
Patients where care meets the BPT for COPD	31.1%	62.0%	↑
Oxygen (released May 2017)			
Patients being prescribed oxygen	70.3%	74.7%	↑
Patients being prescribed oxygen to target saturation	95.7%	97.7%	↑
Spirometry (released May 2017)			
Patients with spirometry result available	36.4%	40.8%	↑
Smoking cessation pharmacotherapy (released June 2017)			
Current smokers that have been prescribed smoking cessation pharmacotherapy	23.9%	26.6%	↑
NIV (released July 2017)			
Patients receiving NIV	11.8%	10.1%	↓
Patients receiving NIV within 3 hours of arrival	26.6%	29.8%	↑

Appendix A: Report preparation

Back to contents

This report was written by the following people, on behalf of the national COPD secondary care audit 2017 workstream group (the full list of workstream group members is included in Appendix G).

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Appendix B: Introduction to the National COPD Audit Programme

Back to contents

The National COPD Audit Programme is a programme of work that aims to drive improvements in the quality of care and services provided for patients with COPD in England and Wales. The programme looks at COPD care across the patient pathway, both in and out of hospital, bringing together key elements from the primary, secondary and community care sectors.

There are three programme workstreams.

1. Primary care: collection of audit data from general practice patient record systems in Wales. Delivered by the RCP and NHS Digital, working with the Primary Care Respiratory Society UK, the Royal College of General Practitioners and the NHS Wales Informatics Service. Another round of audit took place in 2017.

2. Secondary care: in 2014, there were snapshot audits of patients who were admitted to hospital with COPD exacerbation, plus organisational audits of the resourcing of COPD services in acute units. The 2014 audits were delivered by the BTS, working with the RCP. A continuous audit of admission to hospital with COPD exacerbation commenced in 2017.

3. Pulmonary rehabilitation: audits of COPD patients attending pulmonary rehabilitation (including outcomes at 180 days), plus organisational audits of the resourcing of pulmonary rehabilitation services for COPD patients. The 2015 round of this audit was delivered by the BTS, working with the RCP. Another round of snapshot clinical and organisational audits took place in 2017.

The audit also delivered a 1-year development project exploring the potential/feasibility of future incorporation of a patient-reported experience measure (PREM) into the audit programme. This was delivered by the British Lung Foundation, working with the Picker Institute Europe.

The programme is commissioned by HQIP as part of the National Clinical Audit (NCA) Programme. It is included in the list of national audits for inclusion in NHS trusts' quality accounts and also the NHS Wales Clinical Audit and Outcome Review Plan.

Appendix C: Methodology

Back to contents

Methodology of the audit creation and setup

The National COPD Audit Programme's secondary care clinical audit 2017 built upon the learning from the 2014 clinical audit.[u] The structure of the dataset was similar to that used in 2014, however, it was considerably streamlined to account for the change in methodology from snapshot (in 2014) to continuous (in 2017) audit.

All secondary care hospitals in England and Wales that admit patients with acute exacerbations of COPD (AECOPD) were approached to participate in the audit. Out of 197 eligible, 182 hospitals participated in the clinical audit. A full list of participating hospitals, including those hospitals that opted out of taking part are listed in Appendix F.

The continuous audit launched on 1 February 2017. This report presents the results of the cohort of patients discharged between the audit's launch date and 13 September 2017.

Information governance

The audit involved the collection of patient identifiable data for the purpose of linkage with data from other sources (such as Hospital Episode Statistics and Office for National Statistics data for readmission and mortality data), and the audit operated with Section 251 approval via the Confidential Advisory Group (CAG), reference number: CAG 8-06(b)/2013.[v] The rationale for this was the acuity of the patient cohort and the rate of admissions (approximately 115,000 per annum),[w] meaning that the seeking of patient consent (the alternative route for collection of identifiable patient data) was not a viable option.

A patient leaflet and poster, fair processing information as well as the audit data flows, were made available on the audit website www.rcplondon.ac.uk/projects/outputs/secondary-care-audit-2017-resources.

Recruitment

There was a single recruitment process for both the clinical and organisational secondary care audits, which began in early 2016, using the following channels:

- partner and stakeholder channels (such as the BTS's e-bulletin, and the Association of Respiratory Nurse Specialists' newsletter)
- Twitter and the audit's own newsletter
- communication with hospitals that participated in the 2014 audit
- direct letters to chief executives and medical directors.

The reasons provided to participate in the audits were as follows:

[u] Stone RA, Holzhauer-Barrie J, Lowe D *et al. 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. www.rcplondon.ac.uk/projects/outputs/copd-who-cares-matters-clinical-audit-2014 [Accessed 16 February 2018].
[v] A record of the audit approval can be found can be found at www.hra.nhs.uk/about-the-hra/our-committees/section-251/cag-advice-and-approval-decisions/ (April 2013 onwards; non research) [Accessed 16 February 2018].
[w] https://statistics.blf.org.uk/copd [Accessed 16 February 2018].

- the status of the audit as part of NHS Quality Accounts
- the use of the clinical audit to support the launch of the new BPT for COPD (launched on 1 April 2017)
- the Care Quality Commission's (CQC's) future use (as of autumn 2017) of clinical audit metrics in its hospital inspections
- the alignment of the audit to National Institute for Health and Care Excellence (NICE) guidance and key findings from the 2014 audit
- the fact the audit/s would prove to be a useful tool for facilitating local improvement.

Hospitals were asked to complete a registration form, nominating a 'lead clinician' and listing any other team members that would form part of the audit team. It was made clear to prospective participants that the 'lead clinician' role took ultimate responsibility for the accuracy of the data that were entered for that hospital.

Once hospitals had registered, they were sent a Caldicott Guardian letter and a form to have signed off. Only after the Caldicott Guardian form was received by the audit team at the RCP was the hospital considered 'fully signed up' and, at that point, it was registered on the audit web-tool.

People were registered on the web-tool as having one of two roles: 'lead clinician' or 'data inputters'. The former were able to approve the creation of new users for that hospital (ie as the audits progressed) and ensure that they were suitable from an information governance perspective.

The audit team chased the registration form and Caldicott Guardian form up until the audit start date.

Audit question development and pilot

The audit dataset was based on the equivalent 2014 dataset. It was developed iteratively by the audit programme team and clinical lead, in consultation with the workstream group, in particular the representatives of the BTS and the Society of Acute Medicine.

The dataset and web-tool were tested in 33 hospitals (highlighted in the list of participating hospitals in Appendix F) in a pilot between Monday 13 August and Friday 7 September 2016. The pilot hospitals were asked to feed back on the web-tool, the audit questions and the help notes provided.

This feedback was discussed by the team and workstream group, and the dataset was finalised. It is available to download from our website: www.rcplondon.ac.uk/projects/outputs/secondary-care-audit-2017-resources.

The audit team created a full dataset containing helpnotes and reasons for the inclusion of each data item, and also a two-sided proforma to aid those hospitals who prefer to collect the information on paper.

Soft launch period

To aid local planning, the audit team made the clinical audit available on the web-tool from Tuesday 1 November 2016) in 'soft launch' form. Users were able to:

- access the full dataset
- review the help notes
- input data and test the validation rules.

They were, however, **not able to save results**. This gave the teams approximately 3 months to prepare, prior to the audit's launch at the start of February. This was felt to be particularly important, as the dataset would need to be completed multiple times by participants, and familiarisation with the data items required would be key.

Data entry

Hospitals were required to enter data via the audit programme's bespoke web-tool, created by Crown Informatics Ltd (available at www.nacap.org.uk).

Documentation to support participation in the audit, including audit instructions, data collection sheets, datasets with help notes, as well as copies of all communications and newsletters, was available on the secondary care audit resources website and on the web-tool.

Regular email updates and newsletters were sent to participants throughout the data collection period, with reminders about timelines and answers to frequently asked questions.

Data storage, security and transfer

Data were collected on the audit's bespoke web-tool. These data were stored and processed at a secure data centre, owned by AIMES Grid Services, located in Liverpool, UK. It operates to ISO 27001 certification (2015). The servers are owned and operated by Crown Informatics Ltd and are held in a secure locked rack, accessible to named individuals. All access is logged, managed and supervised.

This data centre provides N3 aggregation in collaboration with NHS Digital. Data are stored in secured databases (software by IBM) and encrypted on disc (AES256 standard) and additionally in the database where required. Backups are encrypted at AES256, held in dual copies and stored securely.

Crown Informatics Ltd operate secure SSL at 256 bit, using SHA256 (SHA2) signatures and 4096-bit certificates. Crown Informatics Ltd's certificate is an 'OV' certified by a respected global certifier (Starfield/GoDaddy). In addition, 'Qualsys' using 'SSL Labs' have given the audit site an 'A' rating.

At the end of the data collection period, the data were extracted from the web-tool by the central audit team, using an 'extract' provision developed by Crown Informatics. They were then transferred securely (using the RCP's Mimecast system) to the team at Imperial College London for analysis.

Telephone and email support

The audit programme team at the RCP provided a helpdesk every working day during office hours, which was available via both telephone and email, so that participants could contact the team directly with any questions.

Analysis methodology

The data were analysed at Imperial College London (National Heart and Lung Institute). Data received from the RCP were imported in to Stata 15.

A few patients with unlikely ages (less than 35 years of age) and negative lengths of stay were discovered so these records were sent back to hospitals via the RCP for querying. Once correct results were received back, the appropriate corrections were made to the dataset.

The dataset was then prepared, cleaned, and analysed as follows:

- All string categorical variables were recoded numerically and labelled with the former string value.
- All string date/time variables were converted to numerical date/time variables.
- All indicator variables (to denote presence or absence) were converted from their current format (eg an 'X' character) to a binary 0 or 1 value.
- Variables that comprised lists of strings were converted to separate binary variables for each possible string in the list to indicate the presence or absence of each possible item.
- All draft entries were removed (n=860).
- Admissions before arrival were removed (n=0).
- Admissions after discharge were removed (n=2).
- Respiratory specialist reviews before arrival were removed (n=0).
- Respiratory specialist reviews after discharge were removed (n=224).
- NIVs before arrival were removed (n=95).
- NIVs after discharge were removed (n=34).
- Discharges before arrival were removed (n=0).
- English and Welsh quintiles of index of multiple deprivation (IMD) were produced (1=most deprived, 5=least deprived) using the provided IMD rank for each patient.
- Number of admissions for each hospital was generated.
- Two-hour time categories (ie 12 total) were generated for time of arrival and time of first review by a member of the respiratory team.
- Time from arrival to admission was generated by subtracting arrival time from admission time and patients with admission wait times greater than or equal to 24 hours were removed as this was considered unrealistic (n=387).
- Time from admission to specialist review was generated by subtracting admission time from review time and patients with review wait times less than or equal to -24 hours (24 hours prior) were removed as this was considered unrealistic (n=0 [removed in previous stage]).
- Time from arrival to NIV was calculated by subtracting arrival time from time of NIV administration.
- FEV_1/FVC ratio was cleaned such that values under 0.2 or over 1.0 were replaced with missing values and a variable to denote airflow obstruction for anyone with a ratio under 0.7 was created.
- Errors in day of week variables were corrected using Stata 'dow()' command to get the correct day of the week for the specified date (n=1).
- Errors in the length of stay variable were corrected by subtracting date of admission from date of discharge (n=4).
- Variables required for analysis and generating odds ratios were created:
    - Specialist review in 24 hours (yes (y) / no (n))
    - Oxygen prescription (y/n)
    - NIV in 3 hours (y/n)
    - Time to NIV administration (<3 hours, 3–24 hours, >24 hours)
    - Smoking cessation pharmacotherapy prescribed (y/n)
    - Discharge bundle completed (y/n)
    - Weekend admission (y/n)
    - Length of stay (equal to or below median/above median).
- All Stata analysis was performed using the 'summarize', 'tabulate', or 'tabodds' commands, depending on whether median/mean, proportion, or odds ratio was the desired analysis, respectively.

Appendix D: Chronic obstructive pulmonary disease in adults NICE Quality standard [QS10]

Back to contents

Please note: In 2016 this quality standard was updated and statements prioritised in 2011 were updated (2011, updated 2016) or replaced (new 2016).

Statements are marked as [new 2016] or [2011, updated 2016]:

- [new 2016] if the statement covers a new area for quality improvement
- [2011, updated 2016] if the statement covers an area for quality improvement included in the 2011 quality standard and has been updated.

No.	Quality statement
1	People aged over 35 years who present with a risk factor and one or more symptoms of chronic obstructive pulmonary disease (COPD) have post-bronchodilator spirometry. [2011, updated 2016]
2	People with COPD who are prescribed an inhaler have their inhaler technique assessed when starting treatment and then regularly during treatment. [2011, updated 2016]
3	People with stable COPD and a persistent resting stable oxygen saturation level of 92% or less have their arterial blood gases measured to assess whether they need long-term oxygen therapy. [2011, updated 2016]
4	People with stable COPD and exercise limitation due to breathlessness are referred to a pulmonary rehabilitation programme. [2011, updated 2016]
5	People admitted to hospital for an acute exacerbation of COPD start a pulmonary rehabilitation programme within 4 weeks of discharge. [2011, updated 2016]
6	People receiving emergency oxygen for an acute exacerbation of COPD have oxygen saturation levels maintained between 88% and 92%. [new 2016]
7	People with an acute exacerbation of COPD and persistent acidotic hypercapnic ventilatory failure that is not improving after 1 hour of optimal medical therapy have non–invasive ventilation. [2011, updated 2016]
8	(Placeholder[x]) Hospital discharge care bundle. [new 2016]

[x] A placeholder statement is an area of care that has been prioritised by the Quality Standards Advisory Committee but for which no source guidance is currently available. A placeholder statement indicates the need for evidence-based guidance to be developed in this area.

Statements from the 2011 quality standard for COPD that may still be useful at a local level, but are no longer considered national priorities for improvement:
• People with COPD have a current individualised comprehensive management plan, which includes high-quality information and educational material about the condition and its management, relevant to the stage of disease.
• People with COPD have a comprehensive clinical and 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 comorbidities.
• People with COPD who smoke are regularly encouraged to stop and are offered the full range of evidence-based smoking cessation support.
• People who have had an exacerbation of COPD are provided with individualised 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.
• People with COPD receiving long-term oxygen therapy are reviewed in accordance with NICE guidance, at least annually, by a specialist oxygen service as part of the integrated clinical management of their COPD.
• 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.
• People admitted to hospital with an exacerbation of COPD are reviewed within 2 weeks of discharge.
• People with advanced COPD, and their carers, are identified and offered palliative care that addresses physical, social and emotional needs.

Appendix E: Chronic obstructive pulmonary disease in over 16s: diagnosis and management NICE Clinical guideline [CG101]

Back to contents

Below is only a summary of the NICE Clinical guidelines [CG101] that we specifically refer to within this report. To see the full guideline please use the following link: www.nice.org.uk/guidance/cg101

1.1	Diagnosing COPD
1.1.8	**Referral for specialist advice**
1.1.8.2	Patients who are referred do not always have to be seen by a respiratory physician. In some cases they may be seen by members of the COPD team who have appropriate training and expertise. [2004]
1.1.2	**Spirometry**
1.1.2.1	Spirometry should be performed: • at the time of diagnosis • to reconsider the diagnosis, if patients show an exceptionally good response to treatment. [2004]
1.1.2.2	Measure post-bronchodilator spirometry to confirm the diagnosis of COPD. [new 2010]
1.1.2.3	Consider alternative diagnoses or investigations in: • older people without typical symptoms of COPD where the FEV_1/FVC ratio is <0.7 • younger people with symptoms of COPD where the FEV_1/FVC ratio is ≥0.7. [new 2010]
1.1.2.4	All health professionals involved in the care of people with COPD should have access to spirometry and be competent in the interpretation of the results. [2004]
1.1.2.5	Spirometry can be performed by any healthcare worker who has undergone appropriate training and who keeps his or her skills up to date. [2004]
1.1.2.6	Spirometry services should be supported by quality control processes. [2004]
1.1.2.7	It is recommended that ERS 1993 reference values[y] are used but it is recognised that these values may lead to under-diagnosis in older people and are not applicable in black and Asian populations.[z] [2004]

1.2	Managing stable COPD
1.2.1	**Smoking cessation**
1.2.1.1	An up-to-date smoking history, including pack years smoked (number of cigarettes smoked per day, divided by 20, multiplied by the number of years smoked), should be documented for everyone with COPD. [2004]
1.2.1.2	All COPD patents still smoking, regardless of age, should be encouraged to stop, and offered help to do so, at every opportunity. [2004]
1.2.1.3	Unless contraindicated, offer NRT, varenicline or bupropion, as appropriate, to people who are planning to stop smoking combined with an appropriate support programme to optimise smoking quit rates for people with COPD.[aa] [2010]
1.2.6	**Non-invasive ventilation**
1.2.6.1	Adequately treated patients with chronic hypercapnic respiratory failure who have

[y] Quanjer PH, Tammeling GJ, Cotes JE *et al*. Lung volumes and forced ventilatory flows. Report Working Party Standardization of Lung Function Tests, European Community for Steel and Coal. Official Statement of the European Respiratory Society. *Eur Respir J Suppl* 1993:16;5–40.

[z] Definitive spirometry reference values are not currently available for all ethnic populations. The GDG was aware of ongoing research in this area.

[aa] Stop smoking services. NICE Public health guidance [PH10]. www.nice.org.uk/guidance/ph10 [Accessed January 2018].

	required assisted ventilation (whether invasive or non-invasive) during an exacerbation or who are hypercapnic or acidotic on LTOT should be referred to a specialist centre for consideration of long-term NIV. [2004]

1.3	Management of exacerbations of COPD
1.3.6	**Oxygen therapy during exacerbations of COPD**[bb]
1.3.6.1	The oxygen saturation should be measured in patients with an exacerbation of COPD, if there are no facilities to measure arterial blood gases. [2004]
1.3.6.2	If necessary, oxygen should be given to keep the SaO_2 within the individualised target range. [2004, amended 2010]
1.3.6.3	Pulse oximeters should be available to all healthcare professionals involved in the care of patients with exacerbations of COPD and they should be trained in their use. Clinicians should be aware that pulse oximetry gives no information about the PCO2 or pH. [2004]
1.3.6.4	When the patient arrives at hospital, arterial blood gases should be measured and the inspired oxygen concentration noted in all patients with an exacerbation of COPD. Arterial blood gas measurements should be repeated regularly, according to the response to treatment. [2004]
1.3.7	**Non-invasive ventilation (NIV) and COPD exacerbations**
1.3.7.1	NIV should be used as the treatment of choice for persistent hypercapnic ventilatory failure during exacerbations despite optimal medical therapy. [2004]
1.3.7.2	It is recommended that NIV should be delivered in a dedicated setting with staff who have been trained in its application, who are experienced in its use and who are aware of its limitations. [2004]
1.3.7.3	When patients are started on NIV there should be a clear plan covering what to do in the event of deterioration and ceilings of therapy should be agreed. [2004]
1.3.11	**Discharge planning**
1.3.11.1	Spirometry should be measured in all patients before discharge. [2004]
1.3.11.2	Patients should be re-established on their optimal maintenance bronchodilator therapy before discharge. [2004]
1.3.11.3	Patients who have had an episode of respiratory failure should have satisfactory oximetry or arterial blood gas results before discharge. [2004]
1.3.11.4	All aspects of the routine care that patients receive (including appropriateness and risk of side effects) should be assessed before discharge. [2004]
1.3.11.5	Patients (or home carers) should be given appropriate information to enable them to fully understand the correct use of medications, including oxygen, before discharge. [2004]
1.3.11.6	Arrangements for follow-up and home care (such as visiting nurse, oxygen delivery, referral for other support) should be made before discharge. [2004]
1.3.11.7	Before the patient is discharged, the patient, family and physician should be confident that he or she can manage successfully. When there is remaining doubt a formal activities of daily living assessment may be helpful. [2004]

[bb] The exacerbation section of this guideline was outside the scope of the 2010 update. However the GDG was aware that some recommendations in this section of the guideline were out of date, and these have been removed. Readers should refer to local protocols.

Appendix F: Participating hospitals in the 2017 clinical secondary care audit

Back to contents

Participating NHS acute units in England:

Trust	Unit
Aintree University Hospitals NHS Foundation Trust	Aintree University Hospital
Airedale NHS Foundation Trust	Airedale General Hospital
Ashford and St Peter's Hospital NHS Foundation Trust	St Peter's Hospital
Barking Havering and Redbridge University Hospitals NHS Trust	King George Hospital
Barnsley Hospital NHS Foundation Trust	Barnsley Hospital
Barts Health NHS Trust	Newham University Hospital
Barts Health NHS Trust	The Royal London Hospital
Basildon and Thurrock University Hospitals NHS Foundation Trust	Basildon Hospital
Bedford Hospital NHS Trust	Bedford 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
Brighton and Sussex University Hospitals NHS Trust	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
Calderdale and Huddersfield NHS Foundation Trust	Huddersfield Royal Infirmary
Central Manchester University Hospitals NHS Foundation Trust	Manchester Royal Infirmary
Central Manchester University Hospitals NHS Foundation Trust	Trafford General Hospital
Chelsea and Westminster Hospital NHS Foundation Trust	Chelsea and Westminster Hospital
Chelsea and Westminster Hospital NHS Foundation Trust	West Middlesex University 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
County Durham and Darlington NHS Foundation Trust	University Hospital of North Durham
Croydon Health Services NHS Trust	Croydon University Hospital
Dartford and Gravesham NHS Trust	Darent Valley Hospital
Derby Teaching Hospitals NHS Foundation Trust	Royal Derby Hospital
Doncaster and Bassetlaw Teaching Hospitals NHS Foundation Trust	Bassetlaw Hospital
Doncaster and Bassetlaw Teaching Hospitals NHS Foundation Trust	Doncaster Royal Infirmary
Dorset County Hospital NHS Foundation Trust	Dorset County Hospital

Trust	Unit
East and North Hertfordshire NHS Trust	Lister Hospital
East Cheshire NHS Trust	Macclesfield District General Hospital
East Kent Hospitals University NHS Foundation Trust	Kent and Canterbury Hospital
East Kent Hospitals University NHS Foundation Trust	Queen Elizabeth the Queen Mother Hospital
East Kent Hospitals University NHS Foundation Trust	William Harvey Hospital
East Lancashire Hospitals NHS Trust	Royal Blackburn Hospital
East Sussex Healthcare NHS Trust	Conquest Hospital
East Sussex Healthcare NHS Trust	Eastbourne District General Hospital
Epsom and St Helier University Hospitals NHS Trust	Epsom Hospital
Epsom and St Helier University Hospitals NHS Trust	St Helier Hospital
Frimley Health NHS Foundation Trust	Frimley Park Hospital
Frimley Health NHS Foundation Trust	Wexham Park Hospital
George Eliot Hospital NHS Trust	George Eliot Hospital
Gloucestershire Hospitals NHS Foundation Trust	Cheltenham General Hospital
Gloucestershire Hospitals NHS Foundation Trust	Gloucestershire Royal Hospital
Great Western Hospitals NHS Foundation Trust	The Great Western Hospital
Guy's and St Thomas' NHS Foundation Trust	St Thomas' Hospitals
Hampshire Hospitals NHS Foundation Trust	Basingstoke and North Hampshire Hospital
Hampshire Hospitals NHS Foundation Trust	Royal Hampshire County Hospital
Harrogate and District NHS Foundation Trust	Harrogate District Hospital
Heart of England NHS Foundation Trust	Birmingham Heartlands Hospital
Heart of England NHS Foundation Trust	Good Hope Hospital
Heart of England NHS Foundation Trust	Solihull Hospital
Hinchingbrooke Health Care NHS Trust	Hinchingbrooke Hospital
Homerton University Hospital NHS Foundation Trust	Homerton University Hospital
Hull and East Yorkshire Hospitals NHS Trust	Hull Royal Infirmary
Imperial College Healthcare NHS Trust	Charing Cross Hospital
Imperial College Healthcare NHS Trust	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 Hospital
Kettering General Hospital NHS Foundation Trust	Kettering General Hospital
King's College Hospital NHS Foundation Trust	King's College Hospital
King's Lynn NHS Foundation Trust	The Queen Elizabeth Hospital
Kingston Hospital NHS Foundation Trust	Kingston Hospital
Lancashire Teaching Hospitals NHS Foundation Trust	Chorley and South Ribble Hospital
Lancashire Teaching Hospitals NHS Foundation Trust	Royal Preston Hospital
Lewisham and Greenwich NHS Trust	University Hospital Lewisham
London North West Healthcare NHS Trust	Ealing Hospital
London North West Healthcare NHS Trust	Northwick Park Hospital
Luton and Dunstable Hospital NHS Foundation Trust	Luton and Dunstable Hospital
Maidstone and Tunbridge Wells NHS Trust	Maidstone Hospital
Maidstone and Tunbridge Wells NHS Trust	Tunbridge Wells Hospital

Trust	Unit
Medway NHS Foundation Trust	Medway Maritime Hospital
Mid Cheshire Hospitals NHS Foundation Trust	Leighton Hospital
Mid Essex Hospital Services NHS Trust	Broomfield Hospital
Milton Keynes University Hospital NHS Foundation Trust	Milton Keynes Hospital
Norfolk and Norwich University Hospitals NHS Foundation Trust	Norfolk and Norwich University Hospital
North Bristol NHS Trust	Southmead 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 NHS Foundation Trust	Diana Princess of Wales Hospital
Northern Lincolnshire and Goole NHS Foundation Trust	Scunthorpe General Hospital
Northumbria Healthcare NHS Foundation Trust	Northumbria Specialist Emergency Care Hospital
Nottingham University Hospitals NHS Trust	Nottingham City Hospital and Queen's Medical Centre Nottingham
Oxford University Hospitals NHS Trust	John Radcliffe Hospital
Pennine Acute Hospitals NHS Trust	Fairfield General Hospital
Pennine Acute Hospitals NHS Trust	North Manchester General Hospital
Pennine Acute Hospitals NHS Trust	Rochdale Infirmary
Peterborough and Stamford Hospitals NHS Foundation Trust	Peterborough City 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 NHS Hospital
Royal Free London NHS Foundation Trust	Barnet 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 Hospitals Bath NHS Foundation Trust	Royal United Hospital Bath
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 and West Birmingham Hospitals NHS Trust	Sandwell General Hospital
Sheffield Teaching Hospital NHS Foundation Trust	Northern General Hospital
Sherwood Forest Hospitals NHS Foundation Trust	Kings Mill Hospital
South Tees Hospitals NHS Foundation Trust	Friarage Hospital
South Tees Hospitals NHS Foundation Trust	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
Southern Health NHS Foundation Trust	Lymington New Forest Hospital

Trust	Unit
Southport and Ormskirk Hospitals NHS Trust	Southport and Formby District General Hospital
St George's University Hospitals NHS Foundation Trust	St George's Hospital
St Helens and Knowsley Teaching Hospital NHS Trust	Whiston Hospital
Stockport NHS Foundation Trust	Stepping Hill Hospital
Surrey and Sussex Healthcare NHS Trust	East Surrey Hospital
Tameside and Glossop Integrated Care NHS Foundation Trust	Tameside General Hospital
Taunton and Somerset NHS Foundation Trust	Musgrove Park Hospital
The Dudley Group of Hospitals NHS Foundation Trust	Russells Hall Hospital
The Hillingdon Hospitals NHS Foundation Trust	Hillingdon Hospital
The Mid Yorkshire Hospitals NHS Trust	Dewsbury District Hospital
The Mid Yorkshire Hospitals NHS Trust	Pinderfields General Hospital
The Newcastle upon Tyne Hospitals NHS Foundation Trust	Royal Victoria Infirmary
The Princess Alexandra NHS Hospital Trust	Princess Alexandra Hospital
The Rotherham NHS Foundation Trust	Rotherham General Hospital
The Royal Bournemouth and Christchurch Hospitals NHS Foundation Trust	Royal Bournemouth Hospital
The Royal Oldham Hospital	Pennine Acute Hospitals NHS Trust
The Royal Wolverhampton Hospitals NHS Trust	New Cross Hospital
The Whittington Hospital NHS Trust	Whittington Hospital
Torbay and South Devon Healthcare NHS Foundation Trust	Torbay Hospital
United Lincolnshire Hospitals NHS Trust	Grantham and District Hospital
United Lincolnshire Hospitals NHS Trust	Lincoln County Hospital
United Lincolnshire Hospitals NHS Trust	Pilgrim Hospital
University College London Hospitals NHS Foundation Trust	University College Hospital
University Hospital of South Manchester NHS Foundation Trust	Wythenshawe Hospital
University Hospital of the North Midlands NHS Trust	County Hospital
University Hospital of the North Midlands NHS Trust	Royal Stoke University 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 Coventry
University Hospitals of Leicester NHS Trust	Glenfield Hospital
University Hospitals of Leicester NHS Trust	Leicester Royal Infirmary
University Hospitals of Morecambe Bay NHS Foundation Trust	Furness General Hospital
University Hospitals of Morecambe Bay NHS Foundation Trust	Royal Lancaster Infirmary
Walsall Healthcare NHS Trust	Manor Hospital
Warrington and Halton Hospitals NHS Foundation Trust	Warrington Hospital
West Hertfordshire Hospitals NHS Trust	Watford General Hospital

Trust	Unit
West Suffolk NHS Foundation Trust	West Suffolk Hospital
Western Sussex Hospitals NHS Foundation Trust	St Richard's Hospital
Western Sussex Hospitals NHS Foundation Trust	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	Worcestershire Royal Hospital
Wrightington, Wigan and Leigh NHS Foundation Trust	Royal Albert Edward Infirmary
Wye Valley NHS Trust	County Hospital Hereford
Yeovil District Hospital NHS Foundation Trust	Yeovil District Hospital
York Teaching Hospital NHS Foundation Trust	Scarborough Hospital
York Teaching Hospital NHS Foundation Trust	The York Hospital

Participating NHS acute units in Wales:

Trust	Unit
Abertawe Bro Morgannwg University Health Board	Morriston Hospital
Abertawe Bro Morgannwg University Health Board	Princess of Wales Hospital
Abertawe Bro Morgannwg University Health Board	Singleton Hospital
Aneurin Bevan University Health Board	Nevill Hall Hospital
Aneurin Bevan University Health Board	Royal Gwent Hospital
Aneurin Bevan University Health Board	Ysbyty Ystrad Fawr Hospital
Betsi Cadwaladr University Health Board	Ysbyty Gwynedd
Betsi Cadwaladr University Health Board	Glan Clwyd Hospital
Cardiff and Vale University Health Board	University Hospital Llandough
Cardiff and Vale University Health Board	University Hospital of Wales
Cwm Taf University Health Board	Prince Charles Hospital
Cwm Taf University Health Board	Royal Glamorgan Hospital
Hywel Dda University Health Board	Glangwili General Hospital
Hywel Dda University Health Board	Prince Philip Hospital
Hywel Dda University Health Board	Withybush General Hospital

Non-participating NHS acute hospital units

Trust	Unit
Barts Health NHS Trust	Whipps Cross University Hospital
Betsi Cadwaladr University Health Board	Wrexham Maelor Hospital
Cambridge University Hospitals NHS Foundation Trust	Addenbrooke's Hospital
Gateshead Health NHS Foundation Trust	Queen Elizabeth Hospital
King's College Hospital NHS Foundation Trust	Princess Royal University Hospital
Plymouth Hospitals NHS Trust	Derriford Hospital
Oxford University Hospitals NHS Foundation Trust	Churchill Hospital
Oxford University Hospitals NHS Foundation Trust	Horton General Hospital
The Shrewsbury and Telford Hospital NHS Trust	The Princess Royal Hospital
The Shrewsbury and Telford Hospital NHS Trust	The Royal Shrewsbury Hospital

Appendix G: Members of the former secondary care workstream group

Back to contents

- **Robert A Stone**, National COPD Audit Programme Clinical Lead – Secondary Care Workstream; and Consultant Respiratory Physician, Musgrove Park Hospital, Taunton
- **Noel Baxter**, National COPD Audit Programme Clinical Lead – Primary Care Workstream; and GP Clinical Lead, NHS Southwark CCG
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- **Gill Lowrey**, Consultant Respiratory Physician, Royal Derby Hospital
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- **Jenni Quint**, Clinical Senior Lecturer in Respiratory Epidemiology, Occupational Medicine and Public Health, National Heart and Lung Institute, Imperial College London; and Honorary Consultant Physician in Respiratory Medicine, Royal Brompton Hospital, London
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If you would like to join our mailing list and be kept informed of updates and developments in the National Asthma and COPD Audit Programme, please send us your email address and contact details.

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