AN INTERNATIONAL COMPARISON OF COPD CARE IN EUROPE

RESULTS OF THE FIRST EUROPEAN COPD AUDIT

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every breath counts

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We would also like to express our gratitude to the Data Analysis Team for their outstanding support and expertise.

We acknowledge and very much appreciate the time and effort given by the hundreds of clinical and audit colleagues and COPD patients across the 13 participating European countries, who contributed to this audit by completing the surveys.

Finally, we would like to thank the European Respiratory Society, which provided most of the funding for the European COPD Audit 2010–2011.

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Contents

Foreword

It is for me a great honour and a pleasure to introduce this publication on the COPD Audit. COPD is a highly prevalent disease affecting about 44 million people in Europe.[1] In contrast to other major causes of death, its prevalence has been increasing in the past three decades.[2] The overwhelming burden of this disease prompted government officials recently to organise several high level conferences on this disease[3] either on its own or as part of chronic non-communicable diseases in general, including a United Nations summit on non-communicable diseases in early September 2011.

There are several studies indicating that treatment of this disease is suboptimal. A recent Canadian study indicated that, even in the latter stages of the disease, only about 50% of patients receive appropriate pharmacotherapy.[4] In addition, several studies have indicated that less than 10% of patients who are eligible for a pulmonary rehabilitation programme are actually admitted to such a programme.[4,5]

COPD exacerbations are intermittent events occurring in the course of this disease. They speed the progression of the disease,[6] reduce health-related quality of life[7] and are associated with significant mortality.[8] Hence, it is of utmost importance that these episodes are treated appropriately. This is exactly why a systematic audit of the management of these exacerbations is timely. This was done in the COPD Audit, and the results are published in the present publication. The Steering Board of this audit, on behalf of the European Respiratory Society, succeeded in including over 16,000 patients and 400 centres across 13 countries in this project. It is the largest exercise of its kind ever performed. It is clear that this audit will have a profound influence on the treatment of COPD exacerbations in Europe in future and I sincerely hope that it will contribute to substantial improvements in the treatment of this devastating disease.

Marc Decramer
ERS Past President, 2011–2012

Preface

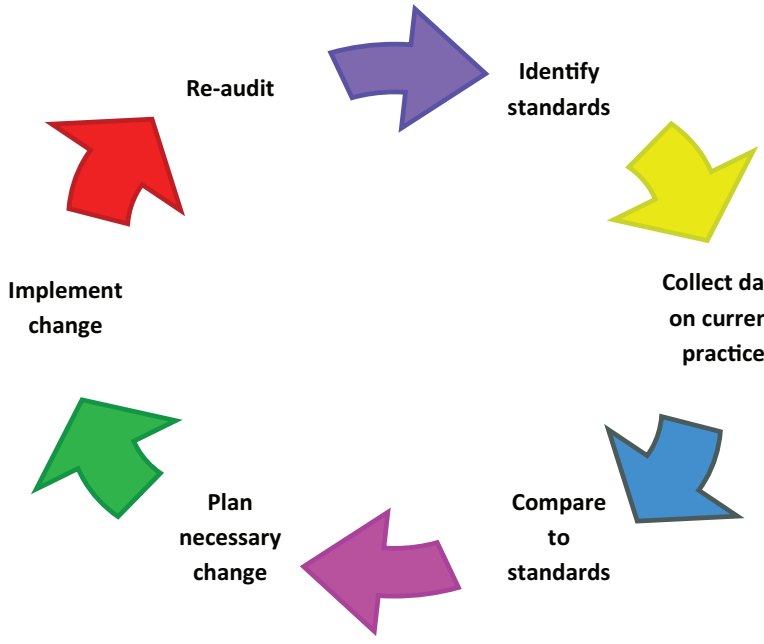
An audit is a validated method of assessing and improving process standards in several settings. The complete audit cycle consists of a multi-step approach of measuring, implementing quality improvements, and re-measuring. Such an approach creates a self-developing system of quality improvement. The objective of the COPD Audit is to improve service delivery of COPD care in Europe using a multi-step approach of audit methodology.

The audit was conducted using two linked data collection tools. The first was the collection of clinical data. The objectives were to measure treatment standards of COPD management for patients hospitalised with exacerbations in a representative number of European countries, in three phases of the care pathway: before hospital admission, during admission and at discharge. The second data tool comprised an evaluation of the organisation of care at the hospitals in the participating countries supplemented by information on availability of care facilities.

This report provides information at a national level benchmarking standards against the European average. Where relevant, GOLD guideline standards (2010) have been used to illustrate international recommendations for a particular process standard. We appreciate that many clinicians will feel that their allegiance is to their own national guidelines, but it is not possible within the context of a European audit to choose one such guideline above another. Where a national guideline varies when compared to the equivalent section within the GOLD document we understand that national practice may differ in that area, but ask clinicians to consider, if that variance is significantly different from the rest of European clinical practice, whether that variance is truly justified.

We have displayed information in tables and in figures that we hope provide the results in a format that is helpful to most, giving both a visual snapshot of the situation while also allowing a deeper analysis, where required, using the statistical data provided in tabular format.

Figure 1. Clinical audit cycle. The Royal College of Pathologists, 2011. Reproduced with permission.



The responsibility for the accuracy of the data included in the reports lies with the clinicians who reported to the Data Analysis Team. Where data points were outside reasonable limits of statistical variation the Data Analysis Team have made enormous efforts to request validation of the data entries.

As in all audits, some data is missing and some will not be fully accurate, but this report is the best possible representation of actual clinical practice across 13 European countries and, as such, represents the largest and most accurate dataset of its kind ever collected by European clinicians.

The audit is, however, more than the collection of data. It is the use of data to identify areas of strength and weakness in the care delivered to patients. This will then be used to formulate action plans to take forward improvements in the clinical service that, in turn, will result in better process of care, patient experience and outcomes. In time, the audit process will be repeated to measure the effectiveness of those improvements (figure 1).

We now urge those who read this document to make the most use possible of the data presented, to argue for improved care for COPD patients within each of the participant countries and across the whole of Europe. The challenge is not to attempt to deny or justify our weaknesses, but to better understand and to address them to the benefit of our patients.

COPD Audit Steering Board

Dr Sylvia Hartl

Prof. Michael Roberts

Prof. José Luis López-Campos

Introduction

Around 44 million people in Europe live with chronic obstructive pulmonary disease (COPD). COPD ranks as the fourth leading cause of morbidity and mortality in Europe, is the leading cause of healthcare costs and is a major drain on resources in both primary and secondary healthcare. Therefore, COPD has an increasingly high profile with health authorities, health insurance companies and healthcare providers in Europe.

Evidence is growing that COPD patient care varies widely between different hospitals and between different European countries, and is frequently not consistent with published guidelines. There are many different service models and it remains unknown which deliver the best results for patients. As stated by the Global Initiative for Chronic Obstructive Lung Disease (GOLD), there exist important differences between countries in the approach to chronic illnesses such as COPD and in the acceptability and affordability of particular forms of therapy. Ethnic differences in drug metabolism, especially for oral medications, may result in different patient preferences in different communities. Little is known about these important issues in relation to COPD (GOLD, 2010). In all likelihood, we can all improve the care we give to COPD patients if we have better knowledge of our own performance relating to patient care, and a greater understanding of the service organisational factors in European hospitals that promote better outcomes.

Changes in health policy, rising patient and public expectations and involvement, and the impact of organisational change on the provision and delivery of healthcare, are some of the contributing factors that influence the introduction of clinical governance within COPD care.

In order to improve knowledge, the initiative was taken to perform a COPD audit covering multiple European countries. From October 2010, 13 countries across Europe took part in the first European COPD Audit, a cross-sectional, multicentre study, collecting data (60-day admission period with 90-day follow-up) about the way hospitals provide care for COPD patients, as well as clinical data on the process of care and outcomes for COPD patients admitted to a hospital with an exacerbation.

This COPD Audit has collected over 16,000 clinical cases and organisational data from 422 hospitals, with a view to raising the standards of care to a level consistent with the best in Europe.

Methodology

The European COPD Audit is an observational, multicentre study. The data collection is specific to patients experiencing a COPD exacerbation resulting in admission to hospital. Clinical cases were identified prospectively, with process of care and 90-day clinical outcomes audited retrospectively.

All data have been collected and stored *via* a multilingual web-based database (webtool), developed by IDCode (Lausanne, Switzerland). It was accessible *via* the secured domain of the project website (www.erscopdaudit.org). Security and confidentiality were maintained by using login names and passwords. It was organised as a hierarchical tool with different levels of responsibilities and rights to process data. At the national level there was a hierarchy of access for country administrators (national experts) down to the local level hospital managers and doctors or research nurses coordinating the local data collection (local investigators). All patient related data was anonymised at the level of data collection.

Governance

The project was overseen by the Steering Board, which reported to the ERS Executive Committee. The Steering Board worked with the national experts to form an operational group that was responsible for ensuring the

success of the data collection and that provided feedback on the process and suggested improvements for the audit processes. Each participating national society nominated one or more national experts to represent their views in this forum. Within each participating national society, a number of investigators were appointed, each operating at individual hospital level and responsible for local data collection. Where access to data required formal ethical research committee approval this was sought and provided according to individual national convention.

The project was managed and funded centrally by the European Respiratory Society. In some cases individual national societies raised additional funding to support the project at a national level.

Figure 2. Project governance.

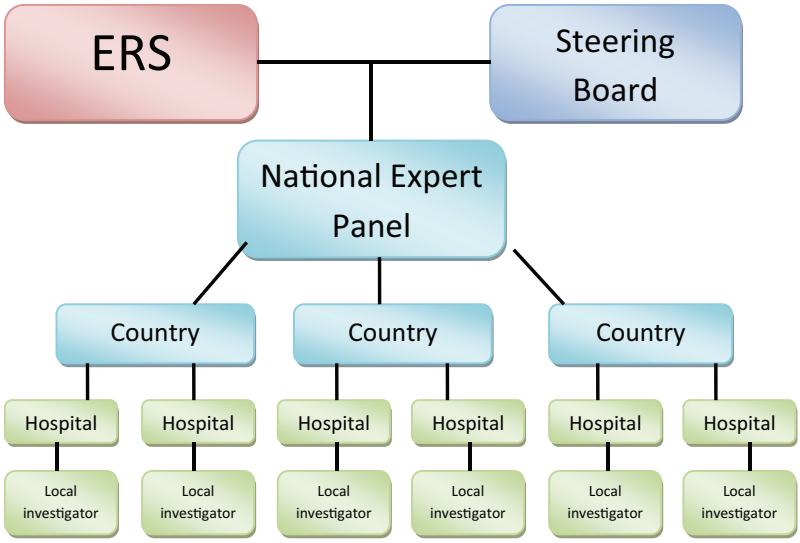
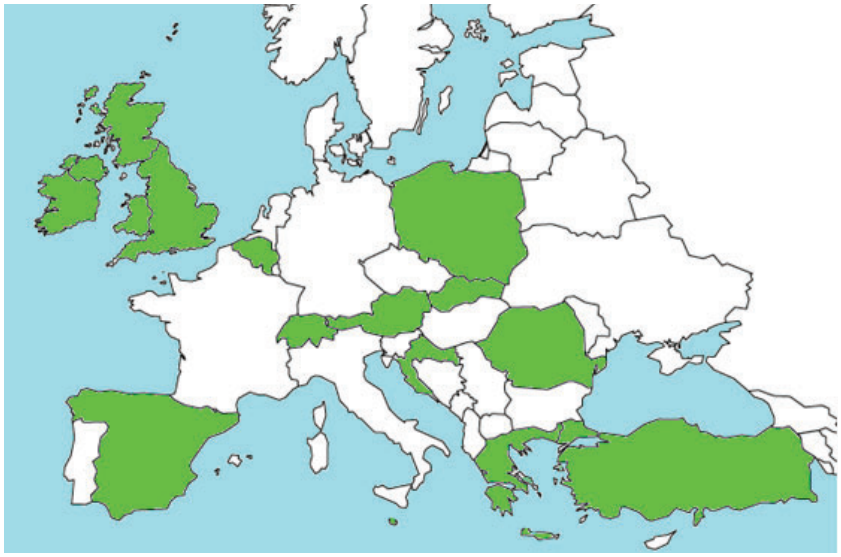


Figure 3. Participant countries.



Stages

The study comprised the following different stages:

1) Webtool creation: the dataset was established according to guideline recommendations for treatment of COPD exacerbations and outcome markers were added. The clinical questionnaire was validated in a modified Delphi

process by all national experts and reduced to a core pilot dataset that included a significant and achievable number of items.

2) Establishing and training local teams: the steering group provided training in the audit methodology to national representatives at a series of meetings in London, UK and Vienna, Austria. Each national society was then responsible for organising appropriate levels of training of participants within that country. Further email and telephone support was available to participants from the steering group when required. A specific memorandum of understanding was signed by all participating national societies.

3) Data collection: there were two different starting and ending points for clinical data collection, depending upon the preference of the national society for commencing the audit (see later for details). Organisational data for a country was collected during the clinical data collection period for that country.

4) Data processing and report creation: on completion of case submission, the data had to be cleaned and validated. National and local reports will be published and distributed to participants during 2011–2012. The ownership of the COPD Audit data remains with the ERS. National partners have the right to request proposals for analyses that will further the understanding of the audit data.

Webtool

The secured part of the COPD Audit webtool could only be entered by participants using personalised usernames and passwords. Due to the hierarchy of the webtool, a case was open for changes until submission. After this, only the ERS and the COPD Audit Steering Board could change the content of a case in order to prepare it for statistical processing at the European level.

Online "help-notes" for each question were accessible within the webtool. These contained the rationale for each question, suggestions for sources of data and, where appropriate, references to the guidance from which standards emerged. Some modifications were made to the webtool to improve the usability and content of the surveys following user feedback.

A number of supporting documents were posted within the secure part of the website, including a guide on how to use the webtool and a question and answer document. Updates were either shared with the participants *via* the webtool and/or *via* the national experts. Biweekly newsletters with updates on the progress were distributed and regular conference calls with the national partners were held to discuss the progress and occurring issues.

Both local investigators and national experts were encouraged to check the accuracy of their completed data prior to validation. After validation and end of the data collection the ERS, the Steering Board and the Data Analysis Team checked the database for any missing, extreme or inconsistent values and contacted the investigators to retrieve the correct information when possible.

Data collection period

The unexpectedly high level of recruitment to the audit provided challenges to the administration of the project. A decision was taken to create two groups of countries with different data collection dates, which would allow better management of the project and greater preparation time for countries requiring ethical permissions. Each national society was given a choice over the two start dates.

Group 1: Austria, England, Wales, Northern Ireland, Scotland, Slovakia and Poland.
October 25 until December 19, 2010 with a 90-day follow-up. Final deadline: April 15, 2011

Group 2: Belgium, Greece, Spain, Switzerland, Croatia, Romania, Malta, Turkey and Ireland.
January 3 until February 27, 2011 with a 90-day follow-up. Final deadline: June 22, 2011

Presentation of results

This report shows the European results of the first European COPD Audit, an overview of data distribution for each variable both at European and at national level.

There are two separate results sections:

Section 1. Resources and organisation of COPD care across Europe.

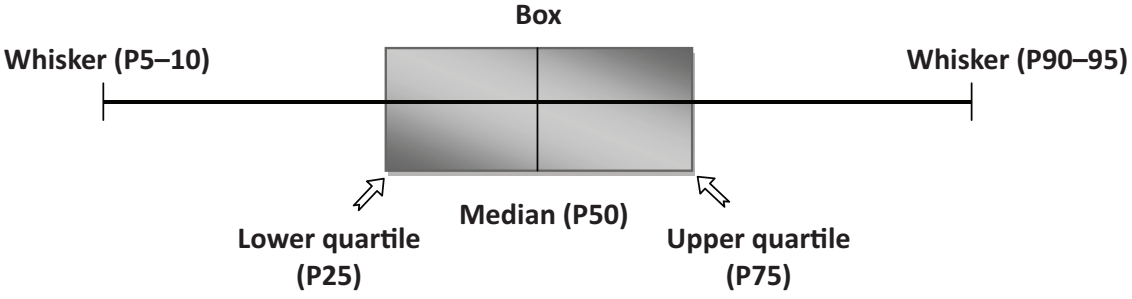
Section 2. Process of care and clinical outcomes for COPD patients admitted with an exacerbation across Europe.

Each variable has been analysed separately at national level within Europe and across countries displaying measures of central tendency and dispersion of values. The analysis so far is purely descriptive and no account of hospital clustering has been made at this stage. Outlying values beyond the 2.5–97.5% range deemed not to be credible have been removed from the present analysis.

The variables measured as nominal or ordinal scales are given as proportions. "Patients" refers to the total number of patients available to be included (denominator); "number" to the number of patients with the attribute (numerator); and "%" to the proportion. One part of the figures consists of a vertical bar chart with the frequencies per country.

The variables measured as numerical or ratio scales are given as median (P50), interquartile range (P25–P75), and the 10th and 90th percentiles (P10–P90) for organisational data, and the 5th and 95th percentiles (P5–P95) for clinical data. These values are represented graphically as a box plot. All extreme values situated beyond the whiskers are represented as dots.

Figure 4. Box and whiskers plot.



Please note that this report only represents the data provided by the participants of the COPD Audit. The responsibility for the provision of accurate data lies with these participants and not the Data Analysis Team, COPD Audit Steering Board or the European Respiratory Society.

Section 1. Resources and organisation of COPD care across Europe

How many hospitals completed the organisational survey?

This section of the report describes the data collected from the organisation and resources audit. 422 hospitals completed and returned this survey. From within this group, 374 hospitals completed both the organisational survey and the clinical data capture. The results from the combined survey are merged into a single conjoint database that will be used for further analysis to explore the relationships between organisation, resources with clinical processes and outcomes. The data in this report relates to the surveys returned from the 422 hospitals.

Table 1. Total number of hospitals completing the organisational survey.

	Frequency	Percent	Cumulative frequency
EUROPE	422	100	0
1. Austria	49	11.61	49
2. Belgium	23	5.45	72
3. Croatia	10	2.37	82
4. Greece	23	5.45	105
5. Malta	1	0.24	106
6. Poland	40	9.48	146
7. Ireland	11	2.61	157
8. Romania	10	2.37	167
9. Slovakia	3	0.71	170
10. Spain	94	22.27	264
11. Switzerland	19	4.50	283
12. Turkey	22	5.21	305
13. UK	117	27.73	422

General hospital organisation and resources

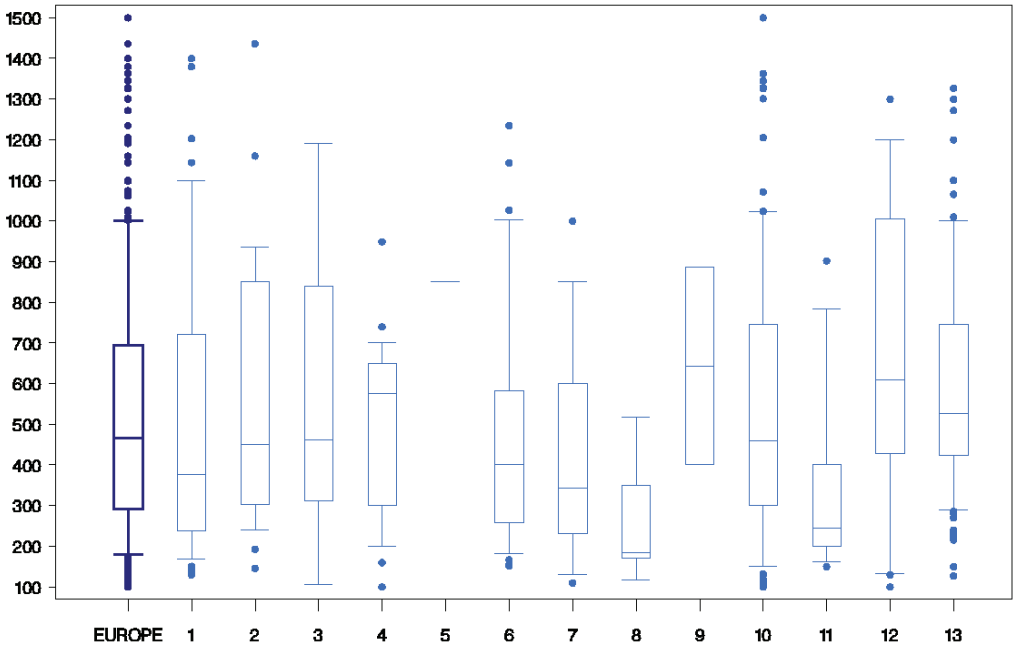
Hospitals and organisation

What is the total number of beds in the hospital?

In order to characterise each hospital, we recorded the size, equipment status, staffing and contracting authority. The scale of involvement of a hospital in COPD treatment was reflected by the population catchment and the number of emergency admissions in the previous year. These data will provide a basis for future comparative analyses.

Table 2. Total number of hospital beds.

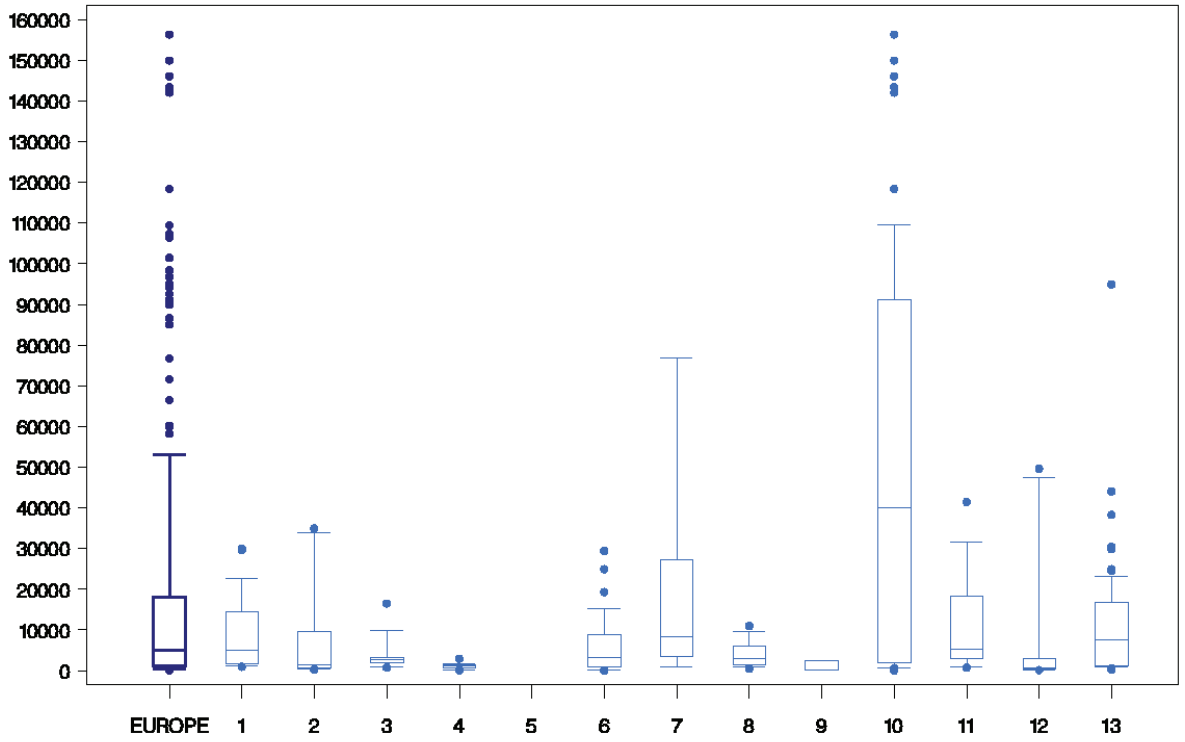
	Hospitals	Median	P25–P75		P10–P90	
EUROPE	400	466	293	695	180	1001
1. Austria	47	377	238	720	169	1098
2. Belgium	21	450	302	850	240	935
3. Croatia	8	461	312	840	105	1191
4. Greece	22	575	300	650	200	700
5. Malta	1	850				
6. Poland	38	400	258	583	182	1002
7. Ireland	11	343	230	600	131	851
8. Romania	9	185	170	350	118	517
9. Slovakia	2	644	400	887	400	887
10. Spain	91	460	300	745	150	1023
11. Switzerland	18	245	200	400	161	784
12. Turkey	20	610	429	1006	133	1200
13. UK	112	527	423	747	290	1000



How many emergency admissions for any cause did your unit take in 2009?

Table 3. Emergency admissions for any cause in 2009.

	Hospitals	Median	P25–P75		P10–P90	
EUROPE	298	5000	1112	18000	518	53000
1. Austria	27	5000	1708	14515	1149	22597
2. Belgium	16	1480	572	9680	500	34000
3. Croatia	10	2751	1975	3100	1015	9987
4. Greece	15	1200	700	1500	250	1754
5. Malta	0					
6. Poland	33	3299	981	8900	131	15326
7. Ireland	8	8290	3358	27370	905	76776
8. Romania	10	2950	1363	6000	815	9628
9. Slovakia	3	150	110	2400	110	2400
10. Spain	67	40097	1910	91250	691	109500
11. Switzerland	15	5220	3000	18201	1000	31632
12. Turkey	17	719	300	3000	213	47536
13. UK	77	7631	1300	16776	800	23122

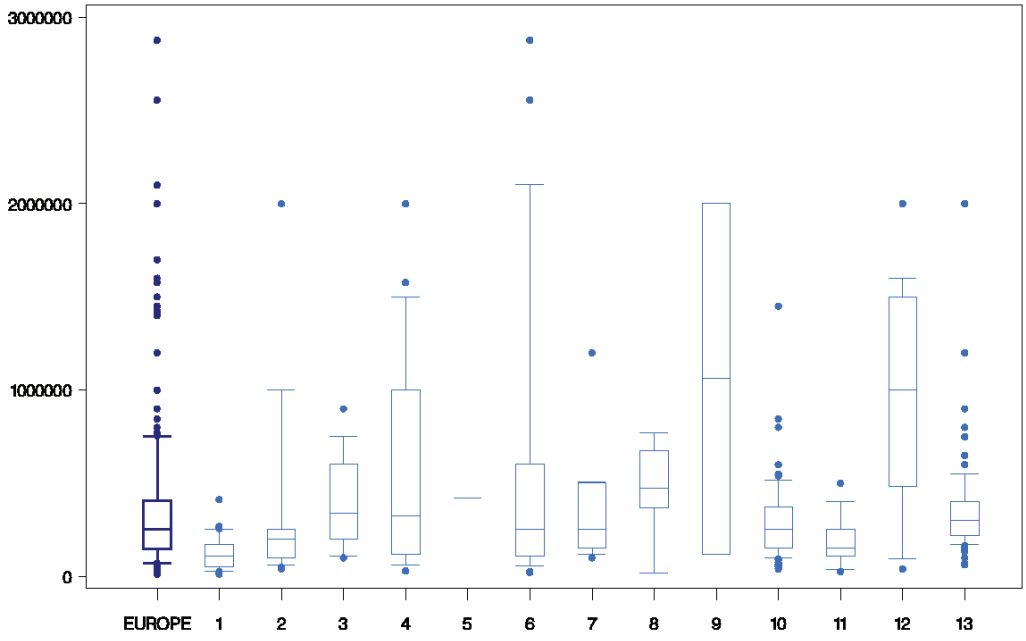


How many people may have access to your hospital?

This question caused some difficulty in interpretation where the organisation of care varied across European countries. The catchment population reflects the population that has access to a hospital. The "service population" of a hospital normally is determined by loco-regional determinants (*i.e.* distance between the hospital and living place) and specialty of the hospital (supra-regional or national centres). There is a considerable difference of official definition of catchment in different European countries. For example, in a national referral centre, the catchment population was taken to be that of the whole population of the country. The overlap of catchment in neighbouring hospitals in some countries led to sums exceeding the total national population.

Table 4. Hospital catchment area.

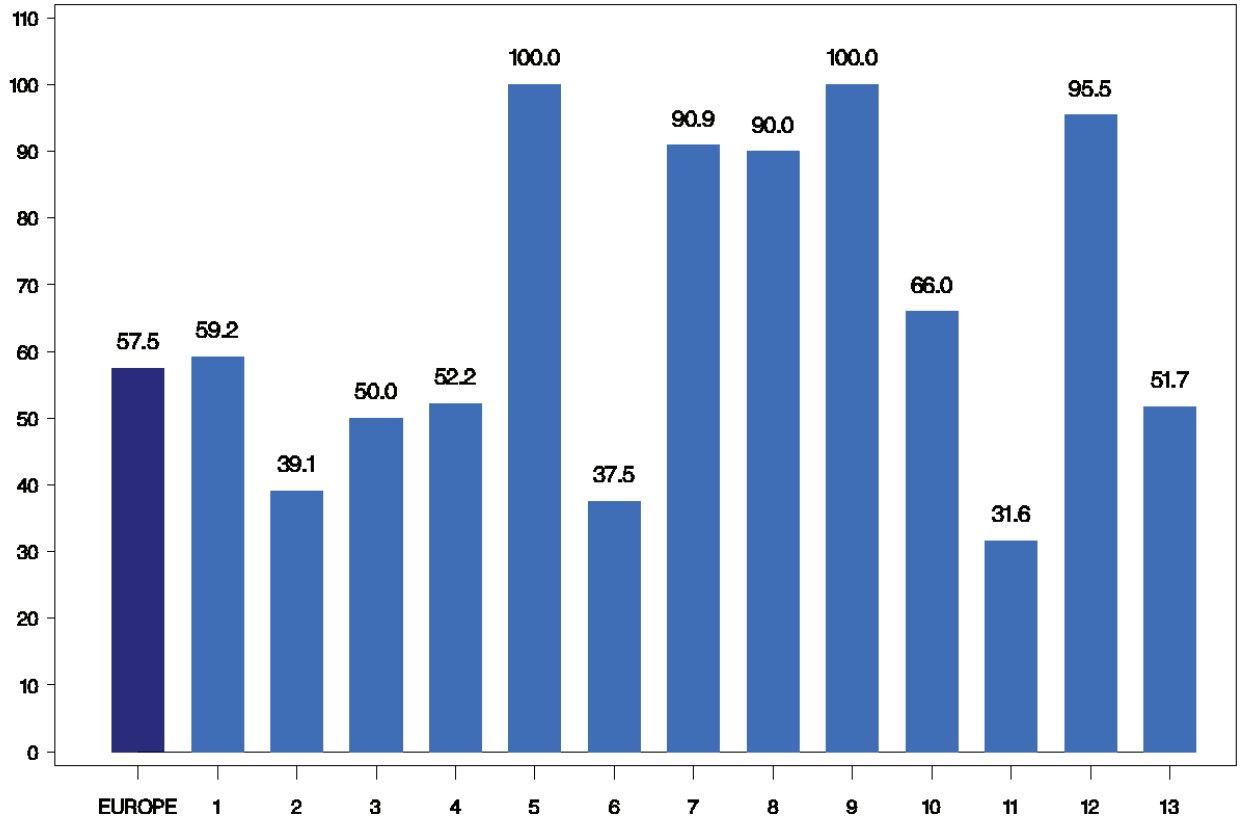
	Hospitals	Median	P25–P75		P10–P90	
EUROPE	399	250000	147000	405085	70000	750000
1. Austria	46	106103	50086	172456	28697	250000
2. Belgium	21	200000	100000	250000	60000	1000000
3. Croatia	10	340000	200000	600000	110000	750000
4. Greece	22	325000	120000	1000000	60000	1500000
5. Malta	1	417608				
6. Poland	37	250000	110000	600000	58000	2100000
7. Ireland	11	250000	150000	500000	120000	505739
8. Romania	8	475000	369500	675000	17000	770000
9. Slovakia	2	1060000	120000	2000000	120000	2000000
10. Spain	93	250000	150000	370000	99850	515000
11. Switzerland	18	150000	110000	250000	34677	400000
12. Turkey	16	1000000	480335	1500000	96000	1600000
13. UK	114	300000	220000	400000	170000	550000



What is the type of the hospital? Teaching/university hospital?

Table 5. Hospital type: teaching/university hospital.

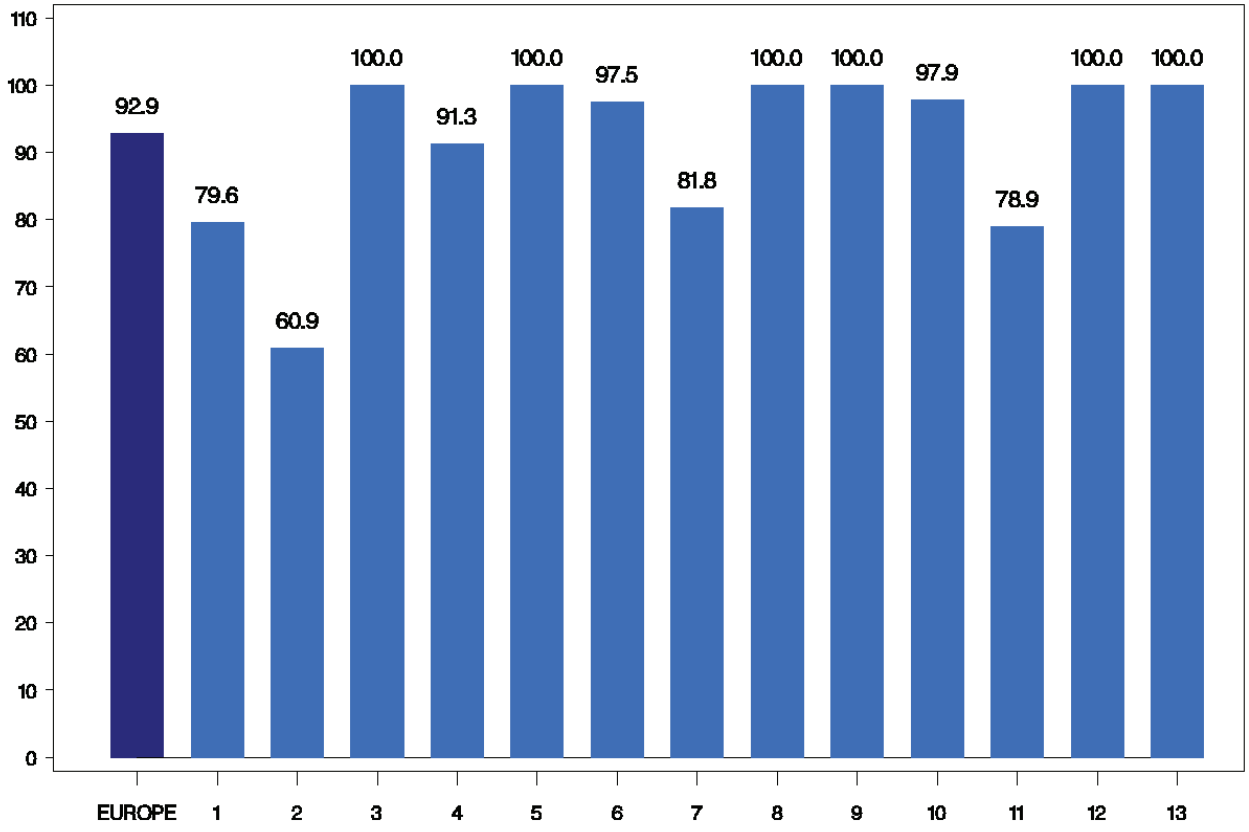
	Hospitals	Number	%
EUROPE	421	242	57.5
1. Austria	49	29	59.2
2. Belgium	23	9	39.1
3. Croatia	10	5	50.0
4. Greece	23	12	52.2
5. Malta	1	1	100.0
6. Poland	40	15	37.5
7. Ireland	11	10	90.9
8. Romania	10	9	90.0
9. Slovakia	3	3	100.0
10. Spain	94	62	66.0
11. Switzerland	19	6	31.6
12. Turkey	22	21	95.5
13. UK	116	60	51.7



Hospitals included in this survey were mainly government or state funded but a minority were privately funded.

Table 6. Public hospitals.

	Hospitals	Number	%
EUROPE	420	390	92.9
1. Austria	49	39	79.6
2. Belgium	23	14	60.9
3. Croatia	10	10	100.0
4. Greece	23	21	91.3
5. Malta	1	1	100.0
6. Poland	40	39	97.5
7. Ireland	11	9	81.8
8. Romania	10	10	100.0
9. Slovakia	3	3	100.0
10. Spain	94	92	97.9
11. Switzerland	19	15	78.9
12. Turkey	22	22	100.0
13. UK	115	115	100.0

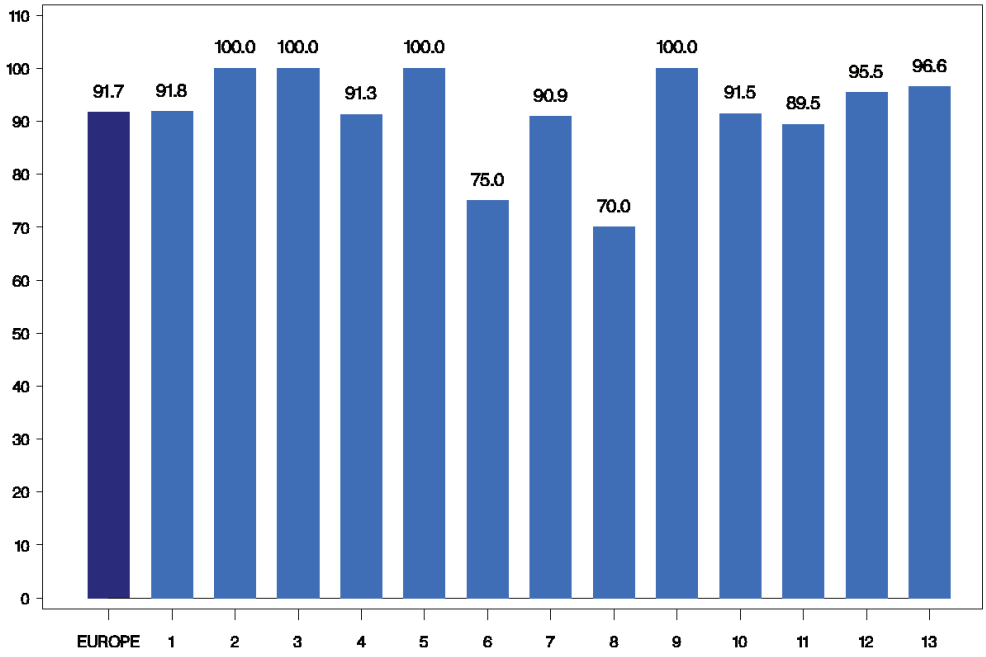


Does your hospital have an intensive care unit?

In 91.7% of the hospitals, an intensive care unit (ICU) was available. Intensive care has a high standard of staff and technical equipment and, therefore, is a limited resource. The calculated need for ICU beds may vary with the mandate of the hospital: in many countries the ring fencing protection of ICU beds for either surgical or internal medicine diseases is common, which is why not all ICUs or all ICU beds are available for COPD patients.

Table 7. Availability of ICU.

	Hospitals	Number	%
EUROPE	421	386	91.7
1. Austria	49	45	91.8
2. Belgium	23	23	100.0
3. Croatia	10	10	100.0
4. Greece	23	21	91.3
5. Malta	1	1	100.0
6. Poland	40	30	75.0
7. Ireland	11	10	90.9
8. Romania	10	7	70.0
9. Slovakia	3	3	100.0
10. Spain	94	86	91.5
11. Switzerland	19	17	89.5
12. Turkey	22	21	95.5
13. UK	116	112	96.6

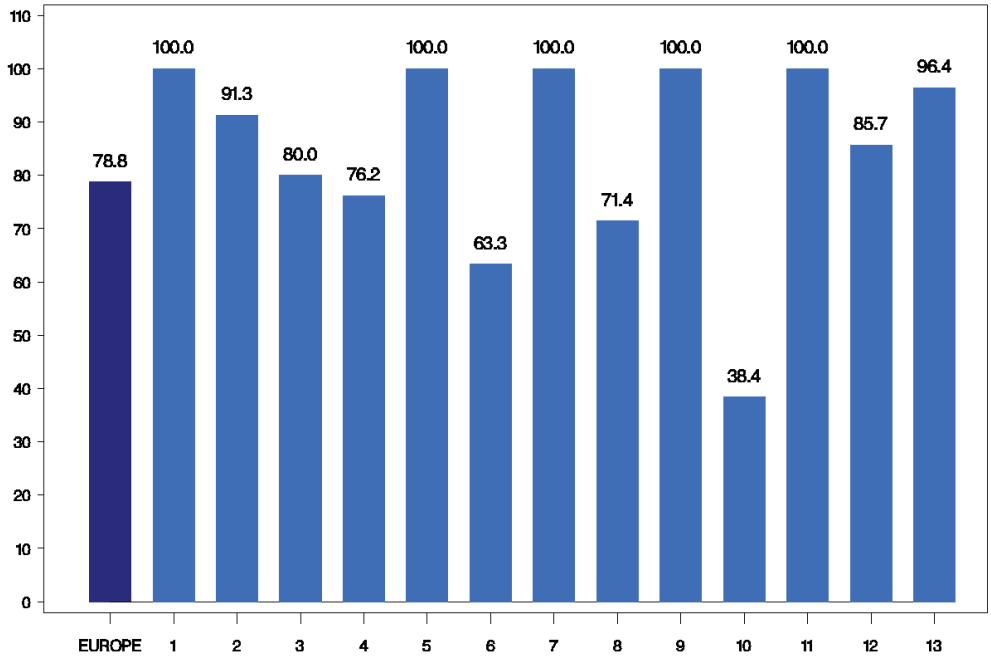


Does your hospital have an ICU that admits COPD patients?

In a significant proportion of hospitals it was stated that the existing ICU facility did not admit COPD patients. This may have been for a variety of reasons but again raises serious concerns about the suitability of such hospitals to provide optimum care for acidotic COPD patients.

Table 8. ICUs admitting COPD patients.

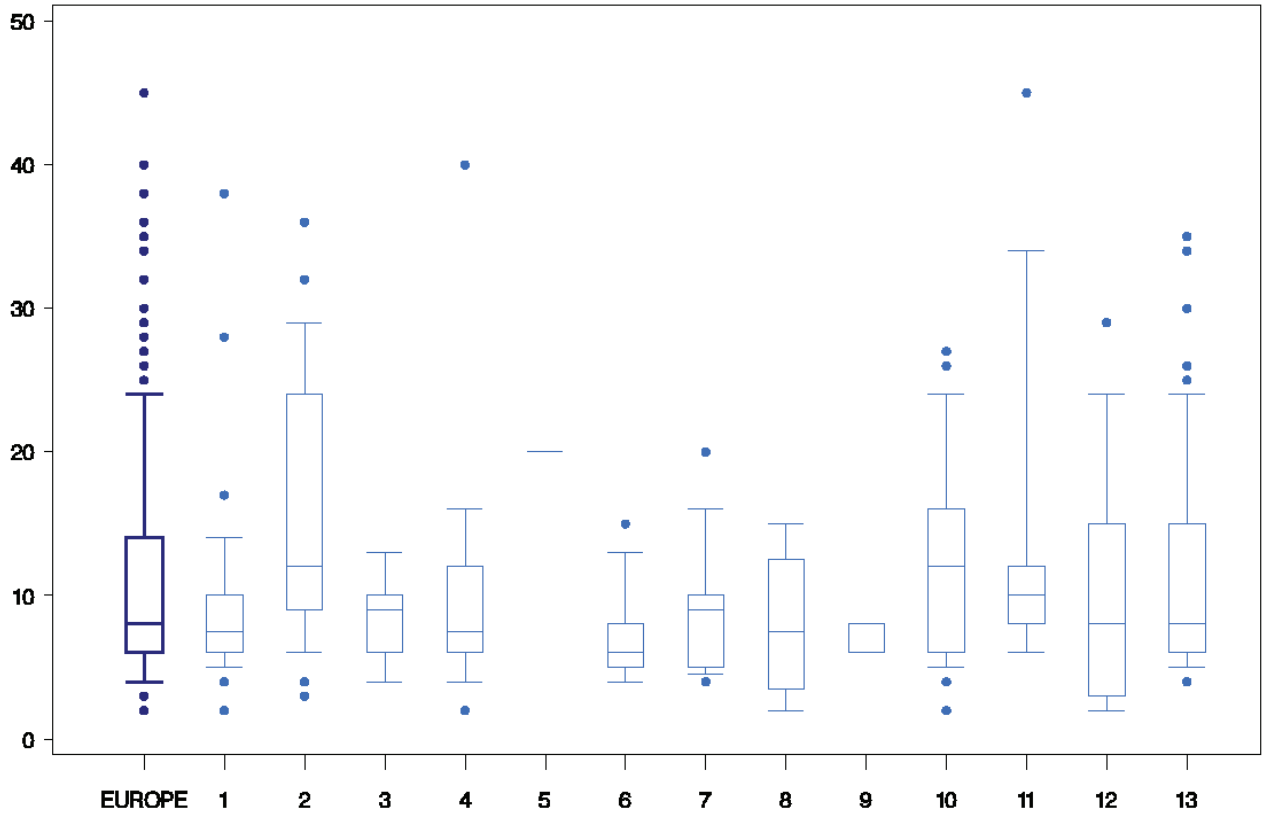
	Hospitals	Number	%
EUROPE	386	304	78.8
1. Austria	45	45	100.0
2. Belgium	23	21	91.3
3. Croatia	10	8	80.0
4. Greece	21	16	76.2
5. Malta	1	1	100.0
6. Poland	30	19	63.3
7. Ireland	10	10	100.0
8. Romania	7	5	71.4
9. Slovakia	3	3	100.0
10. Spain	86	33	38.4
11. Switzerland	17	17	100.0
12. Turkey	21	18	85.7
13. UK	112	108	96.4



If your unit has an ICU that admits COPD patients, how many beds are there?

Table 9. Number of beds in ICU admitting COPD patients.

	Hospitals	Median	P25–P75		P10–P90	
EUROPE	294	8	6	14	4	24
1. Austria	42	8	6	10	5	14
2. Belgium	21	12	9	24	6	29
3. Croatia	7	9	6	10	4	13
4. Greece	16	8	6	12	4	16
5. Malta	1	20				
6. Poland	19	6	5	8	4	13
7. Ireland	10	9	5	10	5	16
8. Romania	4	8	4	13	2	15
9. Slovakia	3	6	6	8	6	8
10. Spain	29	12	6	16	5	24
11. Switzerland	17	10	8	12	6	34
12. Turkey	18	8	3	15	2	24
13. UK	107	8	6	15	5	24



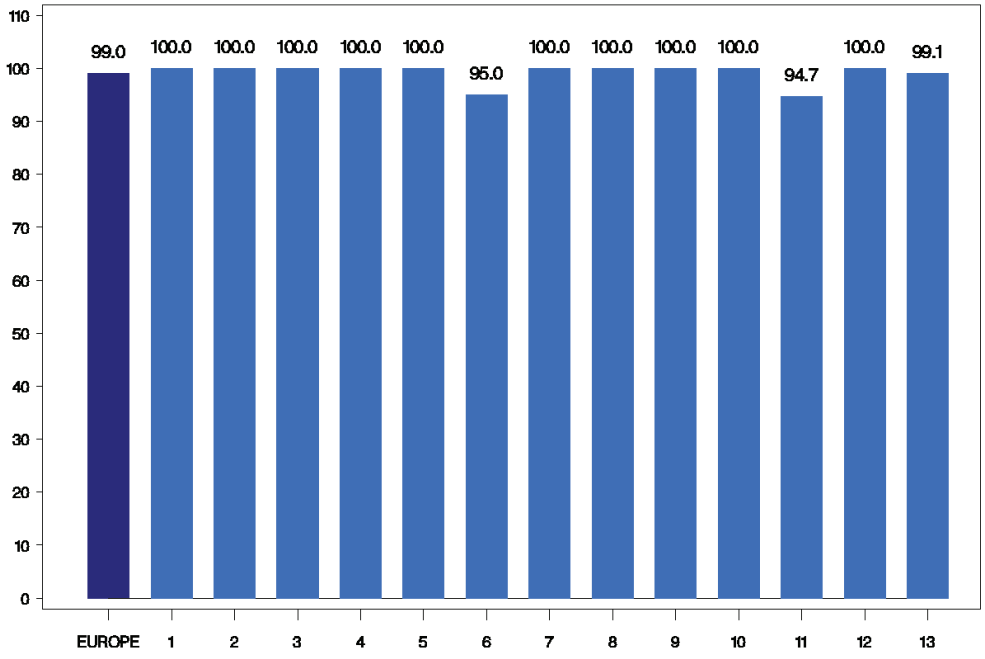
General resources

Does your hospital have spirometry available?

It was determined whether spirometry was available within the hospital. It was in nearly all cases, but this contrasts markedly with the clinical availability of recorded spirometry within the clinical section of the audit. This raises issues about the organisational availability of spirometry to inpatients and the limitations of data availability within clinical case notes, or may simply be due to poor awareness among clinicians of the requirement to confirm a diagnosis of COPD with spirometry.

Table 10. Spirometry availability.

	Hospitals	Number	%
EUROPE	421	417	99.0
1. Austria	49	49	100.0
2. Belgium	23	23	100.0
3. Croatia	10	10	100.0
4. Greece	23	23	100.0
5. Malta	1	1	100.0
6. Poland	40	38	95.0
7. Ireland	11	11	100.0
8. Romania	10	10	100.0
9. Slovakia	3	3	100.0
10. Spain	94	94	100.0
11. Switzerland	19	18	94.7
12. Turkey	22	22	100.0
13. UK	116	115	99.1

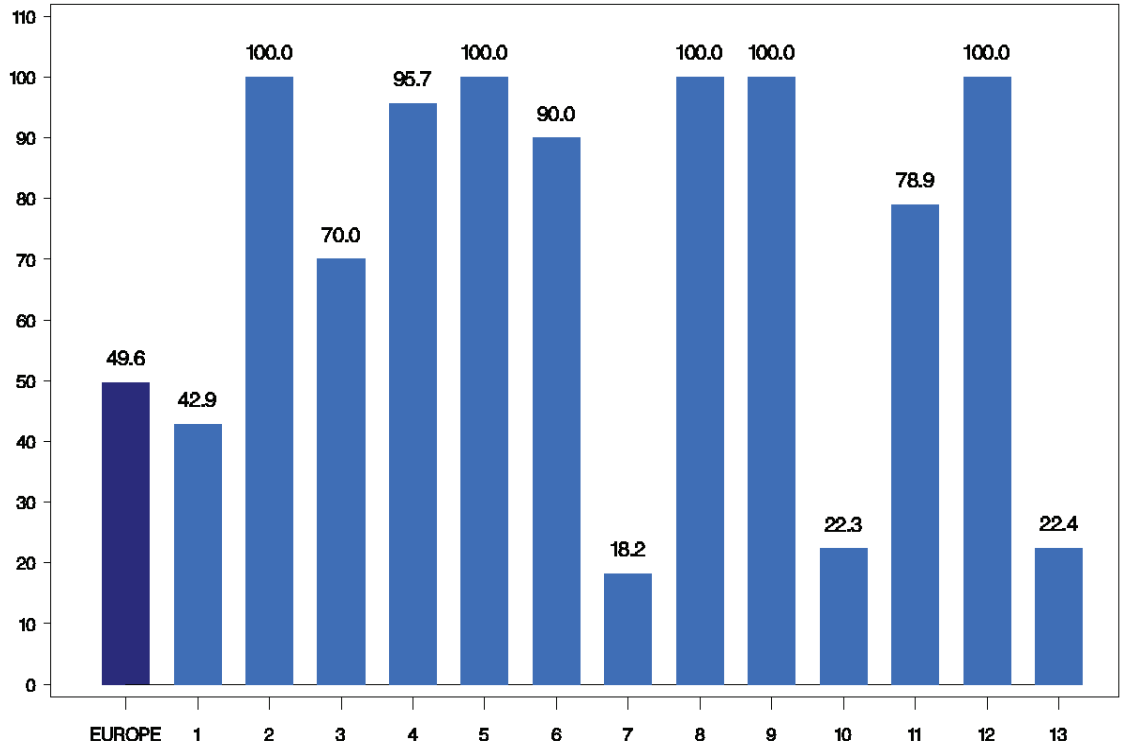


Is there a respiratory physician on call every day of the year?

The relative lack of available respiratory specialists is a significant challenge to the respiratory community and asks serious questions about what standard of specialty access is deemed acceptable.

Table 11. Respiratory specialist on call every day of the year.

	Hospitals	Number	%
EUROPE	421	209	49.6
1. Austria	49	21	42.9
2. Belgium	23	23	100.0
3. Croatia	10	7	70.0
4. Greece	23	22	95.7
5. Malta	1	1	100.0
6. Poland	40	36	90.0
7. Ireland	11	2	18.2
8. Romania	10	10	100.0
9. Slovakia	3	3	100.0
10. Spain	94	21	22.3
11.Switzerland	19	15	78.9
12. Turkey	22	22	100.0
13. UK	116	26	22.4

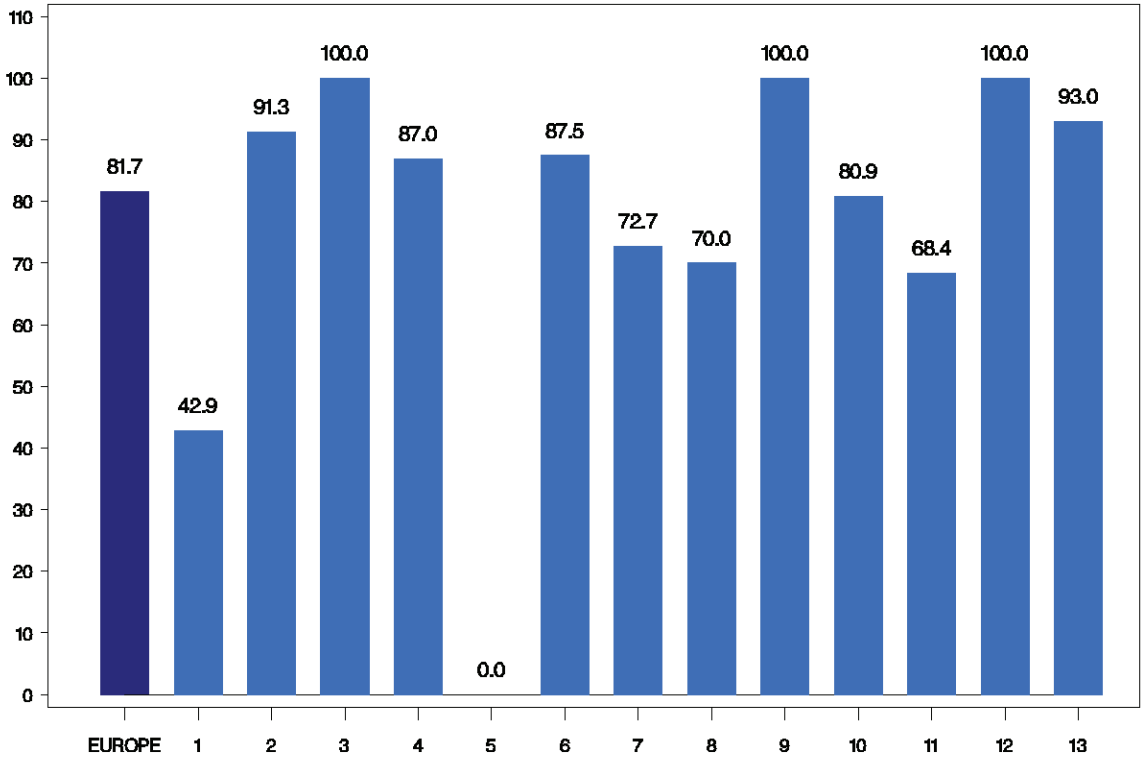


Does your hospital have a respiratory ward?

Specialist respiratory care consists of a multidisciplinary approach to patient care that includes nursing, physiotherapy and social care expertise that is often best delivered in a dedicated specialty setting.

Table 12. Respiratory ward available.

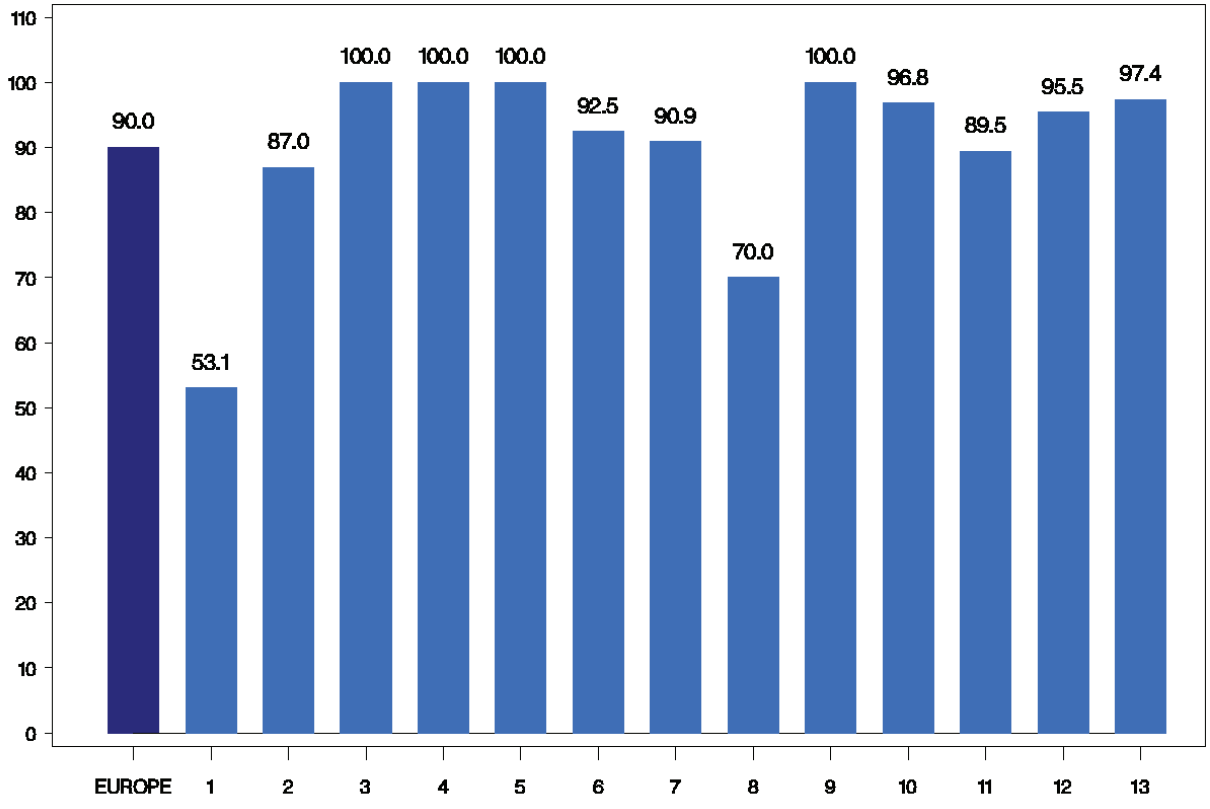
	Hospitals	Number	%
EUROPE	420	343	81.7
1. Austria	49	21	42.9
2. Belgium	23	21	91.3
3. Croatia	10	10	100.0
4. Greece	23	20	87.0
5. Malta	1	0	0.0
6. Poland	40	35	87.5
7. Ireland	11	8	72.7
8. Romania	10	7	70.0
9. Slovakia	3	3	100.0
10. Spain	94	76	80.9
11. Switzerland	19	13	68.4
12. Turkey	22	22	100.0
13. UK	115	107	93.0



Does your hospital have a respiratory team?

Table 13. Respiratory team available.

	Hospitals	Number	%
EUROPE	421	379	90.0
1. Austria	49	26	53.1
2. Belgium	23	20	87.0
3. Croatia	10	10	100.0
4. Greece	23	23	100.0
5. Malta	1	1	100.0
6. Poland	40	37	92.5
7. Ireland	11	10	90.9
8. Romania	10	7	70.0
9. Slovakia	3	3	100.0
10. Spain	94	91	96.8
11. Switzerland	19	17	89.5
12. Turkey	22	21	95.5
13. UK	116	113	97.4

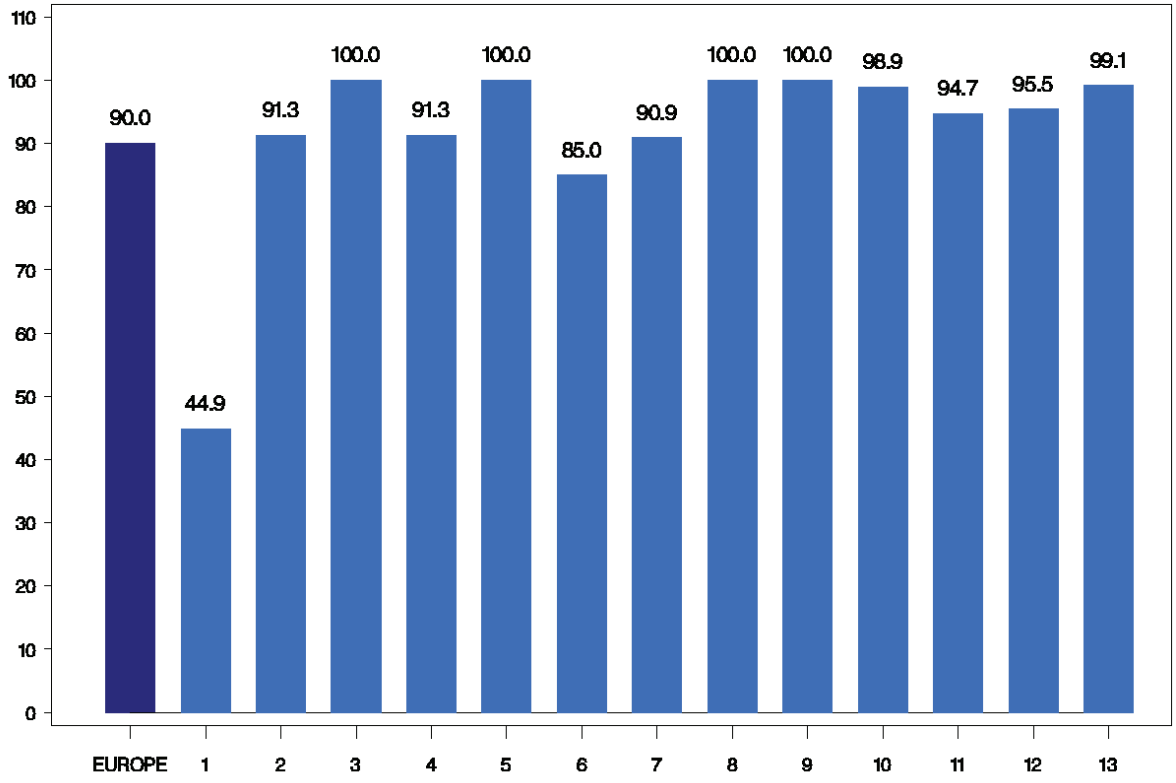


Resources of the unit

Does your unit have a respiratory outpatient clinic available?

Table 14. Respiratory outpatient clinic available.

	Hospitals	Number	%
EUROPE	422	380	90.0
1. Austria	49	22	44.9
2. Belgium	23	21	91.3
3. Croatia	10	10	100.0
4. Greece	23	21	91.3
5. Malta	1	1	100.0
6. Poland	40	34	85.0
7. Ireland	11	10	90.9
8. Romania	10	10	100.0
9. Slovakia	3	3	100.0
10. Spain	94	93	98.9
11. Switzerland	19	18	94.7
12. Turkey	22	21	95.5
13. UK	117	116	99.1

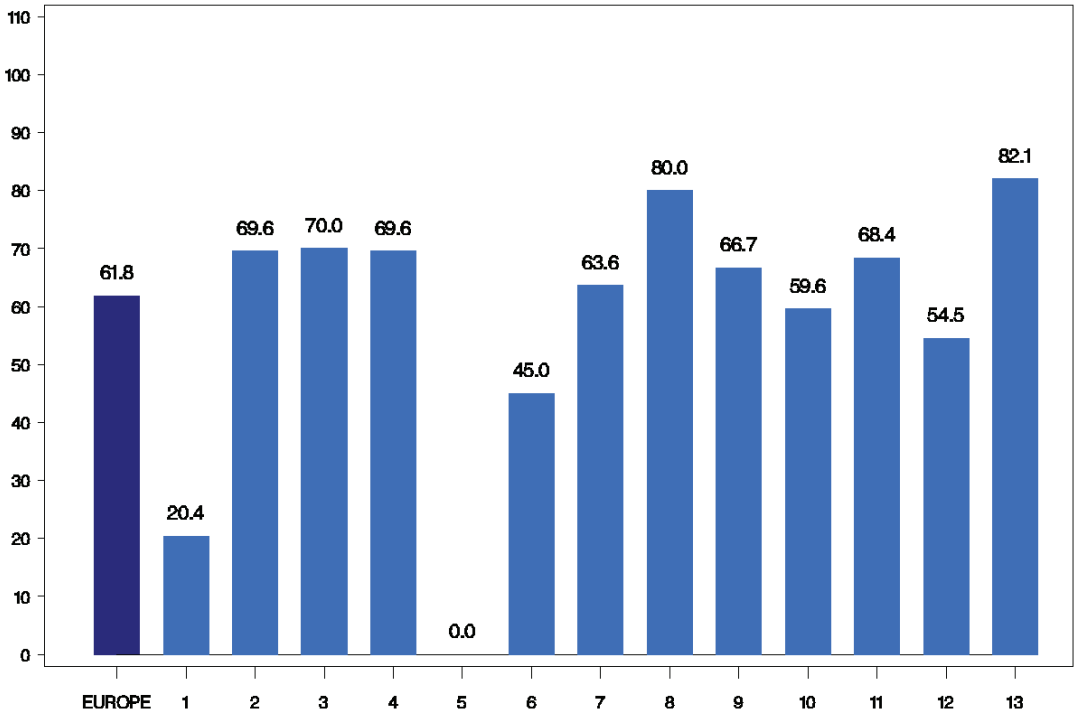


Does your unit have an outpatient clinic for COPD?

The respiratory outpatient clinic question was interpreted differently by some participants to mean, in some cases, a specialist outpatient clinic just for COPD patients, which was the original meaning of the question, but by others as an outpatient clinic in which a variety of patients, including those with COPD, could be seen. The responses must therefore be treated with some caution.

Table 15. Respiratory outpatient clinic for COPD.

	Hospitals	Number	%
EUROPE	422	261	61.8
1. Austria	49	10	20.4
2. Belgium	23	16	69.6
3. Croatia	10	7	70.0
4. Greece	23	16	69.6
5. Malta	1	0	0.0
6. Poland	40	18	45.0
7. Ireland	11	7	63.6
8. Romania	10	8	80.0
9. Slovakia	3	2	66.7
10. Spain	94	56	59.6
11. Switzerland	19	13	68.4
12. Turkey	22	12	54.5
13. UK	117	96	82.1



Respiratory (COPD) care related organisation and resources

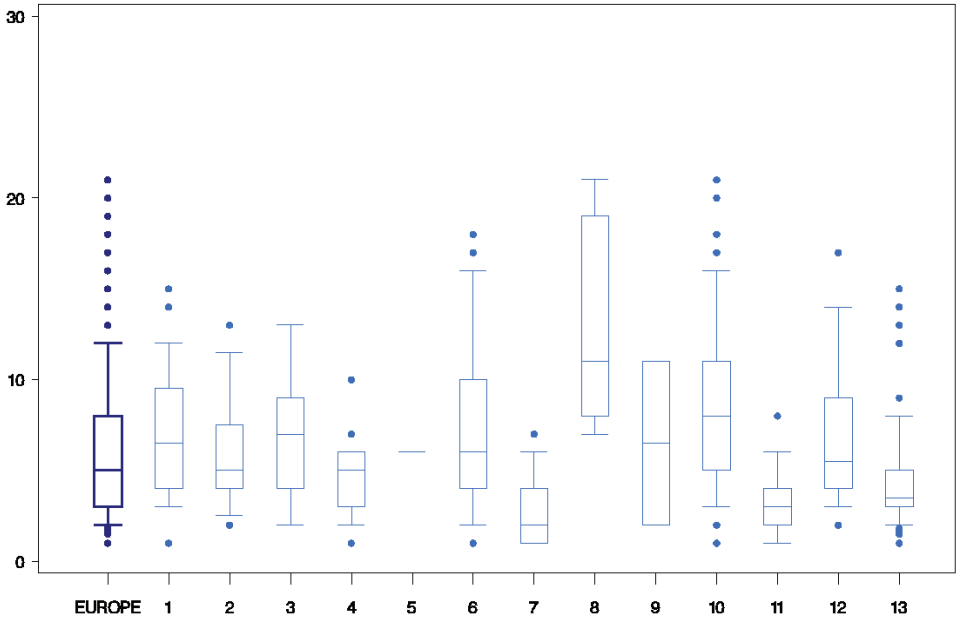
Staffing

How many respiratory specialists are there in your unit?

Previous studies have suggested that staffing levels of both doctors and nurses affect the standard of care delivered to patients. It is notable that the numbers vary considerable across countries; however, high numbers do not always correlate with other organisational improvements, such as daily specialty cover, emphasising that the intelligent deployment of resources is key to optimising service delivery.

Table 16. Respiratory specialists available.

	Hospitals	Median	P25–P75		P10–P90	
EUROPE	364	5	3	8	2	12
1. Austria	24	7	4	10	3	12
2. Belgium	20	5	4	8	3	12
3. Croatia	9	7	4	9	2	13
4. Greece	23	5	3	6	2	6
5. Malta	1	6				
6. Poland	33	6	4	10	2	16
7. Ireland	10	2	1	4	1	6
8. Romania	6	11	8	19	7	21
9. Slovakia	2	7	2	11	2	11
10. Spain	90	8	5	11	3	16
11. Switzerland	17	3	2	4	1	6
12. Turkey	18	6	4	9	3	14
13. UK	111	4	3	5	2	8

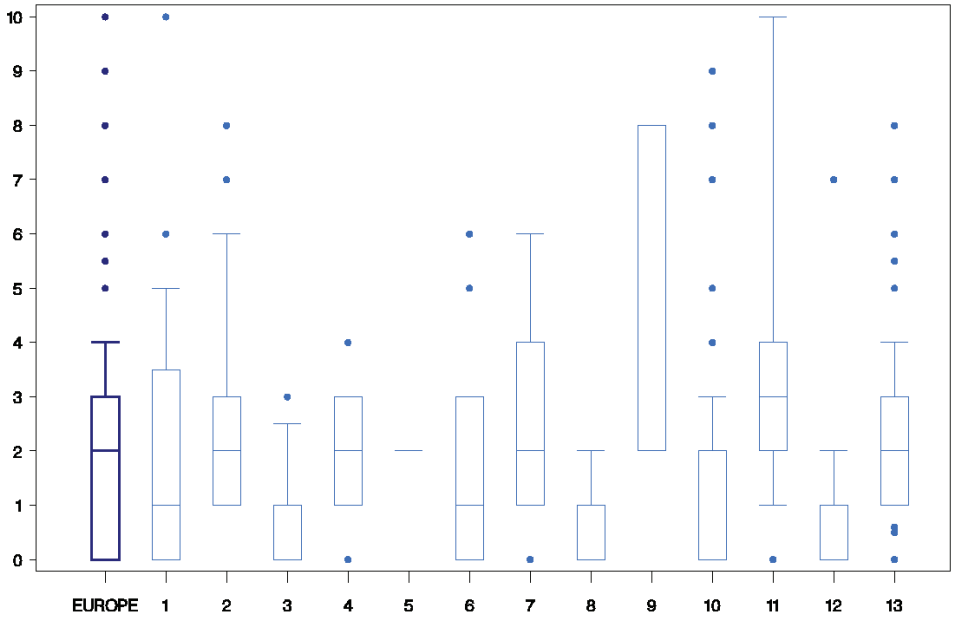


How many chest physiotherapists/respiratory therapists are there in your unit?

In some countries there are well-developed specialist roles for nurses who train specifically within respiratory medicine or a sub-speciality such as COPD. These nurses will take on advanced roles that may include outpatient clinical management and prescribing of medications. In other countries, this role is not developed beyond that of working within a respiratory ward. This question was, therefore, answered differently in some cases, depending upon the national context, and the data must be interpreted with caution. What is clear is that there is potential to share across Europe the benefits of the extended nurse specialist role.

Table 17. Respiratory physiotherapists available.

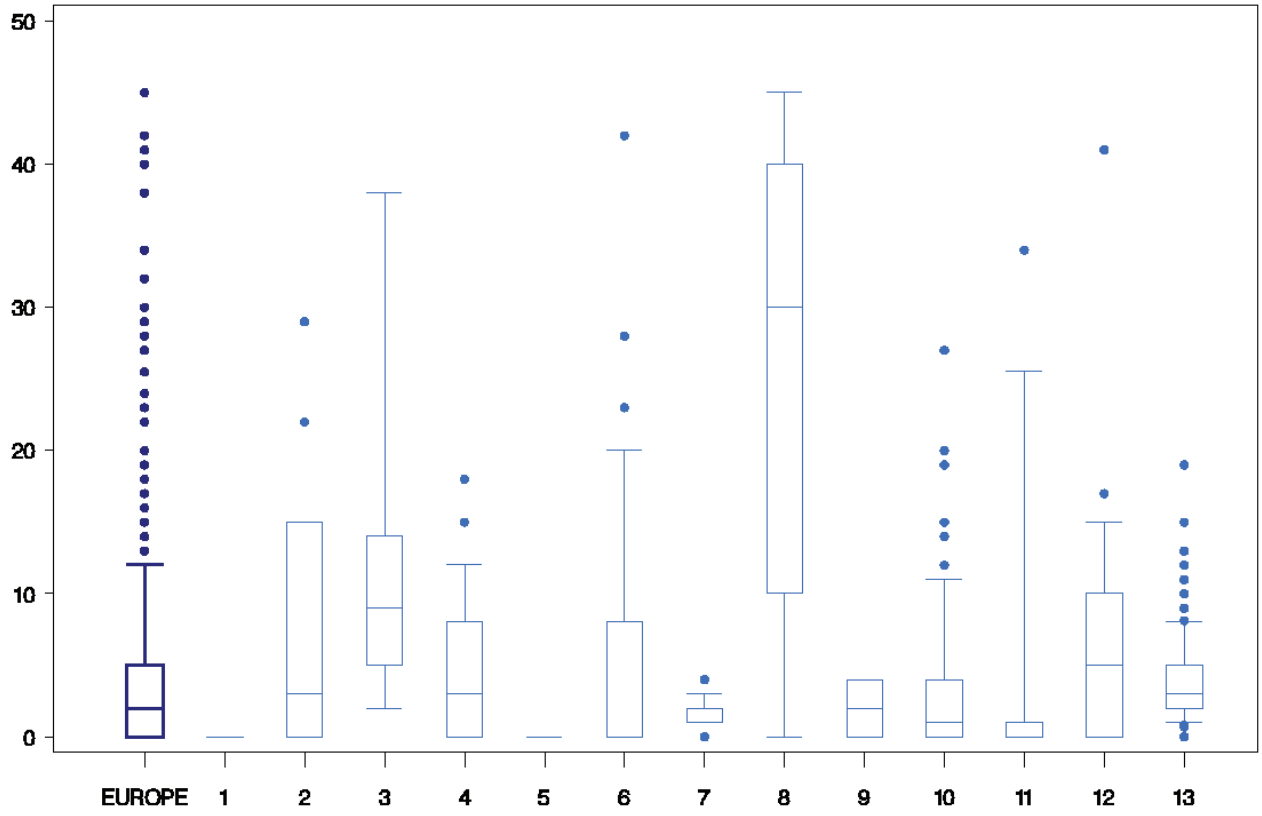
	Hospitals	Median	P25–P75		P10–P90	
EUROPE	415	2	0	3	0	4
1. Austria	48	1	0	4	0	5
2. Belgium	23	2	1	3	1	6
3. Croatia	10	1	0	1	0	3
4. Greece	23	2	1	3	1	3
5. Malta	1	2				
6. Poland	39	1	0	3	0	3
7. Ireland	11	2	1	4	1	6
8. Romania	10	0	0	1	0	2
9. Slovakia	3	8	2	8	2	8
10. Spain	92	0	0	2	0	3
11. Switzerland	17	3	2	4	1	10
12. Turkey	22	0	0	1	0	2
13. UK	116	2	1	3	1	4



How many nurse specialists are there in your unit?

Table 18. Nurse specialists available.

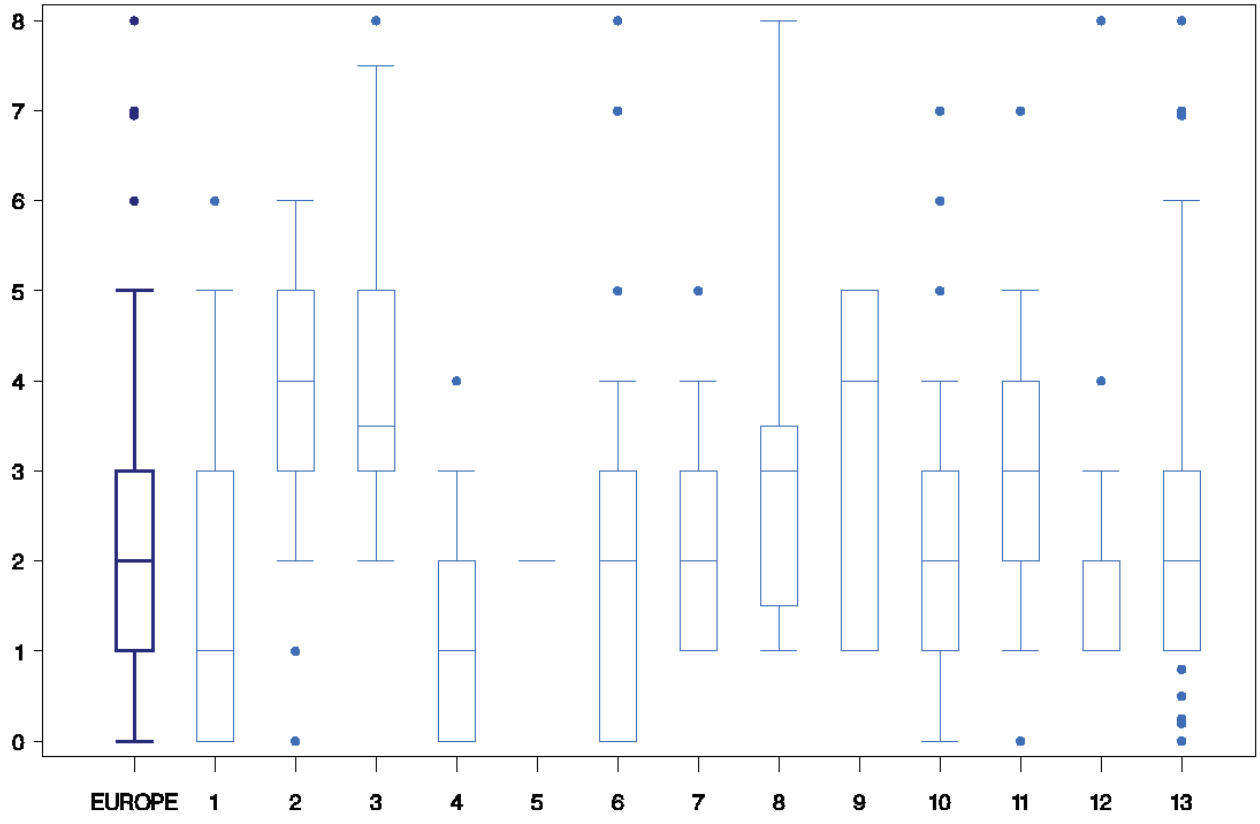
	Hospitals	Median	P25–P75		P10–P90	
EUROPE	411	2	0	5	0	12
1. Austria	49	0	0	0	0	0
2. Belgium	23	3	0	15	0	15
3. Croatia	9	9	5	14	2	38
4. Greece	23	3	0	8	0	12
5. Malta	1	0				
6. Poland	39	0	0	8	0	20
7. Ireland	11	2	1	2	1	3
8. Romania	7	30	10	40	0	45
9. Slovakia	2	2	0	4	0	4
10. Spain	92	1	0	4	0	11
11. Switzerland	17	0	0	1	0	26
12. Turkey	21	5	0	10	0	15
13. UK	117	3	2	5	1	8



How many lung function technicians are there in your unit?

Table 19. Lung function technicians available.

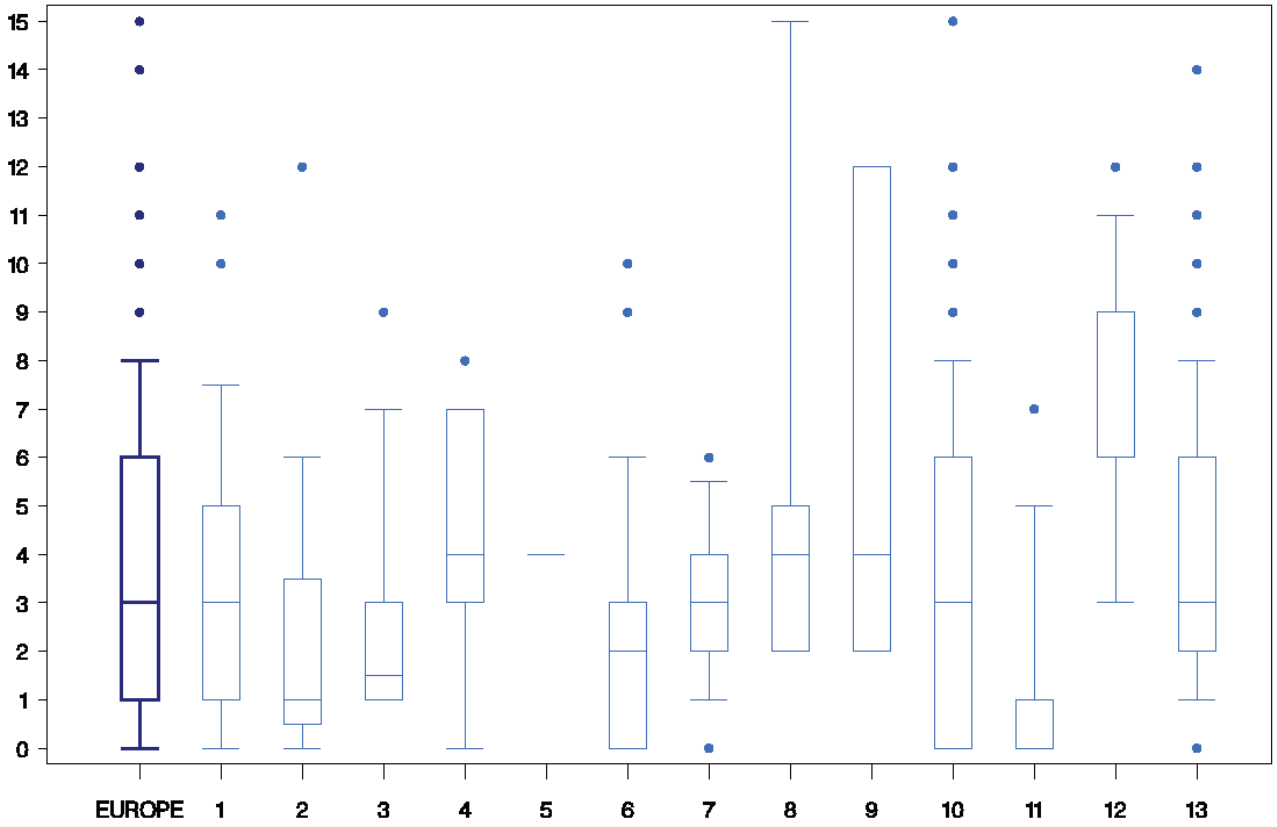
	Hospitals	Median	P25–P75		P10–P90	
EUROPE	414	2	1	3	0	5
1. Austria	47	1	0	3	0	5
2. Belgium	21	4	3	5	2	6
3. Croatia	10	4	3	5	2	8
4. Greece	23	1	0	2	0	3
5. Malta	1	2				
6. Poland	40	2	0	3	0	4
7. Ireland	11	2	1	3	1	4
8. Romania	8	3	2	4	1	8
9. Slovakia	3	4	1	5	1	5
10. Spain	94	2	1	3	0	4
11. Switzerland	19	3	2	4	1	5
12. Turkey	22	2	1	2	1	3
13. UK	115	2	1	3	1	6



How many respiratory medical trainees are there in your team?

Table 20. Respiratory trainees available.

	Hospitals	Median	P25–P75		P10–P90	
EUROPE	371	3	1	6	0	8
1. Austria	26	3	1	5	0	8
2. Belgium	20	1	1	4	0	6
3. Croatia	10	2	1	3	1	7
4. Greece	23	4	3	7	0	7
5. Malta	1	4				
6. Poland	37	2	0	3	0	6
7. Ireland	10	3	2	4	1	6
8. Romania	5	4	2	5	2	15
9. Slovakia	3	4	2	12	2	12
10. Spain	90	3	0	6	0	8
11. Switzerland	17	1	0	1	0	5
12. Turkey	18	6	6	9	3	11
13. UK	111	3	2	6	1	8



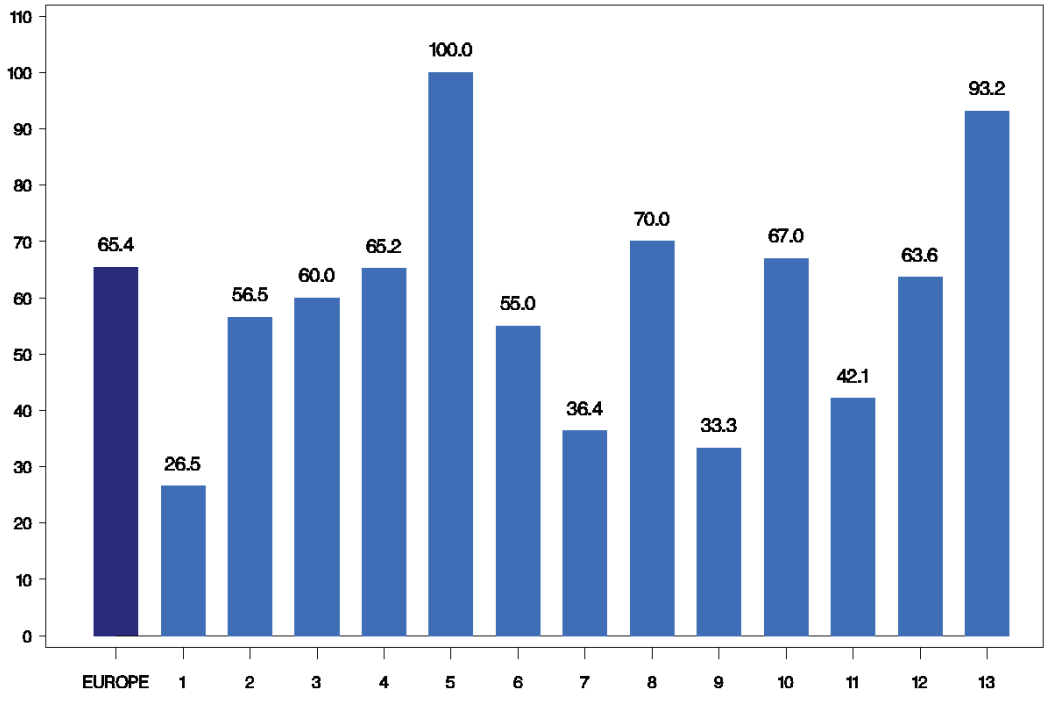
Admissions

Does your unit have a respiratory ward?

An admissions ward takes patients either directly from the emergency department or in some cases directly from the community for assessment. An admissions ward offers the potential to concentrate resources for the acutely ill patient in one location, to determine an admission diagnosis and then to triage to the appropriate ward or specialty team.

Table 21. Admissions ward available in which COPD patients are treated.

	Hospitals	Number	%
EUROPE	422	276	65.4
1. Austria	49	13	26.5
2. Belgium	23	13	56.5
3. Croatia	10	6	60.0
4. Greece	23	15	65.2
5. Malta	1	1	100.0
6. Poland	40	22	55.0
7. Ireland	11	4	36.4
8. Romania	10	7	70.0
9. Slovakia	3	1	33.3
10. Spain	94	63	67.0
11. Switzerland	19	8	42.1
12. Turkey	22	14	63.6
13. UK	117	109	93.2

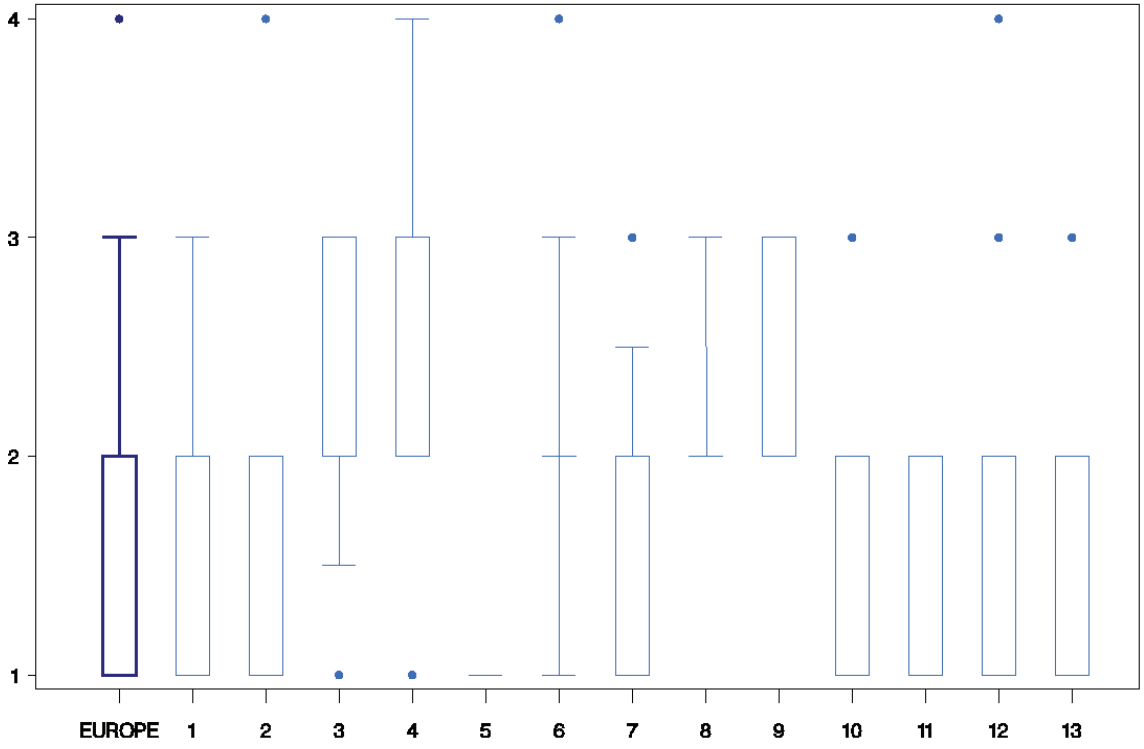


How many ward rounds by the admitting specialist are there in the first 24 hours of a COPD admission in a working day?

Patients admitted with an acute illness should be seen within a reasonable period by an appropriate specialist.

Table 22. Ward rounds by the admitting specialist in the first 24 hours of a COPD admission.

	Hospitals	Median	P25–P75		P10–P90	
EUROPE	368	2	1	2	1	3
1. Austria	26	2	1	2	1	3
2. Belgium	21	2	1	2	1	2
3. Croatia	10	2	2	3	2	3
4. Greece	22	2	2	3	2	4
5. Malta	1	1				
6. Poland	37	2	2	2	1	3
7. Ireland	10	1	1	2	1	3
8. Romania	9	2	2	2	2	3
9. Slovakia	3	2	2	3	2	3
10. Spain	82	1	1	2	1	2
11. Switzerland	14	2	1	2	1	2
12. Turkey	21	2	1	2	1	2
13. UK	112	1	1	2	1	2

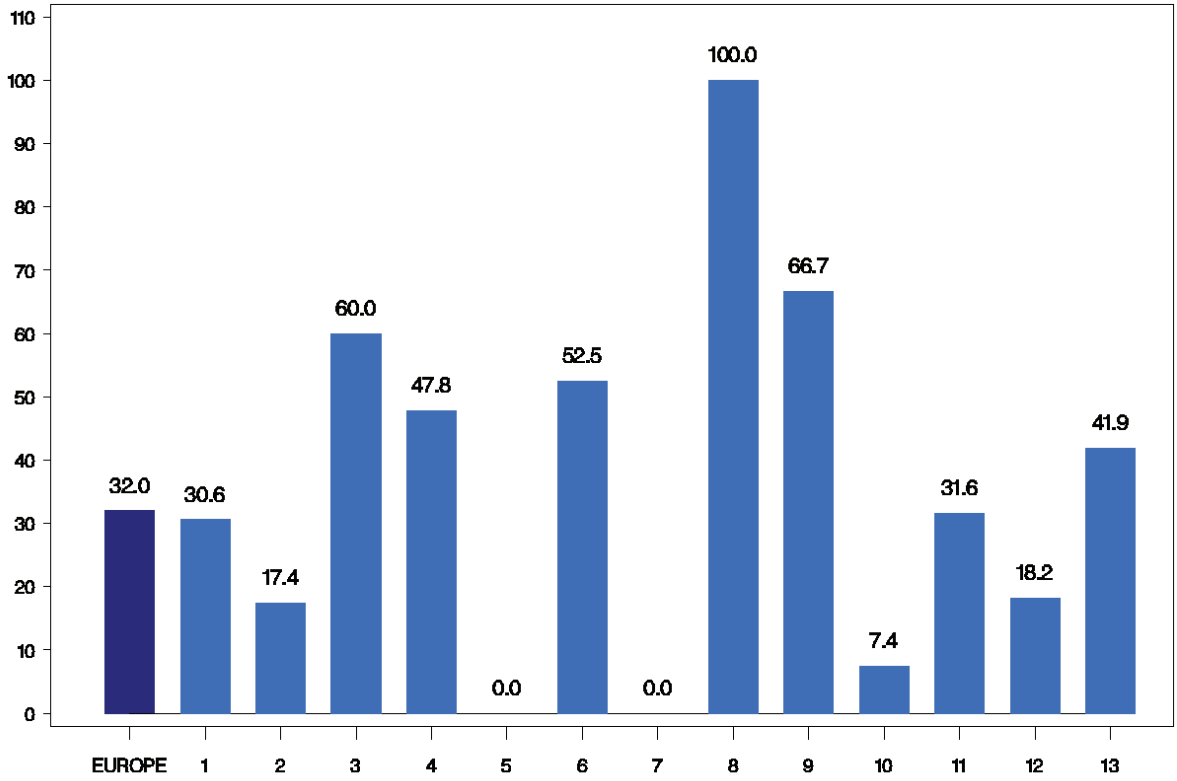


Does your unit operate a system of specialty triage for COPD?

Specialty triage should provide a patient with the most appropriate care for their presenting admission diagnosis.

Table 23. Specialty triage system for COPD operated.

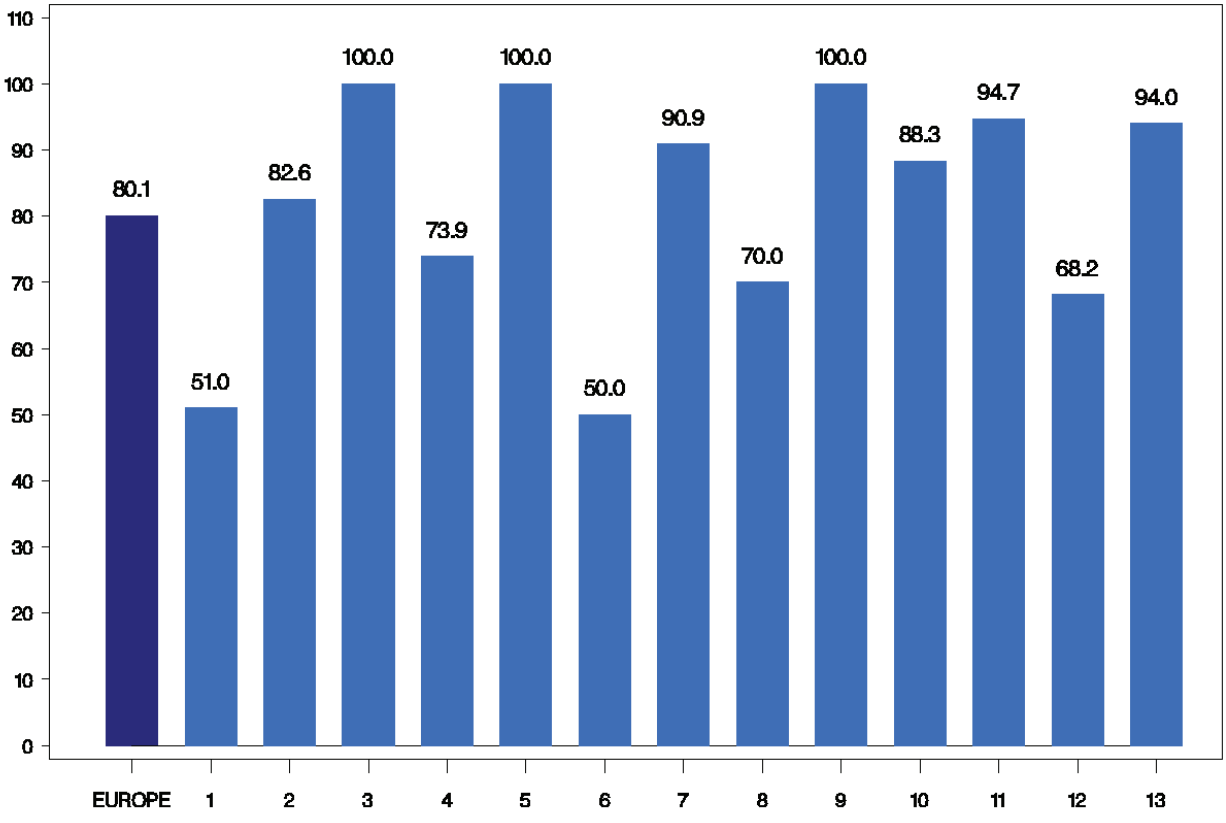
	Hospitals	Number	%
EUROPE	422	135	32.0
1. Austria	49	15	30.6
2. Belgium	23	4	17.4
3. Croatia	10	6	60.0
4. Greece	23	11	47.8
5. Malta	1	0	0.0
6. Poland	40	21	52.5
7. Ireland	11	0	0.0
8. Romania	10	10	100.0
9. Slovakia	3	2	66.7
10. Spain	94	7	7.4
11. Switzerland	19	6	31.6
12. Turkey	22	4	18.2
13. UK	117	49	41.9



Does your unit have an emergency department?

Table 24. Emergency departments operated.

	Hospitals	Number	%
EUROPE	422	338	80.1
1. Austria	49	25	51.0
2. Belgium	23	19	82.6
3. Croatia	10	10	100.0
4. Greece	23	17	73.9
5. Malta	1	1	100.0
6. Poland	40	20	50.0
7. Ireland	11	10	90.9
8. Romania	10	7	70.0
9. Slovakia	3	3	100.0
10. Spain	94	83	88.3
11. Switzerland	19	18	94.7
12. Turkey	22	15	68.2
13. UK	117	110	94.0

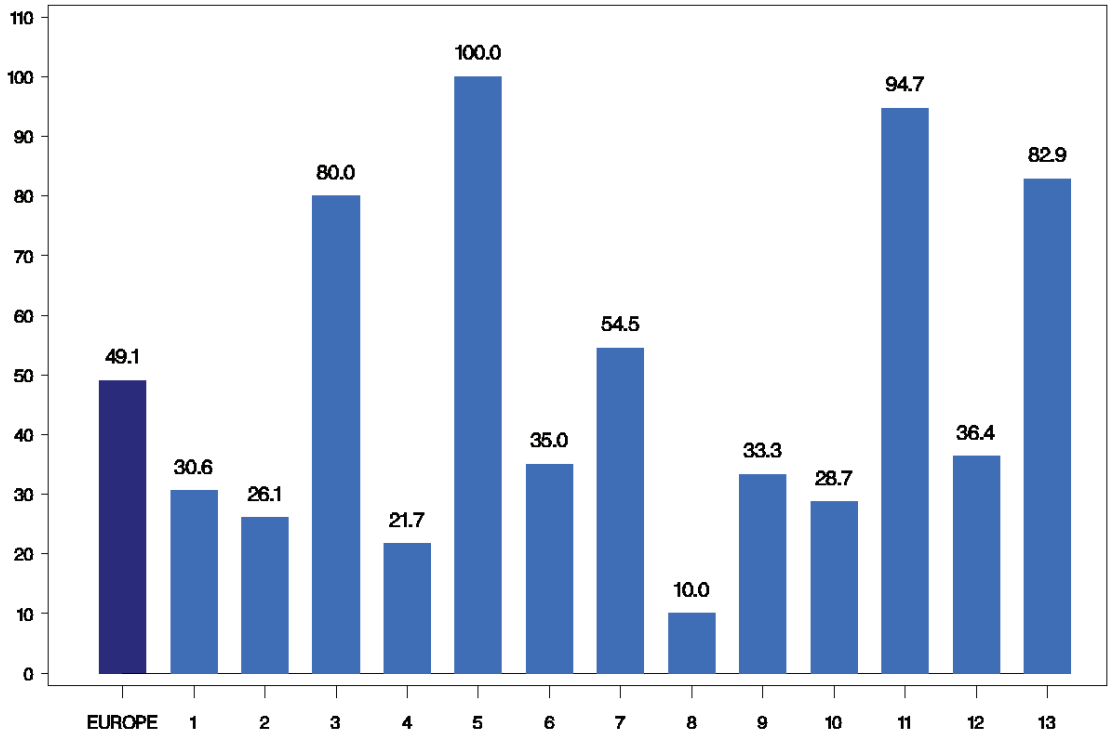


Does your unit have a high dependency unit that admits COPD patients?

High dependency units provide more intensive monitoring and staffing levels than provided on a standard medical ward, without requiring the high cost resources of an ICU. Such a unit may be appropriate to place acidotic patients with COPD. High dependency units provide non-invasive ventilation.

Table 25. High dependency unit available that admits COPD patients.

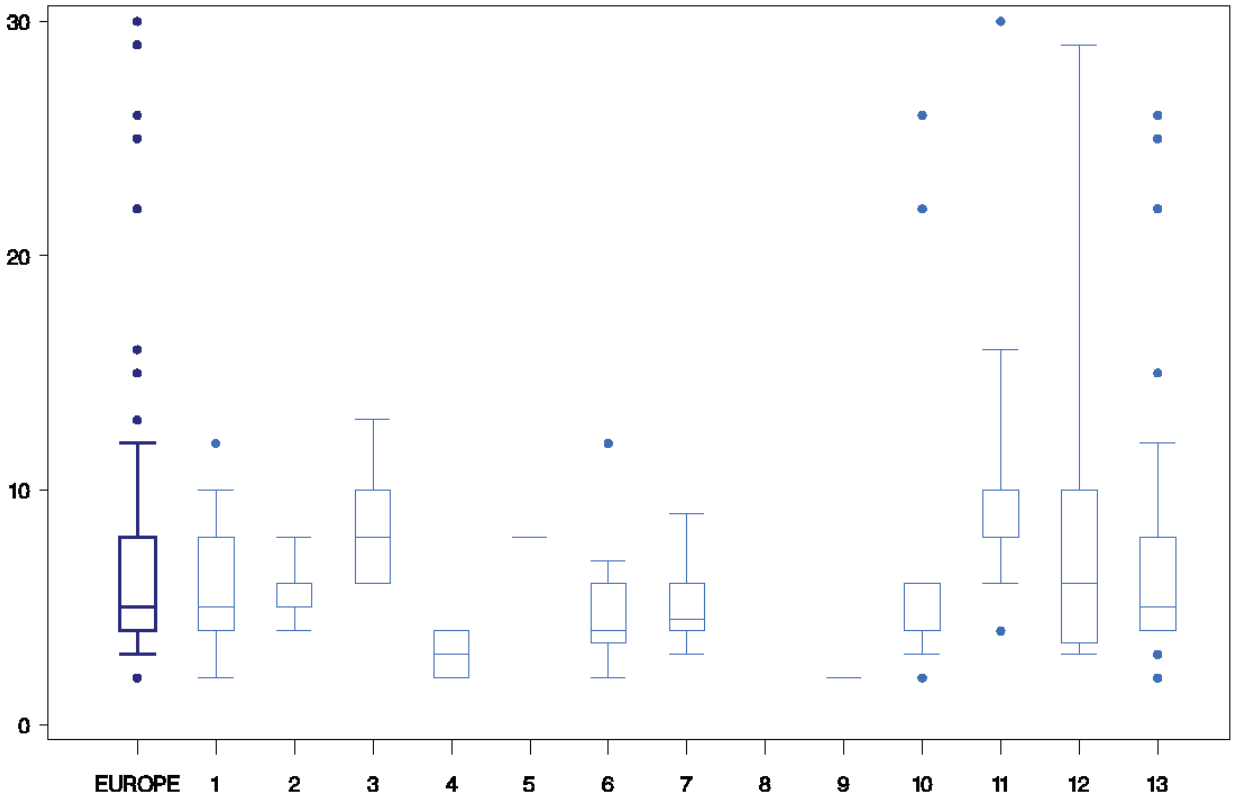
	Hospitals	Number	%
EUROPE	422	207	49.1
1. Austria	49	15	30.6
2. Belgium	23	6	26.1
3. Croatia	10	8	80.0
4. Greece	23	5	21.7
5. Malta	1	1	100.0
6. Poland	40	14	35.0
7. Ireland	11	6	54.5
8. Romania	10	1	10.0
9. Slovakia	3	1	33.3
10. Spain	94	27	28.7
11. Switzerland	19	18	94.7
12. Turkey	22	8	36.4
13. UK	117	97	82.9



How many beds there are in the high dependency unit?

Table 26. Number of beds in the high dependency unit.

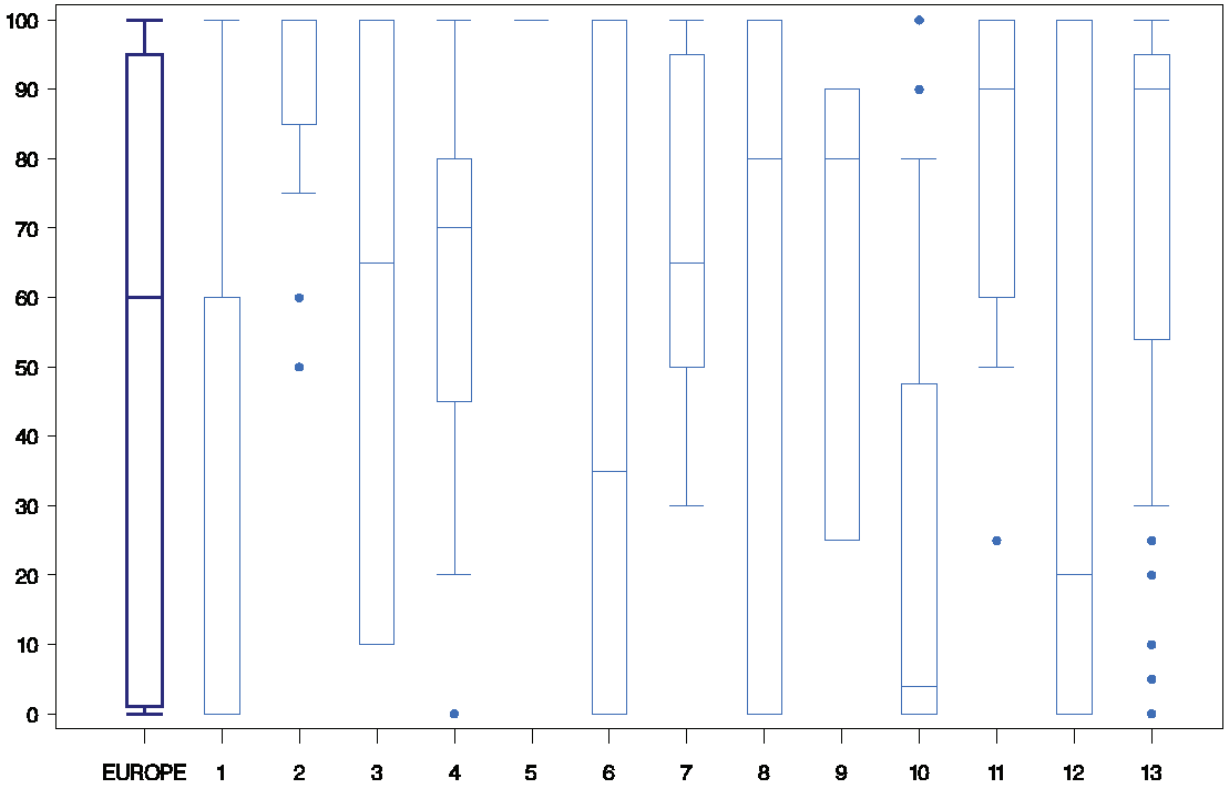
	Hospitals	Median	P25–P75		P10–P90	
EUROPE	193	5	4	8	3	12
1. Austria	13	5	4	8	2	10
2. Belgium	5	6	5	6	4	8
3. Croatia	7	8	6	10	6	13
4. Greece	5	3	2	4	2	4
5. Malta	1	8				
6. Poland	12	4	4	6	2	7
7. Ireland	6	5	4	6	3	9
8. Romania	0					
9. Slovakia	1	2				
10. Spain	22	4	4	6	3	6
11. Switzerland	17	8	8	10	6	16
12. Turkey	8	6	4	10	3	29
13. UK	96	5	4	8	4	12



What percentage of COPD patients are seen by a chest physiotherapist or respiratory nurse specialist during an admission in your unit?

Table 27. Percentage of patients seen by a respiratory physiotherapist and/or nurse specialist.

	Hospitals	Median	P25–P75		P10–P90	
EUROPE	341	60	1	95	0	100
1. Austria	41	0	0	60	0	100
2. Belgium	21	100	85	100	75	100
3. Croatia	6	65	10	100	10	100
4. Greece	20	70	45	80	20	100
5. Malta	1	100				
6. Poland	39	35	0	100	0	100
7. Ireland	8	65	50	95	30	100
8. Romania	7	80	0	100	0	100
9. Slovakia	3	80	25	90	25	90
10. Spain	68	4	0	48	0	80
11. Switzerland	12	90	60	100	50	100
12. Turkey	18	20	0	100	0	100
13. UK	97	90	54	95	30	100

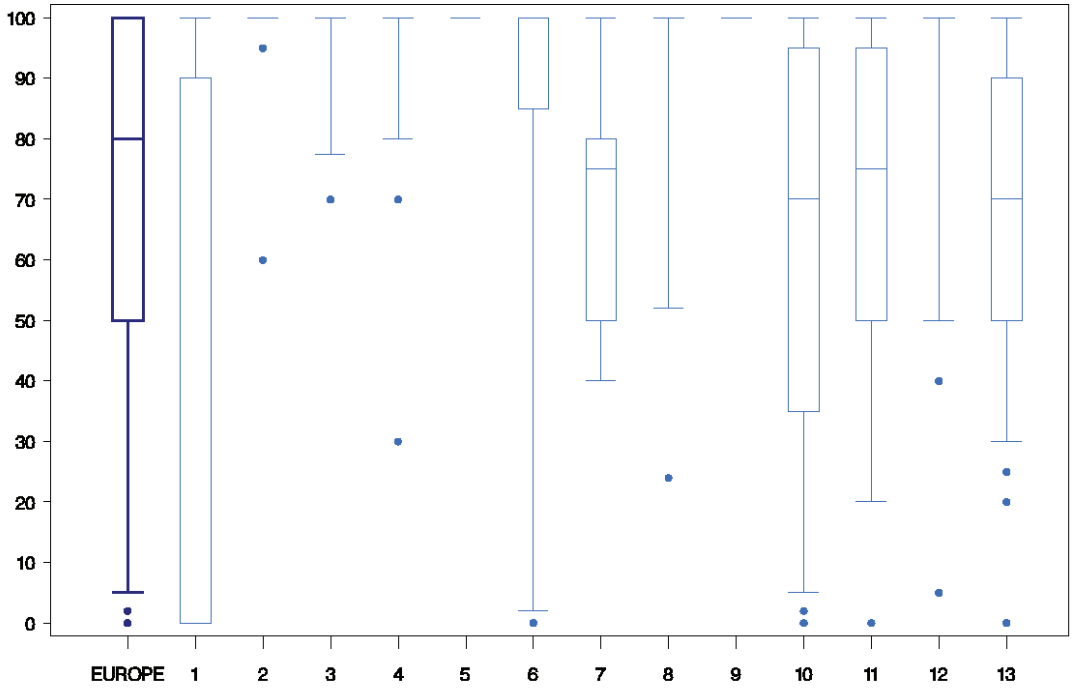


What percentage of COPD patients are seen by a respiratory medical specialist during an admission to your unit?

Specialty care is more than care from a medical specialist and should include the expert input from physiotherapists, nurses and others within the team that specialises in respiratory cases.

Table 28. Percentage of patients seen by a respiratory specialist.

	Hospitals	Median	P25–P75		P10–P90	
EUROPE	376	80	50	100	5	100
1. Austria	46	0	0	90	0	100
2. Belgium	22	100	100	100	100	100
3. Croatia	10	100	100	100	78	100
4. Greece	23	100	100	100	80	100
5. Malta	1	100				
6. Poland	40	100	85	100	2	100
7. Ireland	6	75	50	80	40	100
8. Romania	10	100	100	100	52	100
9. Slovakia	3	100	100	100	100	100
10. Spain	78	70	35	95	5	100
11. Switzerland	17	75	50	95	20	100
12. Turkey	22	100	100	100	50	100
13. UK	98	70	50	90	30	100



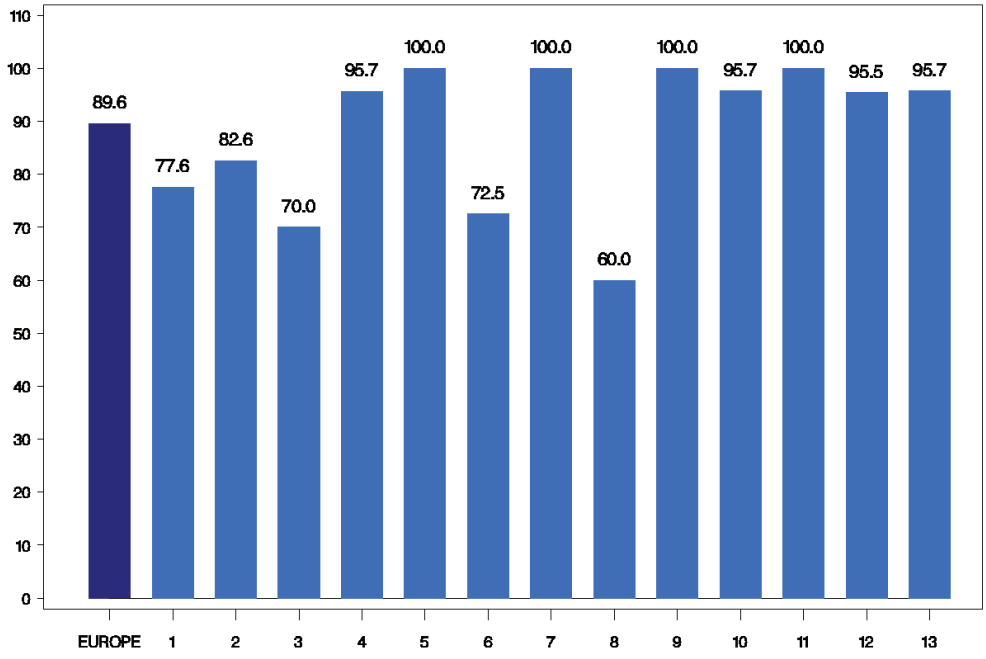
Ventilatory support facilities available for acidotic patients

Does your unit offer non-invasive mechanical ventilation for acidotic respiratory failure patients?

It is clear from many randomised controlled trials that non-invasive ventilation offers one of the few medical interventions that saves lives in acidotic COPD patients. Guidelines specify which patients should be considered for non-invasive ventilation. Failure to provide this service for all suitable patients potentially puts lives at risk.

Table 29. Non-invasive ventilation for acidosis.

	Hospitals	Number	%
EUROPE	422	378	89.6
1. Austria	49	38	77.6
2. Belgium	23	19	82.6
3. Croatia	10	7	70.0
4. Greece	23	22	95.7
5. Malta	1	1	100.0
6. Poland	40	29	72.5
7. Ireland	11	11	100.0
8. Romania	10	6	60.0
9. Slovakia	3	3	100.0
10. Spain	94	90	95.7
11. Switzerland	19	19	100.0
12. Turkey	22	21	95.5
13. UK	117	112	95.7

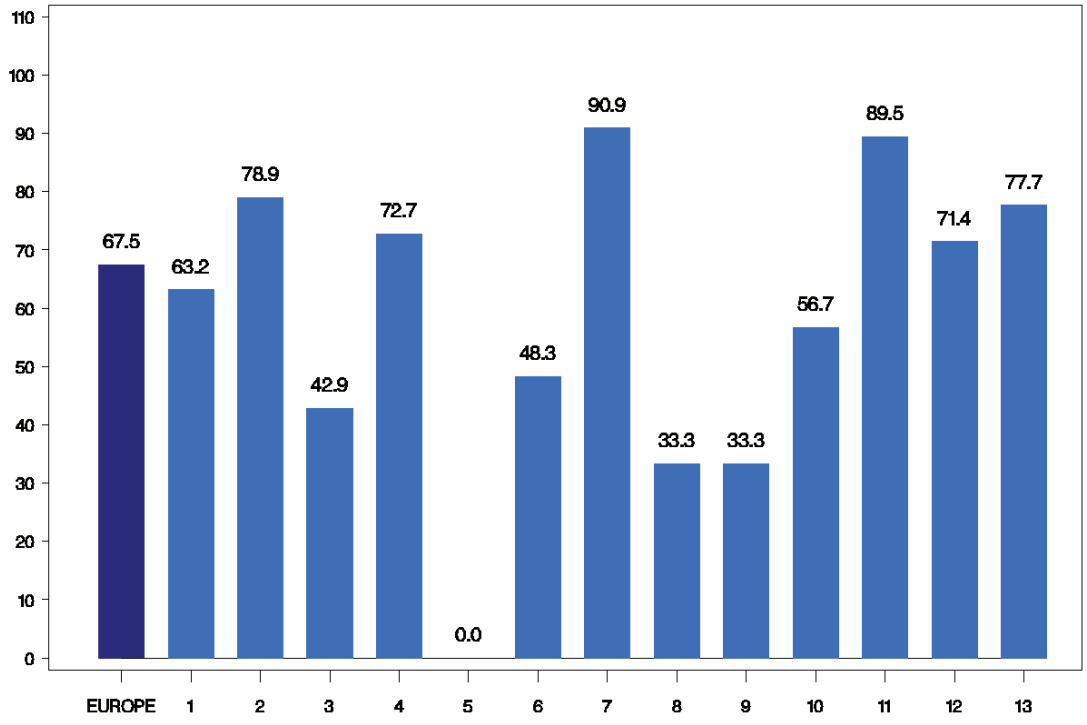


If yes, do you have the capacity to treat all eligible patients?

For a small percentage of acidotic patients, non-invasive ventilation is unsuitable or fails, and such patients should be considered for invasive mechanical ventilation according to a documented plan of escalation made in conjunction with the ICU staff. Failure to provide this service for suitable COPD patients potentially puts lives at risk.

Table 30. Capacity to treat all eligible acidotic patients (non-invasive ventilation).

	Hospitals	Number	%
EUROPE	378	255	67.5
1. Austria	38	24	63.2
2. Belgium	19	15	78.9
3. Croatia	7	3	42.9
4. Greece	22	16	72.7
5. Malta	1	0	0.0
6. Poland	29	14	48.3
7. Ireland	11	10	90.9
8. Romania	6	2	33.3
9. Slovakia	3	1	33.3
10. Spain	90	51	56.7
11. Switzerland	19	17	89.5
12. Turkey	21	15	71.4
13. UK	112	87	77.7

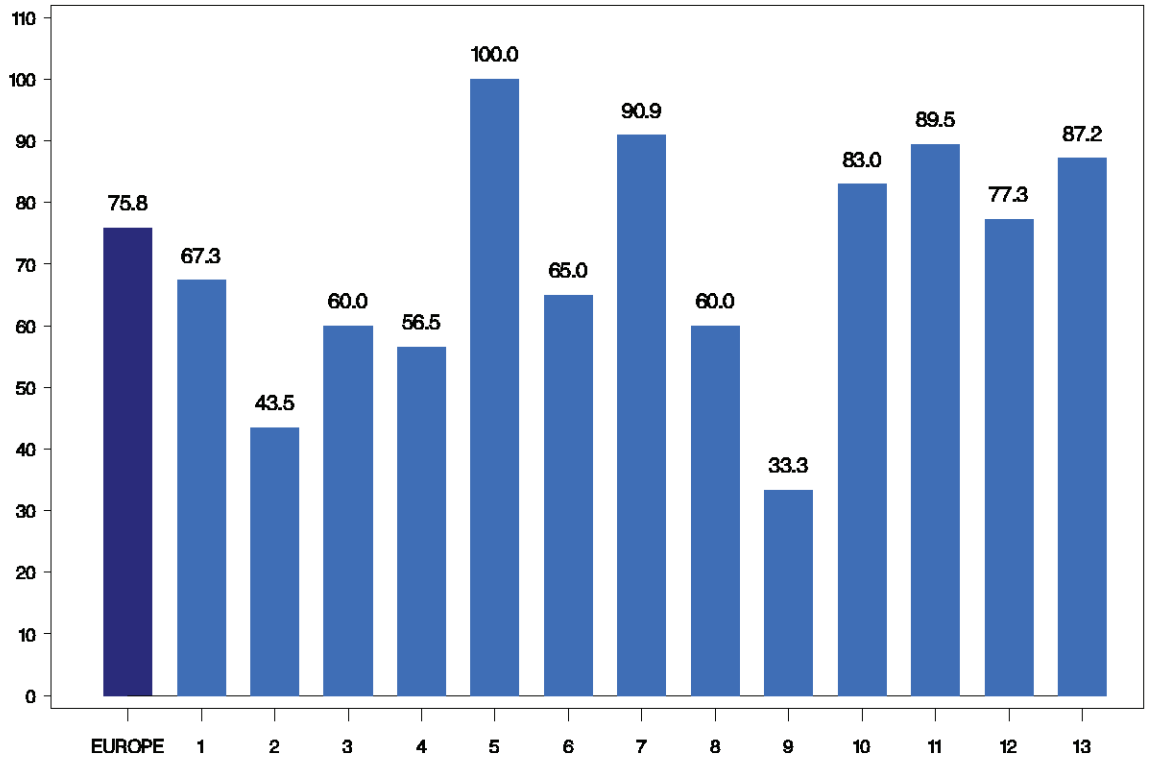


Does your unit offer invasive mechanical ventilation for acidotic respiratory failure patients?

Invasive mechanical ventilation is the gold standard of ventilatory support using endotracheal intubation and sedation for the patient. This support is usually provided in an ICU.

Table 31. Invasive mechanical ventilation for acidosis.

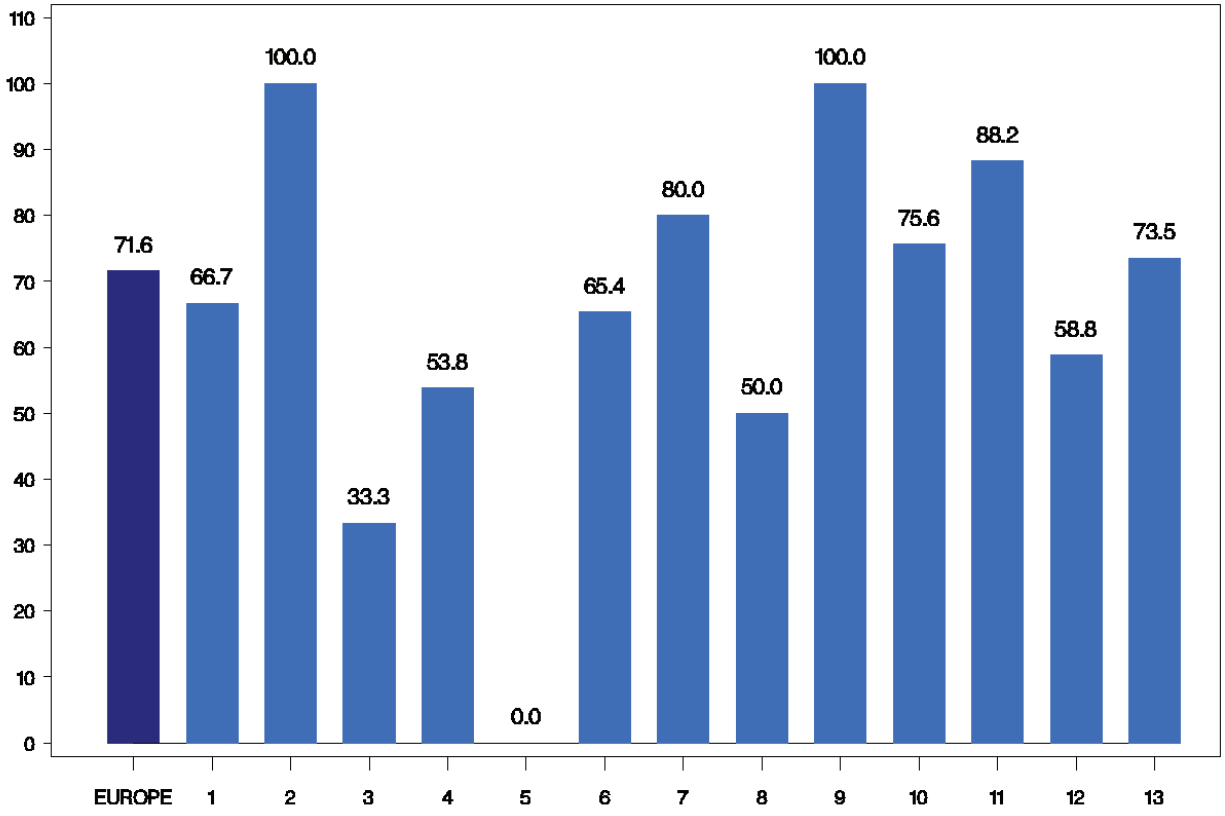
	Hospitals	Number	%
EUROPE	422	320	75.8
1. Austria	49	33	67.3
2. Belgium	23	10	43.5
3. Croatia	10	6	60.0
4. Greece	23	13	56.5
5. Malta	1	1	100.0
6. Poland	40	26	65.0
7. Ireland	11	10	90.9
8. Romania	10	6	60.0
9. Slovakia	3	1	33.3
10. Spain	94	78	83.0
11. Switzerland	19	17	89.5
12. Turkey	22	17	77.3
13. UK	117	102	87.2



If yes, do you have the capacity to treat all eligible patients?

Table 32. Capacity to treat all eligible patients (invasive mechanical ventilation).

	Hospitals	Number	%
EUROPE	320	229	71.6
1. Austria	33	22	66.7
2. Belgium	10	10	100.0
3. Croatia	6	2	33.3
4. Greece	13	7	53.8
5. Malta	1	0	0.0
6. Poland	26	17	65.4
7. Ireland	10	8	80.0
8. Romania	6	3	50.0
9. Slovakia	1	1	100.0
10. Spain	78	59	75.6
11. Switzerland	17	15	88.2
12. Turkey	17	10	58.8
13. UK	102	75	73.5

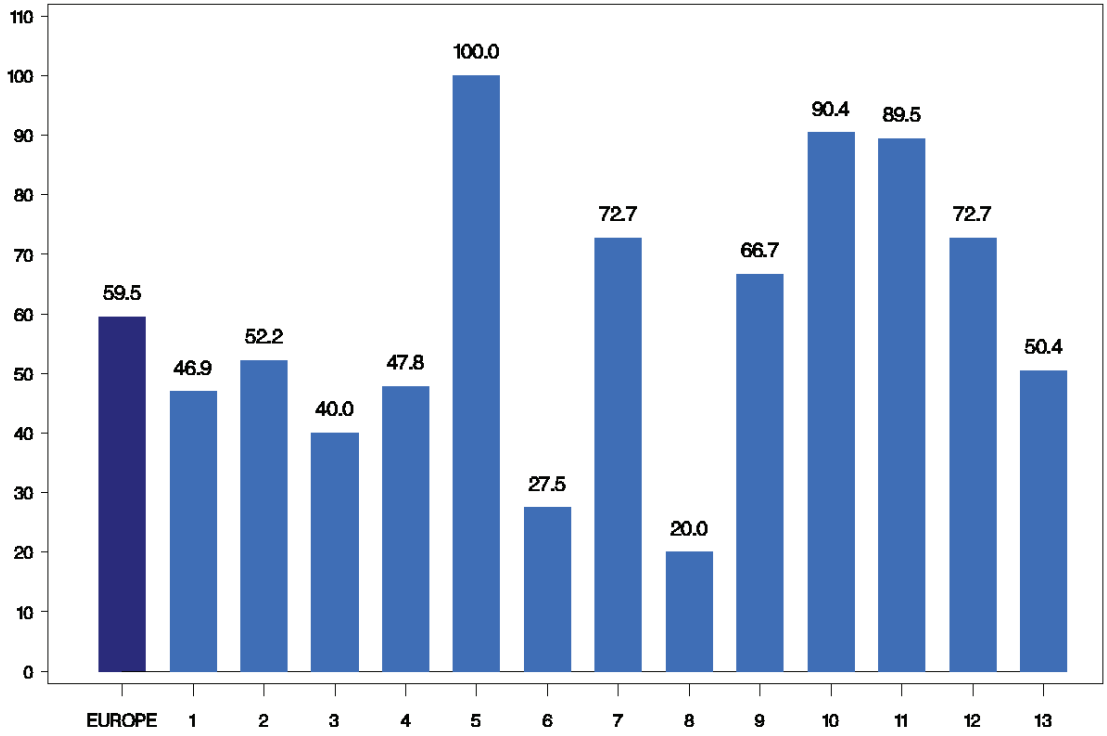


Does your hospital take care of home ventilated patients?

A home mechanical ventilation service takes care of patients with either tracheotomy or non-invasive ventilation. This service is not directly related to ICU resources. There are several guidelines on the indications and equipment standards for home mechanical ventilation.

Table 33. Home ventilation service operated.

	Hospitals	Number	%
EUROPE	422	251	59.5
1. Austria	49	23	46.9
2. Belgium	23	12	52.2
3. Croatia	10	4	40.0
4. Greece	23	11	47.8
5. Malta	1	1	100.0
6. Poland	40	11	27.5
7. Ireland	11	8	72.7
8. Romania	10	2	20.0
9. Slovakia	3	2	66.7
10. Spain	94	85	90.4
11. Switzerland	19	17	89.5
12. Turkey	22	16	72.7
13. UK	117	59	50.4



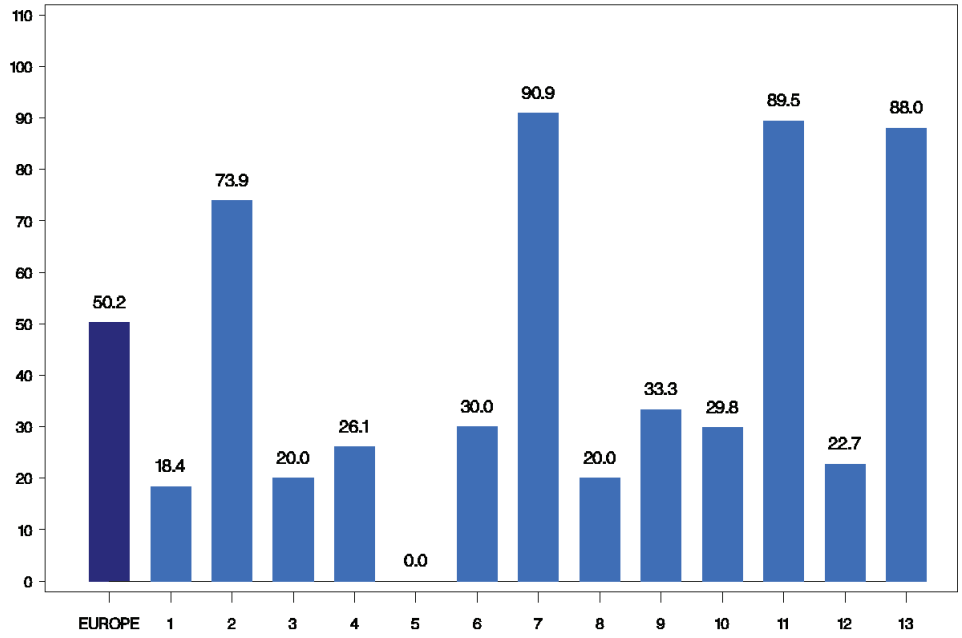
Pulmonary rehabilitation

Does your unit have access to a pulmonary rehabilitation programme for discharged COPD admissions?

Pulmonary rehabilitation is an evidence-based intervention cited in the GOLD 2010 guidelines that should be available for all patients who meet the criteria for eligibility. Recent evidence from randomised controlled trials suggests that recently discharged patients who receive pulmonary rehabilitation soon after a hospital stay are less likely in the medium term to be readmitted to hospital than patients who do not receive early rehabilitation. There are a variety of different formats of pulmonary rehabilitation offered across Europe reflected in this audit.

Table 34. Pulmonary rehabilitation programme available for discharged patients.

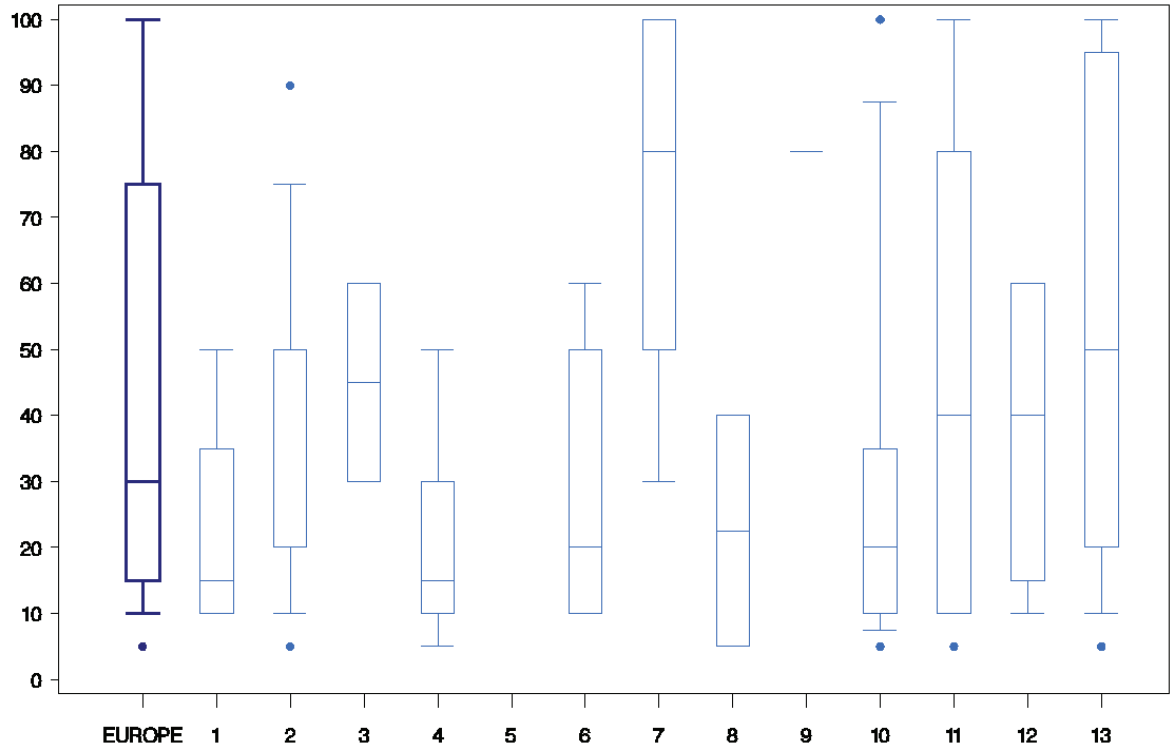
	Hospitals	Number	%
EUROPE	422	212	50.2
1. Austria	49	9	18.4
2. Belgium	23	17	73.9
3. Croatia	10	2	20.0
4. Greece	23	6	26.1
5. Malta	1	0	0.0
6. Poland	40	12	30.0
7. Ireland	11	10	90.9
8. Romania	10	2	20.0
9. Slovakia	3	1	33.3
10. Spain	94	28	29.8
11. Switzerland	19	17	89.5
12. Turkey	22	5	22.7
13. UK	117	103	88.0



If so, what percentage of admissions enter this programme?

Table 35. Percentage of eligible discharges that receive pulmonary rehabilitation.

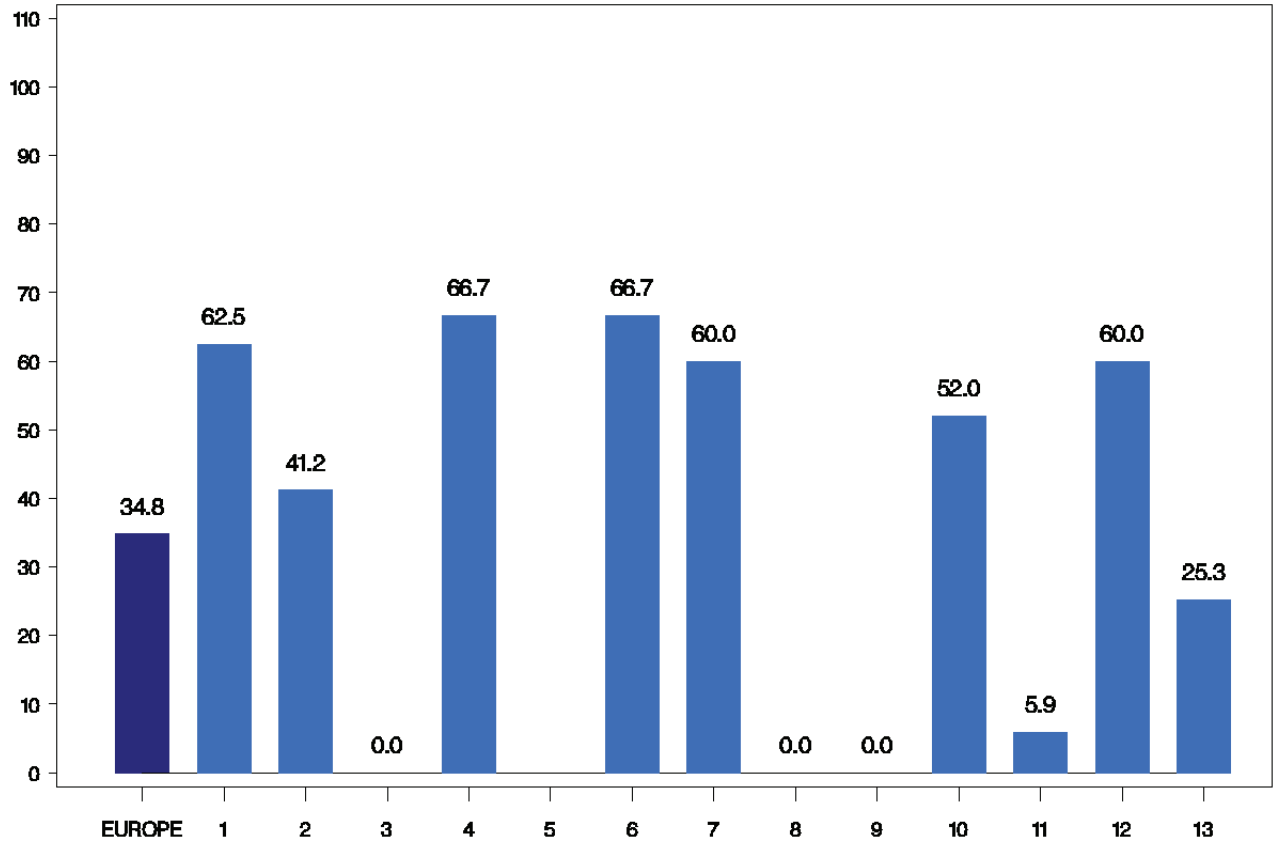
	Hospitals	Median	P25–P75		P10–P90	
EUROPE	127	30	15	75	10	100
1. Austria	4	15	10	35	10	50
2. Belgium	13	20	20	50	10	75
3. Croatia	2	45	30	60	30	60
4. Greece	6	15	10	30	5	50
5. Malta						
6. Poland	6	20	10	50	10	60
7. Ireland	7	80	50	100	30	100
8. Romania	2	23	5	40	5	40
9. Slovakia	1	80				
10. Spain	20	20	10	35	8	88
11. Switzerland	13	40	10	80	10	100
12. Turkey	4	40	15	60	10	60
13. UK	49	50	20	95	10	100



If yes, what type of programme do you implement?

Table 36. Hospital-based pulmonary rehabilitation.

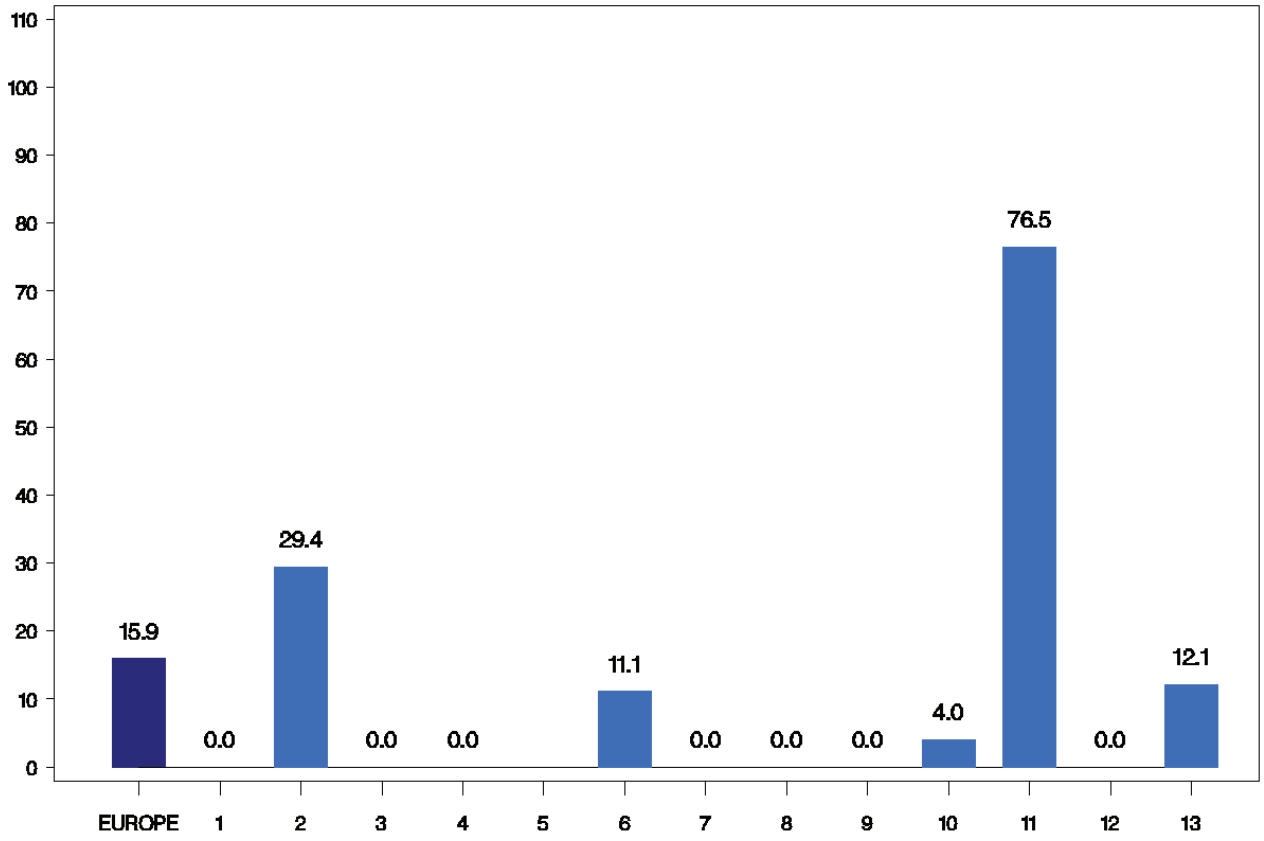
	Hospitals	Number	%
EUROPE	201	70	34.8
1. Austria	8	5	62.5
2. Belgium	17	7	41.2
3. Croatia	2	0	0.0
4. Greece	6	4	66.7
6. Poland	9	6	66.7
7. Ireland	10	6	60.0
8. Romania	2	0	0.0
9. Slovakia	1	0	0.0
10. Spain	25	13	52.0
11. Switzerland	17	1	5.9
12. Turkey	5	3	60.0
13. UK	99	25	25.3



If yes, what type of programme do you implement?

Table 37. Home-based pulmonary rehabilitation.

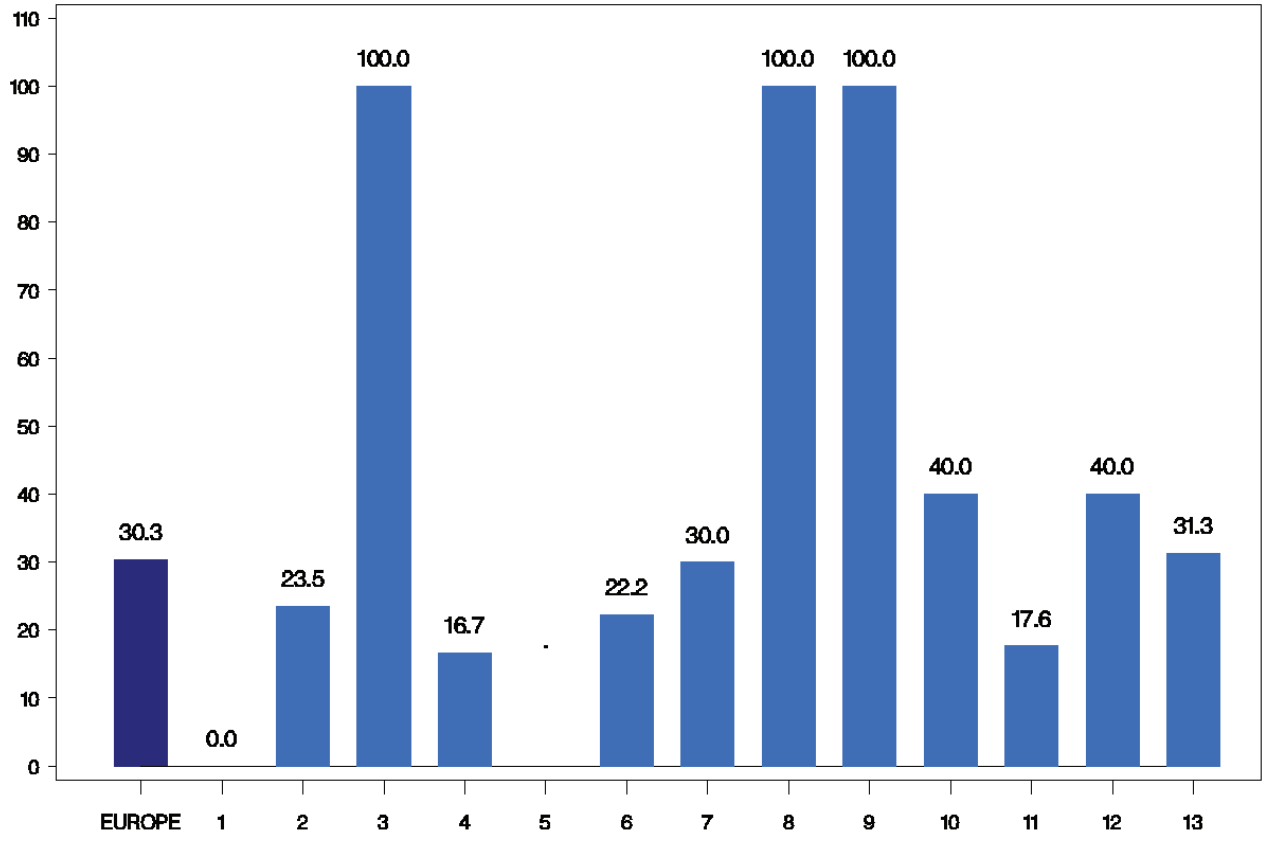
	Hospitals	Number	%
EUROPE	201	32	15.9
1. Austria	8	0	0.0
2. Belgium	17	5	29.4
3. Croatia	2	0	0.0
4. Greece	6	0	0.0
6. Poland	9	1	11.1
7. Ireland	10	0	0.0
8. Romania	2	0	0.0
9. Slovakia	1	0	0.0
10. Spain	25	1	4.0
11. Switzerland	17	13	76.5
12. Turkey	5	0	0.0
13. UK	99	12	12.1



If yes, what type of programme do you implement?

Table 38. Hospital- and home-based pulmonary rehabilitation.

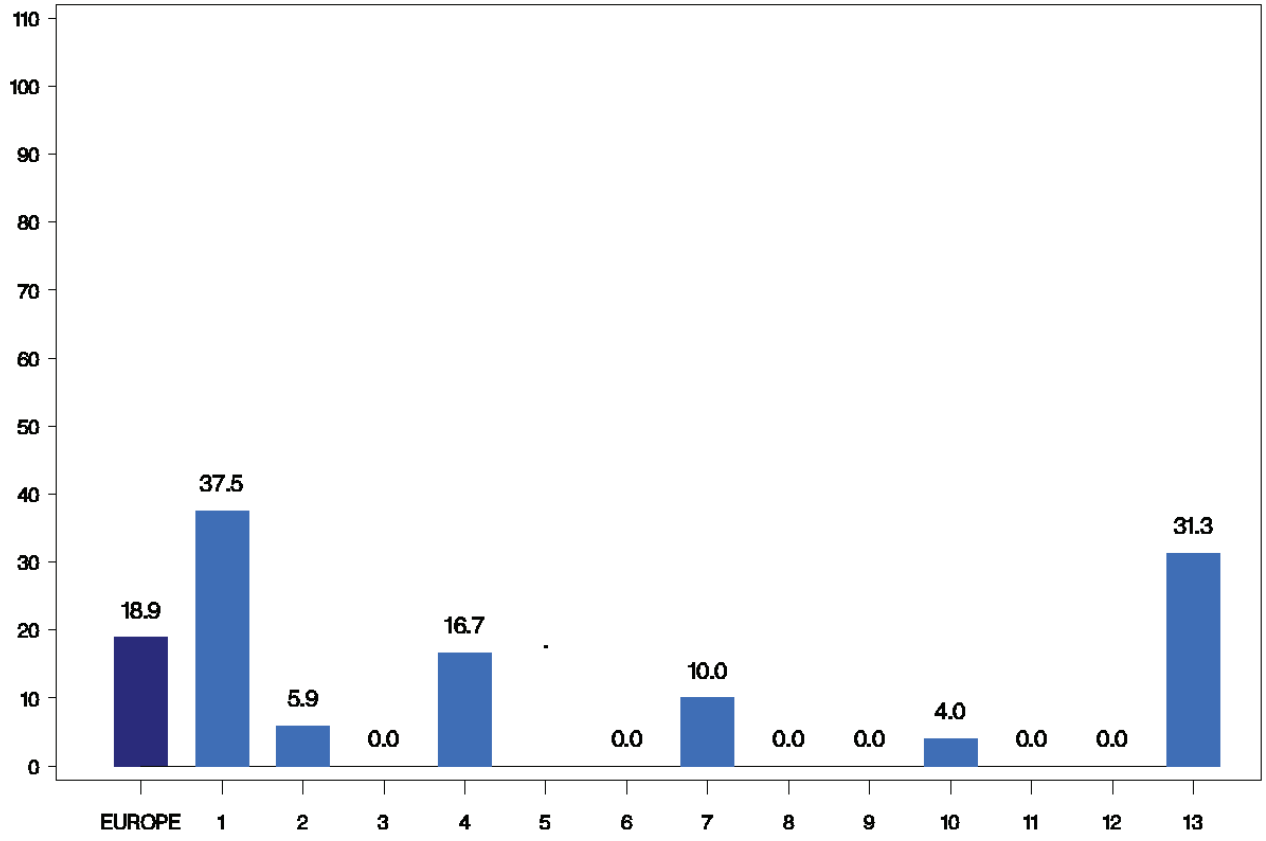
	Hospitals	Number	%
EUROPE	201	61	30.3
1. Austria	8	0	0.0
2. Belgium	17	4	23.0
3. Croatia	2	2	100.0
4. Greece	6	1	16.7
6. Poland	9	2	22.2
7. Ireland	10	3	30.0
8. Romania	2	2	100.0
9. Slovakia	1	1	100.0
10. Spain	25	10	40.0
11. Switzerland	17	3	17.6
12. Turkey	5	3	60.0
13. UK	99	31	31.3



If yes, what type of programme do you implement?

Table 39. Other pulmonary rehabilitation programme.

	Hospitals	Number	%
EUROPE	201	38	18.9
1. Austria	8	1	12.5
2. Belgium	17	0	0.0
3. Croatia	2	1	50.0
4. Greece	6	1	16.7
6. Poland	9	0	0.0
7. Ireland	10	1	10.0
8. Romania	2	0	0.0
9. Slovakia	1	0	0.0
10. Spain	25	1	4.0
11. Switzerland	17	0	0.0
12. Turkey	5	0	0.0
13. UK	99	31	31.3



GOLD 2010: Benefits of pulmonary rehabilitation in COPD.

- Improves exercise capacity
- Reduces the perceived intensity of breathlessness
- Improves health-related quality of life
- Reduces the number of hospitalisations and length of stay
- Reduces anxiety and depression associated with COPD
- Strength and endurance training of the upper limbs improves arm function
- Benefits extend well beyond the immediate period of training
- Improves survival
- Respiratory muscle training is beneficial, especially when combined with general exercise training
- Psychosocial intervention is helpful

From the *Global Strategy for Diagnosis, Management, and Prevention of COPD updated 2010*, used with permission from the Global Initiative for Chronic Obstructive Lung Disease (GOLD), www.goldcopd.org

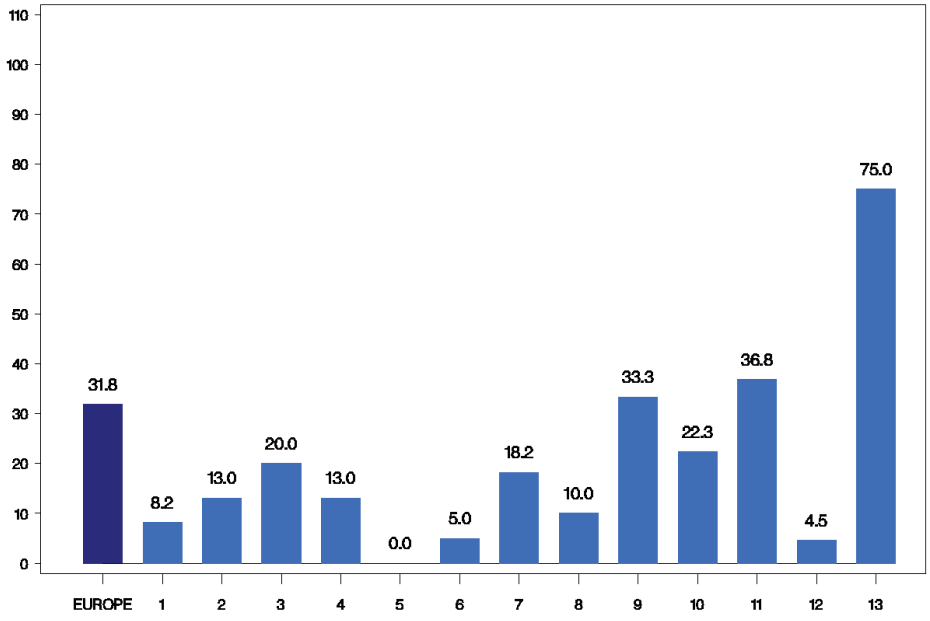
Early discharge programme

Does your unit operate an early/supported discharge programme for COPD admissions?

Early discharge programmes, sometimes referred to as supported discharge programmes, involve multidisciplinary teams operating across the hospital community interface to support COPD patients returning home at an earlier stage in their recovery than might otherwise be possible. Research studies have demonstrated that selected patients entered into such a programme spend less time in hospital and have good clinical outcomes.

Table 40. Early discharge programme available for COPD.

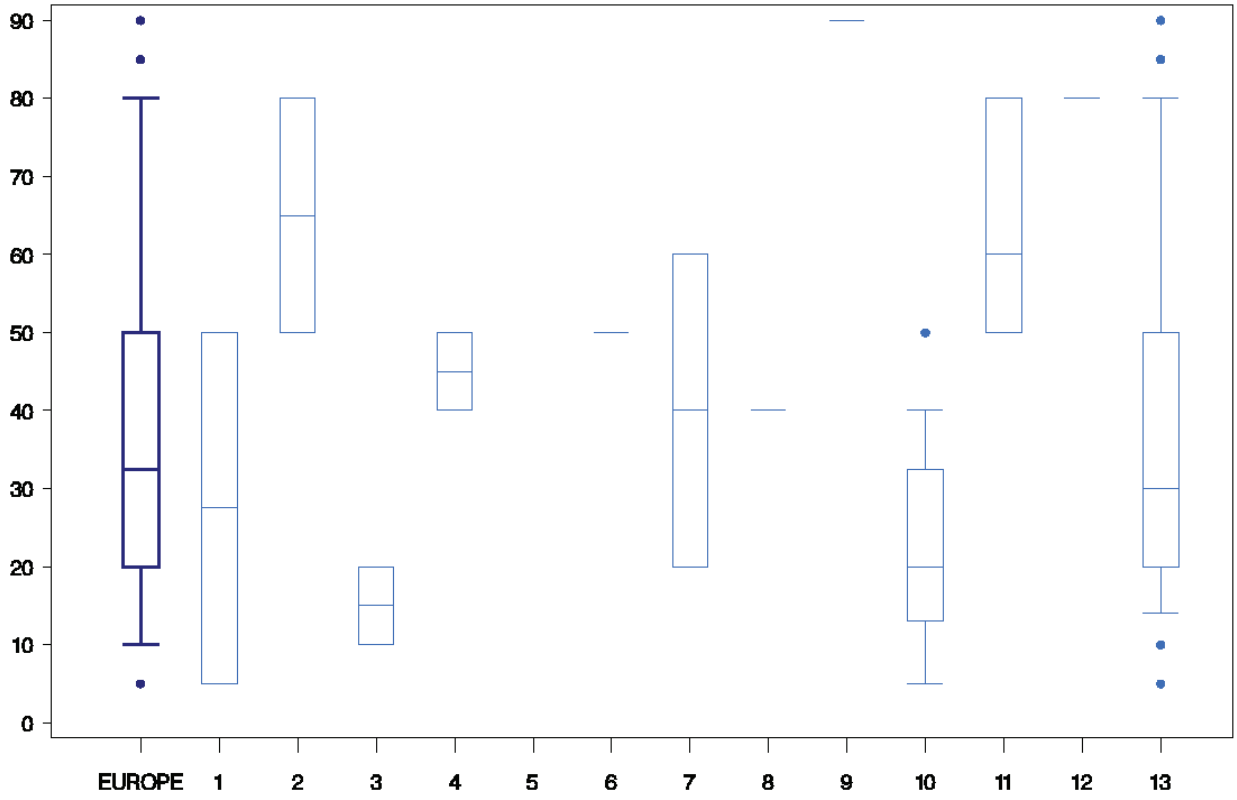
	Hospitals	Number	%
EUROPE	421	134	31.8
1. Austria	49	4	8.2
2. Belgium	23	3	13.0
3. Croatia	10	2	20.0
4. Greece	23	3	13.0
5. Malta	1	0	0.0
6. Poland	40	2	5.0
7. Ireland	11	2	18.2
8. Romania	10	1	10.0
9. Slovakia	3	1	33.3
10. Spain	94	21	22.3
11. Switzerland	19	7	36.8
12. Turkey	22	1	4.5
13. UK	116	87	75.0



If so, what percentage of admissions enter this programme?

Table 41. Percentage of admissions that entered the early discharge programme.

	Hospitals	Median	P25–P75		P10–P90	
EUROPE	104	33	20	50	10	80
1. Austria	2	28	5	50	5	50
2. Belgium	2	65	50	80	50	80
3. Croatia	2	15	10	20	10	20
4. Greece	2	45	40	50	40	50
5. Malta	0					
6. Poland	1	50				
7. Ireland	2	40	20	60	20	60
8. Romania	1	40				
9. Slovakia	1	90				
10. Spain	16	20	13	33	5	40
11. Switzerland	5	60	50	80	50	80
12. Turkey	1	80				
13. UK	69	30	20	50	14	80



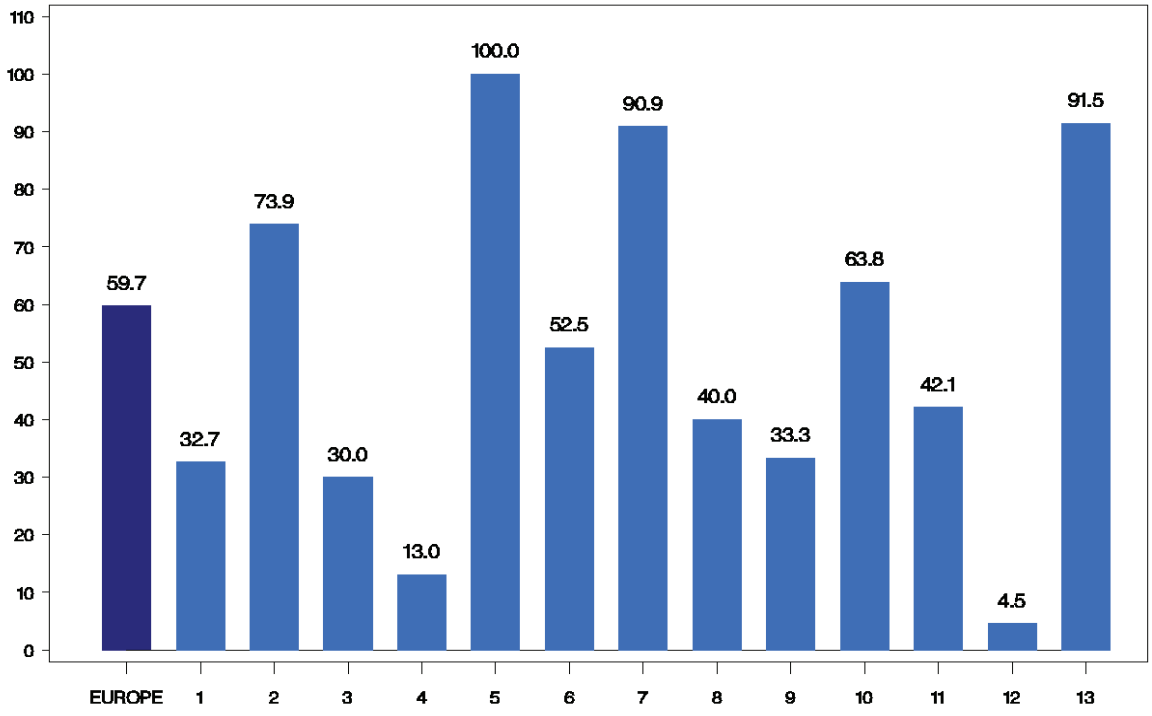
Palliative care service

Does your unit have access to a palliative care service for end-of-life COPD admissions?

It is known that end-of-life COPD patients have as many, if not more, symptoms than lung cancer patients yet, in general, are much less likely to be able to access palliative care services. Raising awareness for this need should improve provision and access to services as part of a whole patient pathway for COPD.

Table 42. Access to a palliative care service.

	Hospitals	Number	%
EUROPE	422	252	59.7
1. Austria	49	16	32.7
2. Belgium	23	17	73.9
3. Croatia	10	3	30.0
4. Greece	23	3	13.0
5. Malta	1	1	100.0
6. Poland	40	21	52.5
7. Ireland	11	10	90.9
8. Romania	10	4	40.0
9. Slovakia	3	1	33.3
10. Spain	94	60	63.8
11. Switzerland	19	8	42.1
12. Turkey	22	1	4.5
13. UK	117	107	91.5



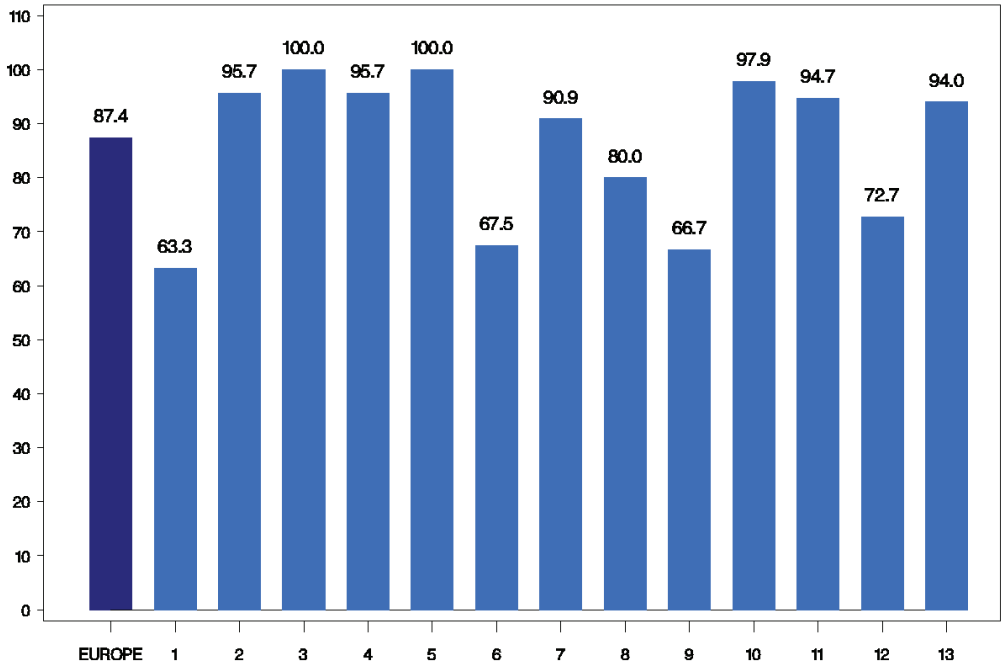
Oxygen

Does your unit take care of long-term oxygen patients?

There is good evidence for the provision of long-term oxygen therapy to patients who meet the criteria increases life expectancy, one of the few interventions that may do so. Such a service should be available for appropriate patients as defined by guidelines.

Table 43. Long-term oxygen programme available.

	Hospitals	Number	%
EUROPE	422	369	87.4
1. Austria	49	31	63.3
2. Belgium	23	22	95.7
3. Croatia	10	10	100.0
4. Greece	23	22	95.7
5. Malta	1	1	100.0
6. Poland	40	27	67.5
7. Ireland	11	10	90.9
8. Romania	10	8	80.0
9. Slovakia	3	2	66.7
10. Spain	94	92	97.9
11. Switzerland	19	18	94.7
12. Turkey	22	16	72.7
13. UK	117	110	94.0



Section 2. Process of care and clinical outcomes for COPD patients admitted with an exacerbation across Europe

Patient data were received from 374 of the 422 (88%) hospitals enrolled in the audit. In total, 19,021 cases were collected, but 3,001 were withdrawn. The main reasons for withdrawal were "in progress" or "withdrawn" according to the original database. 16,022 provisional cases were submitted for analysis but in the present report only 15,821 with organisational data are described.

Figure 5. Inclusion–exclusion process.

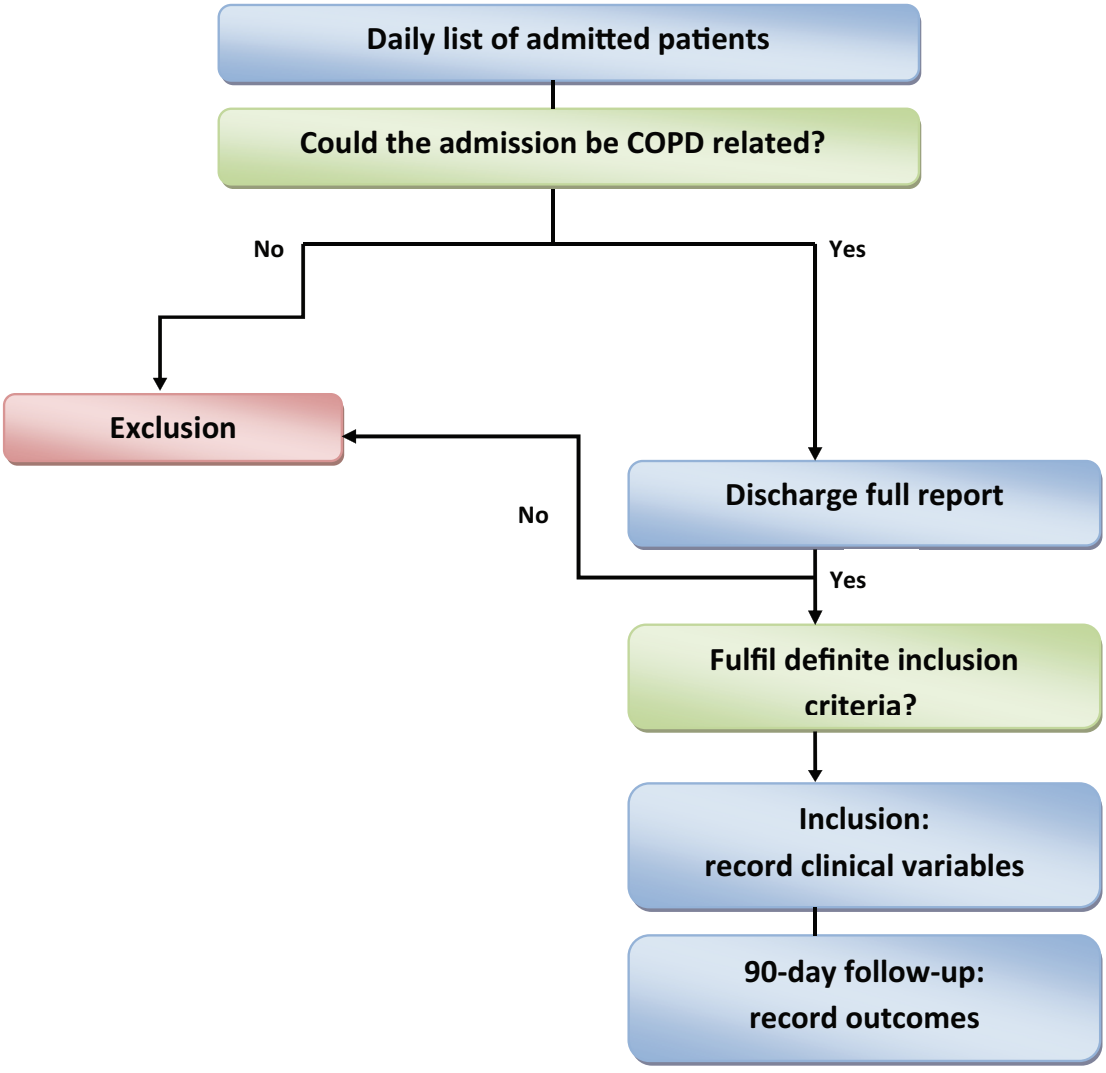


Table 44. Number of cases entered per country.

	Frequency	Percent	Cumulative frequency	Cumulative percent
EUROPE	15821	100		
1. Austria	823	5.20	823	5.20
2. Belgium	512	3.24	1335	8.44
3. Croatia	445	2.81	1780	11.25
4. Greece	1133	7.16	2913	18.41
5. Malta	112	0.71	3025	19.12
6. Poland	734	4.64	3759	23.76
7. Ireland	237	1.50	3996	25.26
8. Romania	629	3.98	4625	29.23
9. Slovakia	32	0.20	4657	29.44
10. Spain	5271	33.32	9928	62.75
11. Switzerland	295	1.86	10223	64.62
12. Turkey	612	3.87	10835	68.48
13. UK	4986	31.52	15821	100.00

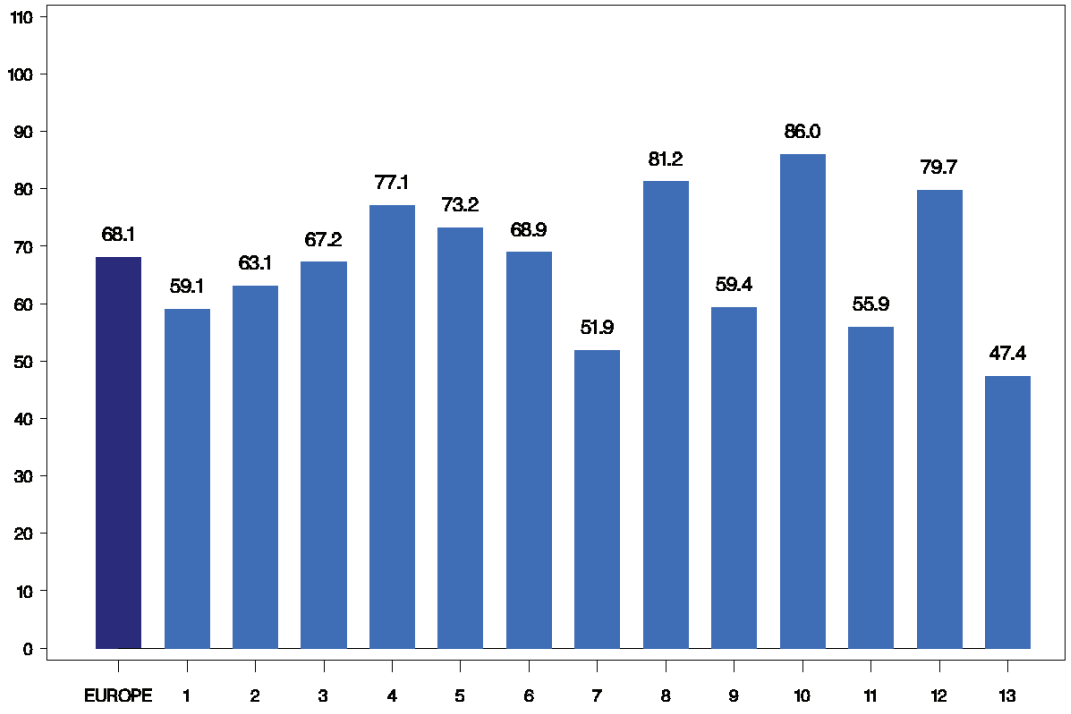
Sociodemographics

Gender

There were 10,770 (68.1%) males and 5,051 (31.9%) females included in this analysis with significant gender differences across European countries.

Table 45. Proportion of males.

	Patients	Number	%
EUROPE	15821	10770	68.1
1. Austria	823	486	59.1
2. Belgium	512	323	63.1
3. Croatia	445	299	67.2
4. Greece	1133	874	77.1
5. Malta	112	82	73.2
6. Poland	734	506	68.9
7. Ireland	237	123	51.9
8. Romania	629	511	81.2
9. Slovakia	32	19	59.4
10. Spain	5271	4533	86.0
11. Switzerland	295	165	55.9
12. Turkey	612	488	79.7
13. UK	4986	2361	47.4



Age

The median age was 72 years. 29.1% were aged under 65 years (n=4,486), 32.6 % (n=5,019) were 65–74 years, 30.9% (n=4,758) 75–84 years and 7.3 % (n=1,125) 85 years and older. Median age was 72 years for males and 70 years for females.

Table 46. Age distribution of patients (years).

	Patients	Median	P25–P75		P5–P95	
EUROPE	15135	72	64	79	54	86
1. Austria	789	69	63	75	53	85
2. Belgium	489	68	60	76	53	83
3. Croatia	431	72	63	78	53	84
4. Greece	1092	71	62	78	53	84
5. Malta	110	68	63	78	55	87
6. Poland	713	70	61	77	54	84
7. Ireland	225	71	63	78	52	86
8. Romania	605	63	56	72	52	78
9. Slovakia	31	63	58	70	53	84
10. Spain	5055	75	66	80	55	86
11. Switzerland	268	71	65	79	53	85
12. Turkey	594	69	61	76	54	82
13. UK	4733	72	65	79	55	86

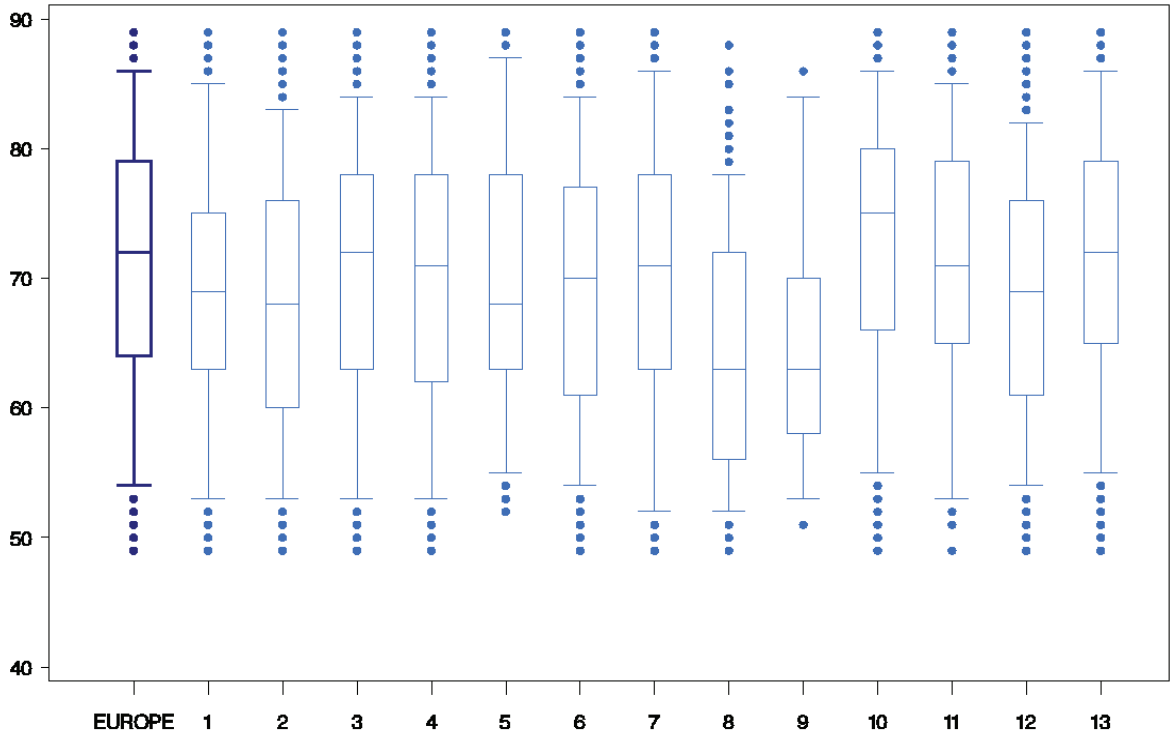


Table 47. Age group distribution of patients.

	Patients		Under 65 years		65–74 years		75–84 years		Older than 85 years	
	N	%	N	%	N	%	N	%	N	%
EUROPE	15388	100.0	4486	29.15	5019	32.62	4758	30.92	1125	7.31
1. Austria	806	5.24	292	36.23	316	39.21	157	19.48	41	5.09
2. Belgium	499	3.24	219	43.89	154	30.86	111	22.24	15	3.01
3. Croatia	434	2.82	136	31.34	145	33.41	137	31.57	16	3.69
4. Greece	1099	7.14	367	33.39	380	34.58	306	27.84	46	4.19
5. Malta	106	0.69	32	30.19	33	31.13	30	28.30	11	10.38
6. Poland	706	4.59	268	37.96	212	30.03	195	27.62	31	4.39
7. Ireland	230	1.49	77	33.48	67	29.13	67	29.13	19	8.26
8. Romania	613	3.98	350	57.10	186	30.34	75	12.23	2	0.33
9. Slovakia	30	0.19	19	63.33	8	26.67	2	6.67	1	3.33
10. Spain	5137	33.38	1167	22.72	1517	29.53	1984	38.62	469	9.13
11. Switzerland	286	1.86	77	26.92	99	34.62	84	29.37	26	9.09
12. Turkey	594	3.86	209	35.19	227	38.22	148	24.92	10	1.68
13. UK	4848	31.51	1273	26.26	1675	34.55	1462	30.16	438	9.03

Table 48. Age (years) by sex.

	Patients	Median	P25–P75		P5–P95	
EUROPE	15135	72	64	79	54	86
Male	10367	72	65	79	55	86
Female	4768	70	62	78	53	86

Table 49. Age group distribution of male patients.

	Patients		Age group (males)							
			Under 65 years		65–74 years		75–84 years		Older than 85 years	
	N	%	N	%	N	%	N	%	N	%
EUROPE	10467	100.0	2775	26.51	3498	33.42	3427	32.74	767	7.33
1. Austria	477	4.56	177	37.11	185	38.78	95	19.92	20	4.19
2. Belgium	315	3.01	117	37.14	108	34.29	79	25.08	11	3.49
3. Croatia	292	2.79	85	29.11	103	35.27	95	32.53	9	3.08
4. Greece	853	8.15	254	29.78	303	35.52	258	30.25	38	4.45
5. Malta	79	0.75	22	27.85	24	30.38	25	31.65	8	10.13
6. Poland	485	4.63	185	38.14	152	31.34	125	25.77	23	4.74
7. Ireland	120	1.15	34	28.33	35	29.17	39	32.50	12	10.00
8. Romania	499	4.77	289	57.92	147	29.46	62	12.42	1	0.20
9. Slovakia	19	0.18	13	68.42	5	26.32	1	5.26	0	
10. Spain	4415	42.18	864	19.57	1359	30.78	1784	40.41	408	9.24
11. Switzerland	160	1.53	37	23.13	60	37.50	48	30.00	15	9.38
12. Turkey	472	4.51	173	36.65	178	37.71	112	23.73	9	1.91
13. UK	2281	21.79	525	23.02	839	36.78	704	30.86	213	9.34

Table 50. Age group distribution of female patients.

	Patients		Age group (females)							
			Under 65 years		65–74 years		75–85 years		Older than 85 years	
	N	%	N	%	N	%	N	%	N	%
EUROPE	4921	100.0	1711	34.77	1521	30.91	1331	27.05	358	7.27
1. Austria	329	6.69	115	34.95	131	39.82	62	18.84	21	6.38
2. Belgium	184	3.74	102	55.43	46	25.00	32	17.39	4	2.17
3. Croatia	142	2.89	51	35.92	42	29.58	42	29.58	7	4.93
4. Greece	246	5.00	113	45.93	77	31.30	48	19.51	8	3.25
5. Malta	27	0.55	10	37.04	9	33.33	5	18.52	3	11.11
6. Poland	221	4.49	83	37.56	60	27.15	70	31.67	8	3.62
7. Ireland	110	2.24	43	39.09	32	29.09	28	25.45	7	6.36
8. Romania	114	2.32	61	53.51	39	34.21	13	11.40	1	0.88
9. Slovakia	11	0.22	6	54.55	3	27.27	1	9.09	1	9.09
10. Spain	722	14.67	303	41.97	158	21.88	200	27.70	61	8.45
11. Switzerland	126	2.56	40	31.75	39	30.95	36	28.57	11	8.73
12. Turkey	122	2.48	36	29.51	49	40.16	36	29.51	1	0.82
13. UK	2567	52.16	748	29.14	836	32.57	758	29.53	225	8.77

Height, weight and BMI

The median height was 166 cm and the median weight was 71 kg. This resulted in a median body mass index (BMI) of 26.1 for males and a median BMI of 25.5 for females.

Table 51. Height (cm).

	Patients	Median	P25–P75		P5–P95	
EUROPE	9061	166.0	160.0	171.0	152.0	179.0
1. Austria	688	167.0	160.0	174.0	154.0	180.0
2. Belgium	449	166.0	160.0	172.0	154.0	179.0
3. Croatia	369	168.0	161.0	174.0	152.0	181.0
4. Greece	958	168.0	163.0	173.0	155.0	179.0
5. Malta	45	162.0	160.0	168.0	150.0	173.0
6. Poland	602	167.0	160.0	172.0	152.0	178.0
7. Ireland	152	165.0	158.0	170.0	154.0	180.0
8. Romania	527	168.0	162.0	173.0	153.0	180.0
9. Slovakia	30	169.5	162.0	174.0	156.0	179.0
10. Spain	2509	165.0	160.0	170.0	153.0	176.0
11. Switzerland	243	168.0	162.0	172.0	155.0	178.0
12. Turkey	435	167.0	160.0	172.0	152.0	178.0
13. UK	2054	164.0	158.0	171.0	151.0	180.0

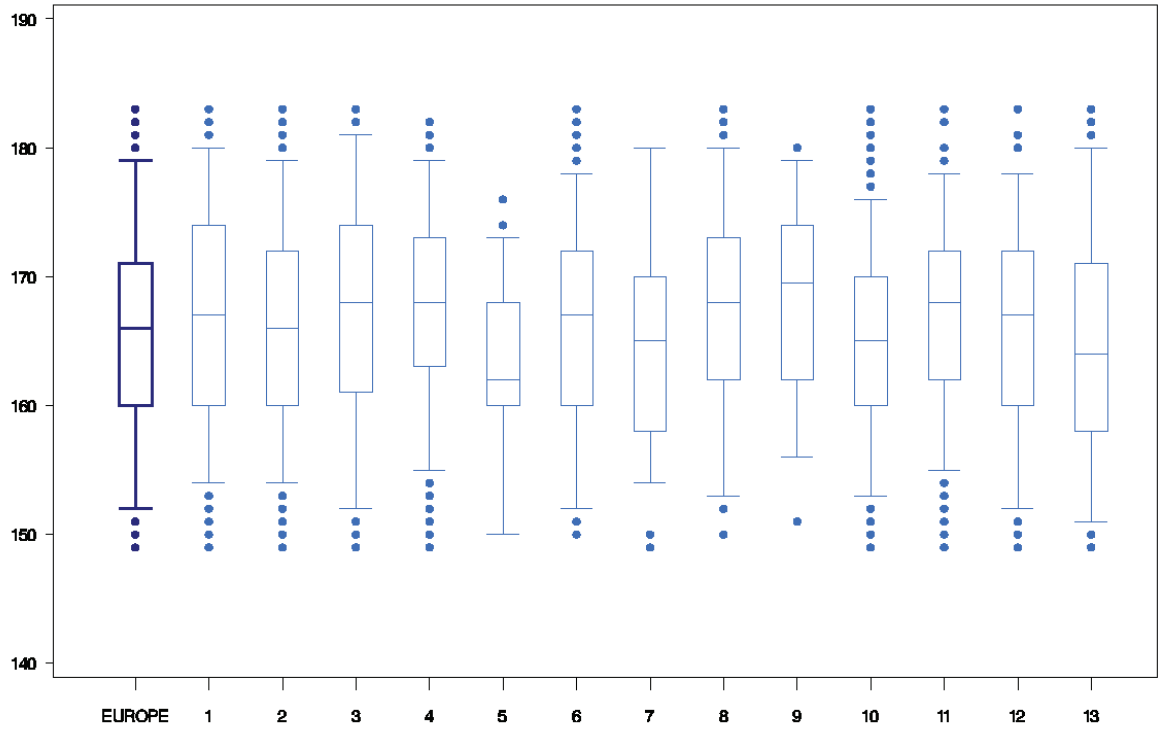
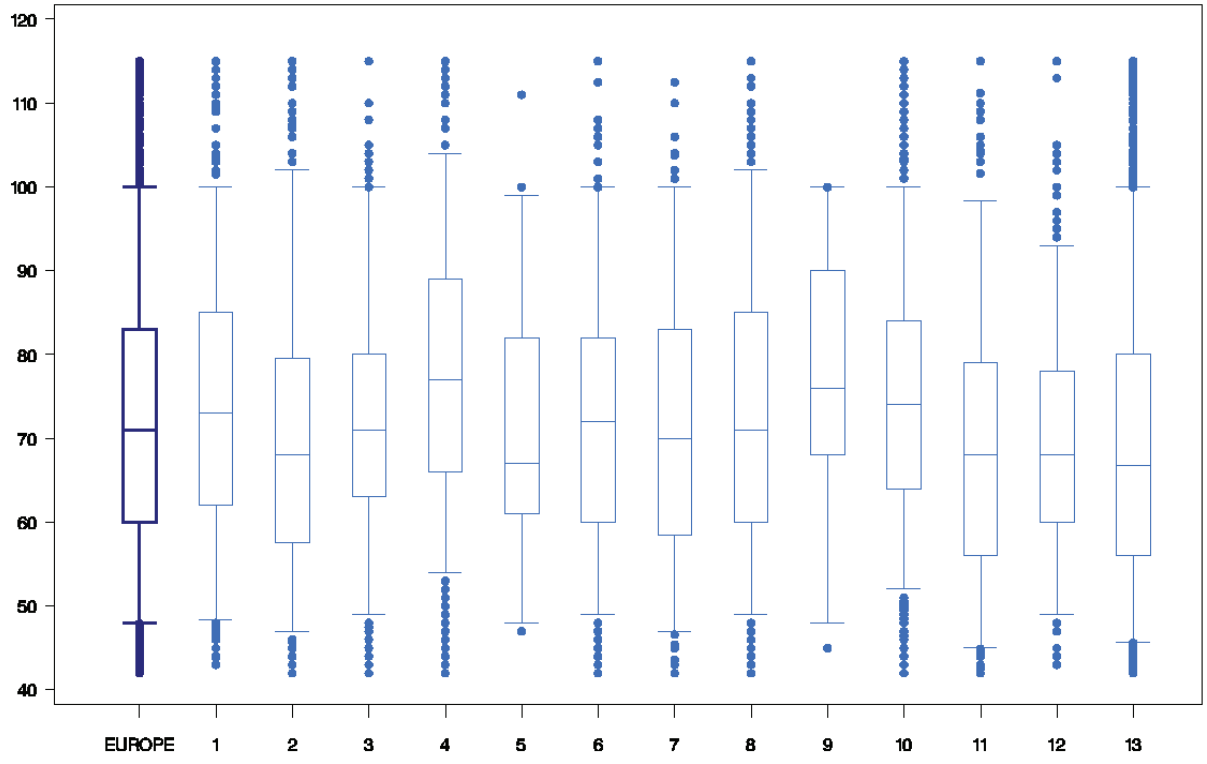


Table 52. Weight (kg).

	Patients	Median	P25–P75		P5–P95	
EUROPE	9187	71.0	60.0	83.0	48.0	100.0
1. Austria	686	73.0	62.0	85.0	48.4	100.0
2. Belgium	448	68.0	57.5	79.5	47.0	102.0
3. Croatia	378	71.0	63.0	80.0	49.0	100.0
4. Greece	944	77.0	66.0	89.0	54.0	104.0
5. Malta	49	67.0	61.0	82.0	48.0	99.0
6. Poland	606	72.0	60.0	82.0	49.0	100.0
7. Ireland	154	70.0	58.5	83.0	47.0	100.0
8. Romania	535	71.0	60.0	85.0	49.0	102.0
9. Slovakia	31	76.0	68.0	90.0	48.0	100.0
10. Spain	2536	74.0	64.0	84.0	52.0	100.0
11. Switzerland	260	68.0	56.0	79.0	45.0	98.3
12. Turkey	443	68.0	60.0	78.0	49.0	93.0
13. UK	2117	66.8	56.0	80.0	45.7	100.0



Of the patients, 11.3% (n=1,049) were underweight (BMI <19.5), 29.9% (n=2,771) overweight (BMI 25–29.9) and 26.1% (n=2,417) obese (BMI >30). In 41.5% of cases (n=6,566) the height and/or weight was not recorded.

Table 53. BMI (kg·m^{-2}).

	Patients	Median	P25–P75		P5–P95	
EUROPE	8800	26.0	22.4	29.9	18.4	36.3
1. Austria	674	25.4	22.2	29.8	18.0	35.6
2. Belgium	427	24.8	21.1	28.7	17.8	35.9
3. Croatia	378	25.3	22.2	28.4	18.6	36.8
4. Greece	941	27.1	24.0	31.2	20.0	37.7
5. Malta	48	25.9	23.4	30.8	20.6	37.3
6. Poland	600	25.6	22.2	29.3	18.4	36.1
7. Ireland	144	25.0	21.4	30.0	18.8	35.9
8. Romania	527	25.3	21.7	29.4	18.0	36.3
9. Slovakia	29	27.2	24.1	31.2	19.7	34.6
10. Spain	2496	27.2	24.0	30.8	19.8	36.3
11. Switzerland	230	24.5	20.8	28.1	17.7	36.4
12. Turkey	436	24.9	21.0	28.0	18.1	34.3
13. UK	1870	24.4	21.0	29.2	17.6	36.2

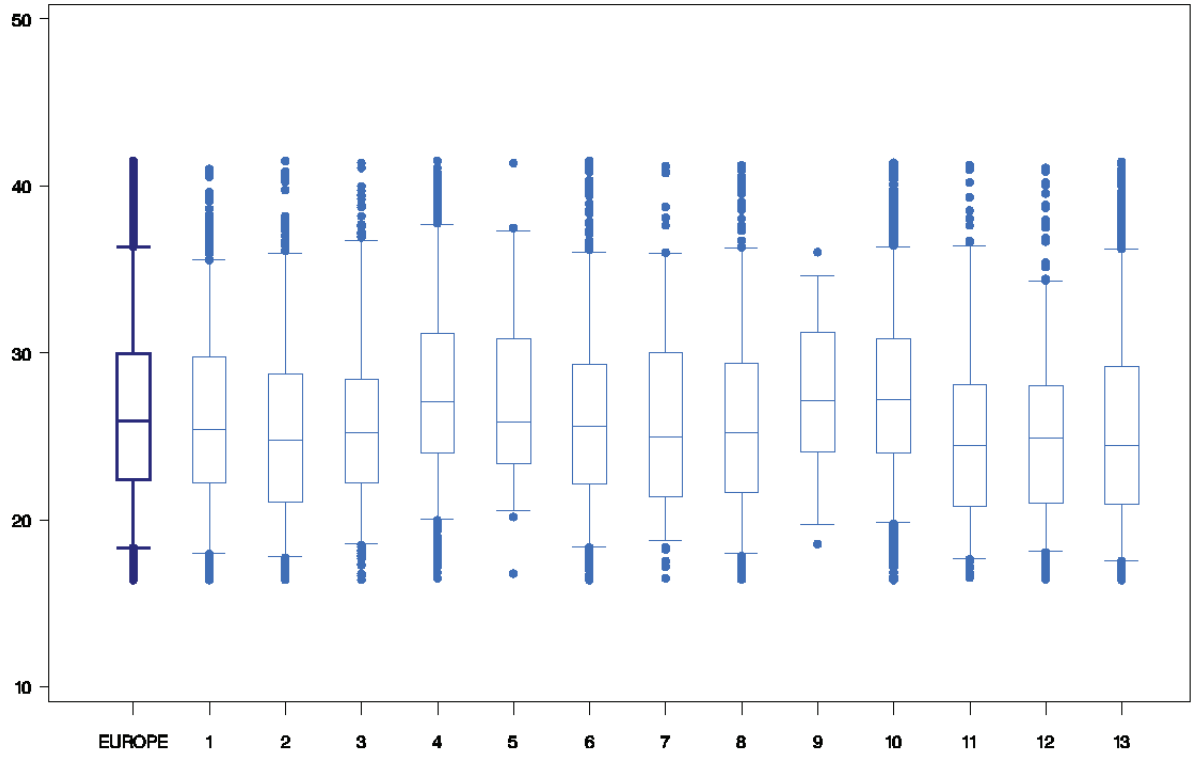


Table 54. BMI (kg·m^{-2}) by sex.

	Patients	Median	P25–P75		P5–P95	
All	8800	26.0	22.4	29.9	18.4	36.3
Male	6224	26.1	22.7	29.8	18.6	35.9
Female	2576	25.5	21.8	30.5	17.8	37.2

Table 55. BMI classification in male patients.

	Patients		BMI (males)							
			Underweight		Normal		Overweight		Obese	
	N	%	N	%	N	%	N	%	N	%
EUROPE	6447	100.0	612	9.49	2112	32.76	2119	32.87	1604	24.88
1. Austria	419	6.50	43	10.26	145	34.61	126	30.07	105	25.06
2. Belgium	293	4.54	52	17.75	102	34.81	79	26.96	60	20.48
3. Croatia	263	4.08	26	9.89	112	42.59	85	32.32	40	15.21
4. Greece	771	11.96	28	3.63	225	29.18	269	34.89	249	32.30
5. Malta	36	0.56	1	2.78	11	30.56	14	38.89	10	27.78
6. Poland	428	6.64	43	10.05	169	39.49	133	31.07	83	19.39
7. Ireland	87	1.35	10	11.49	31	35.63	23	26.44	23	26.44
8. Romania	446	6.92	58	13.00	165	37.00	126	28.25	97	21.75
9. Slovakia	18	0.28	2	11.11	6	33.33	4	22.22	6	33.33
10. Spain	2240	34.74	111	4.96	602	26.88	857	38.26	670	29.91
11. Switzerland	143	2.22	30	20.98	41	28.67	47	32.87	25	17.48
12. Turkey	364	5.65	58	15.93	148	40.66	112	30.77	46	12.64
13. UK	939	14.56	150	15.97	355	37.81	244	25.99	190	20.23

Table 56. BMI classification in female patients.

	Patients		BMI (females)							
			Underweight		Normal		Overweight		Obese	
	N	%	N	%	N	%	N	%	N	%
EUROPE	2809	100.0	437	15.56	896	31.90	661	23.53	815	29.01
1. Austria	296	10.54	50	16.89	105	35.47	63	21.28	78	26.35
2. Belgium	165	5.87	33	20.00	57	34.55	34	20.61	41	24.85
3. Croatia	127	4.52	15	11.81	36	28.35	42	33.07	34	26.77
4. Greece	220	7.83	9	4.09	55	25.00	60	27.27	96	43.64
5. Malta	15	0.53	1	6.67	7	46.67	1	6.67	6	40.00
6. Poland	191	6.80	22	11.52	51	26.70	58	30.37	60	31.41
7. Ireland	69	2.46	7	10.14	27	39.13	12	17.39	23	33.33
8. Romania	103	3.67	13	12.62	33	32.04	30	29.13	27	26.21
9. Slovakia	13	0.46	0		2	15.38	7	53.85	4	30.77
10. Spain	320	11.39	21	6.56	90	28.13	94	29.38	115	35.94
11. Switzerland	107	3.81	25	23.36	41	38.32	17	15.89	24	22.43
12. Turkey	85	3.03	6	7.06	20	23.53	29	34.12	30	35.29
13. UK	1098	39.09	235	21.40	372	33.88	214	19.49	277	25.23

Medical history

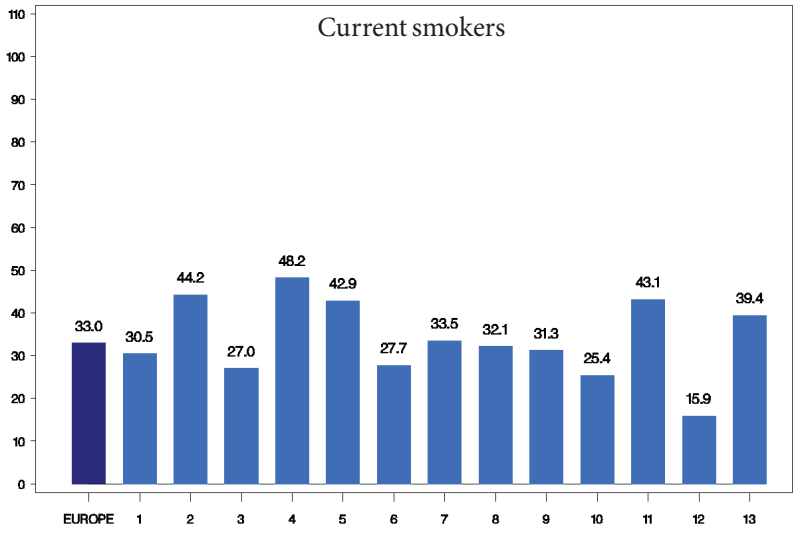
Smoking status

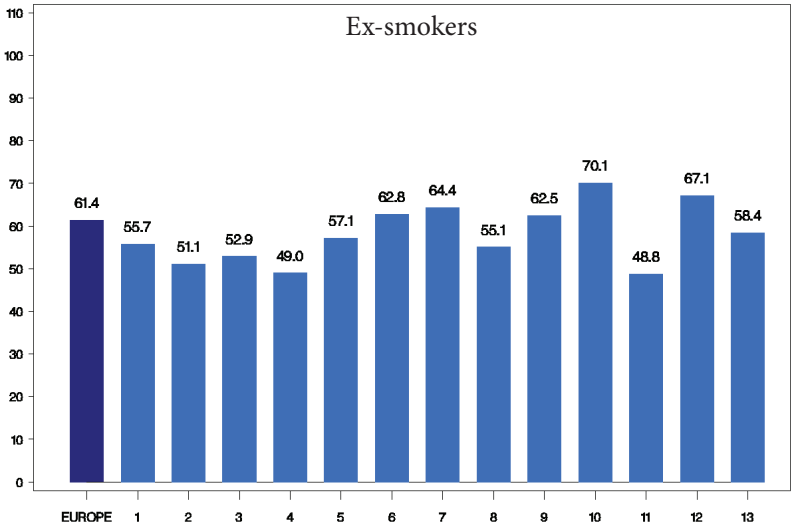
Smoking promotes disease progression and, therefore, is one of the major opportunities for disease modification. The high numbers of current smokers in this report uncover a weakness in disease management that will need to be addressed intensively in each country. Patients admitted with an exacerbation who are current smokers should be offered an opportunity to start intensive smoking cessation interventions.

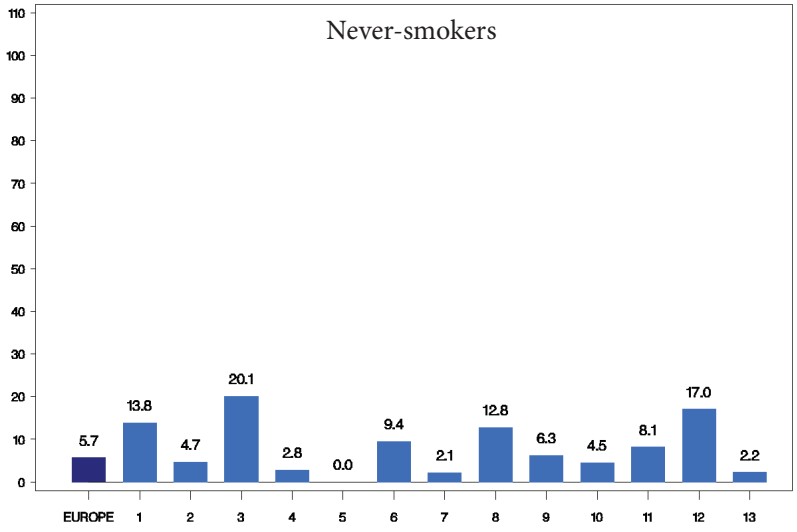
There is an increasing recognition that a significant, although small, proportion of COPD patients may have contracted this condition through industrial exposure or domestic exposure to biofuels, sometimes coupled with passive smoke exposure.

Table 57. Smoking status.

	Total number of patients	Current smoker		Ex-smoker		Never-smoker	
		N	%	N	%	N	%
EUROPE	14989	4941	33.0	9201	61.4	847	5.7
1. Austria	768	234	30.5	428	55.7	106	13.8
2. Belgium	491	217	44.2	251	51.1	23	4.7
3. Croatia	418	113	27.0	221	52.9	84	20.1
4. Greece	1100	530	48.2	539	49.0	31	2.8
5. Malta	112	48	42.9	64	57.1	0	0.0
6. Poland	710	197	27.7	446	62.8	67	9.4
7. Ireland	233	78	33.5	150	64.4	5	2.1
8. Romania	619	199	32.1	341	55.1	79	12.8
9. Slovakia	32	10	31.3	20	62.5	2	6.3
10. Spain	4954	1258	25.4	3475	70.1	221	4.5
11. Switzerland	283	122	43.1	138	48.8	23	8.1
12. Turkey	593	94	15.9	398	67.1	101	17.0
13. UK	4676	1841	39.4	2730	58.4	105	2.2


Current smokers
110
100
90
80
70
60
50
40
30
20
10
0
33.0
30.5
44.2
27.0
48.2
42.9
27.7
33.5
32.1
31.3
25.4
43.1
15.9
39.4
EUROPE
1
2
3
4
5
6
7
8
9
10
11
12
13


Ex-smokers
110
100
90
80
70
60
50
40
30
20
10
0
61.4
55.7
51.1
52.9
49.0
57.1
62.8
64.4
55.1
62.5
70.1
48.8
67.1
58.4
EUROPE
1
2
3
4
5
6
7
8
9
10
11
12
13


Never-smokers
110
100
90
80
70
60
50
40
30
20
10
0
5.7
13.8
4.7
20.1
2.8
0.0
9.4
2.1
12.8
6.3
4.5
8.1
17.0
2.2
EUROPE
1
2
3
4
5
6
7
8
9
10
11
12
13

Smoking history

Internationally there is an agreement to measure the impact of smoking by documenting exposure in terms of pack-years: the number of daily smoked cigarettes (expressed as packs, where 20 cigarettes is equal to one pack) multiplied by the number of years of smoking.

The median number of pack-years smoked for current smokers was 50 pack-years, whereas for ex-smokers the median was 44 pack-years. 6.7% had smoked <20 pack-years, 60.8% (n=6,513) 20–59 pack-years, 23.9% (n=2,565) 60–99 pack-years and 8.6% (n=919) ≥100 pack-years.

In 21.4% of the cases, smoking history was not recorded.

Table 58. Smoking history (pack-years) in current smokers.

	Patients	Median	P25–P75		P5–P95	
EUROPE	3701	50	37	60	20	100
1. Austria	189	50	30	60	20	90
2. Belgium	130	40	30	50	20	80
3. Croatia	90	50	40	60	25	100
4. Greece	481	60	50	90	30	120
5. Malta	31	50	40	90	15	120
6. Poland	192	40	35	50	20	70
7. Ireland	54	50	40	60	27	100
8. Romania	181	35	30	45	15	60
9. Slovakia	10	33	25	48	20	50
10. Spain	932	50	40	70	20	100
11. Switzerland	108	50	40	60	22	100
12. Turkey	92	50	35	68	20	100
13. UK	1211	45	30	60	20	94

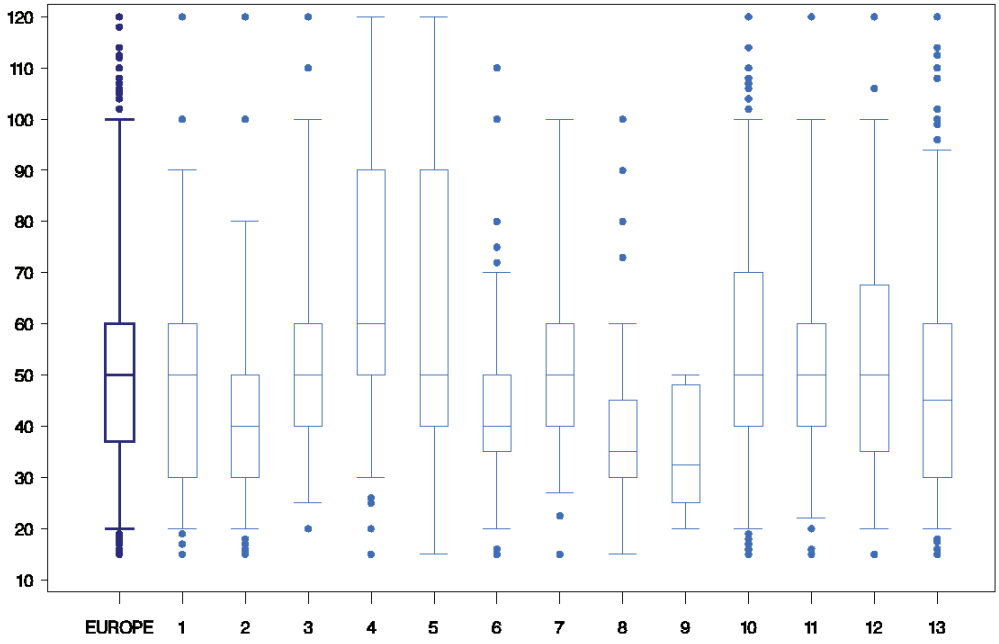


Table 59. Smoking history (pack-years) in ex-smokers.

	Patients	Median	P25–P75		P5–P95	
EUROPE	6586	44	30	60	15	100
1. Austria	346	40	30	60	12	100
2. Belgium	154	40	30	50	15	80
3. Croatia	165	40	30	60	20	80
4. Greece	466	60	45	80	30	110
5. Malta	47	60	40	80	20	110
6. Poland	377	38	28	50	12	74
7. Ireland	87	40	35	60	20	100
8. Romania	291	33	20	45	10	70
9. Slovakia	17	20	20	30	10	100
10. Spain	2424	50	40	65	20	100
11. Switzerland	117	40	30	60	15	95
12. Turkey	373	45	30	60	15	100
13. UK	1722	40	30	50	15	80

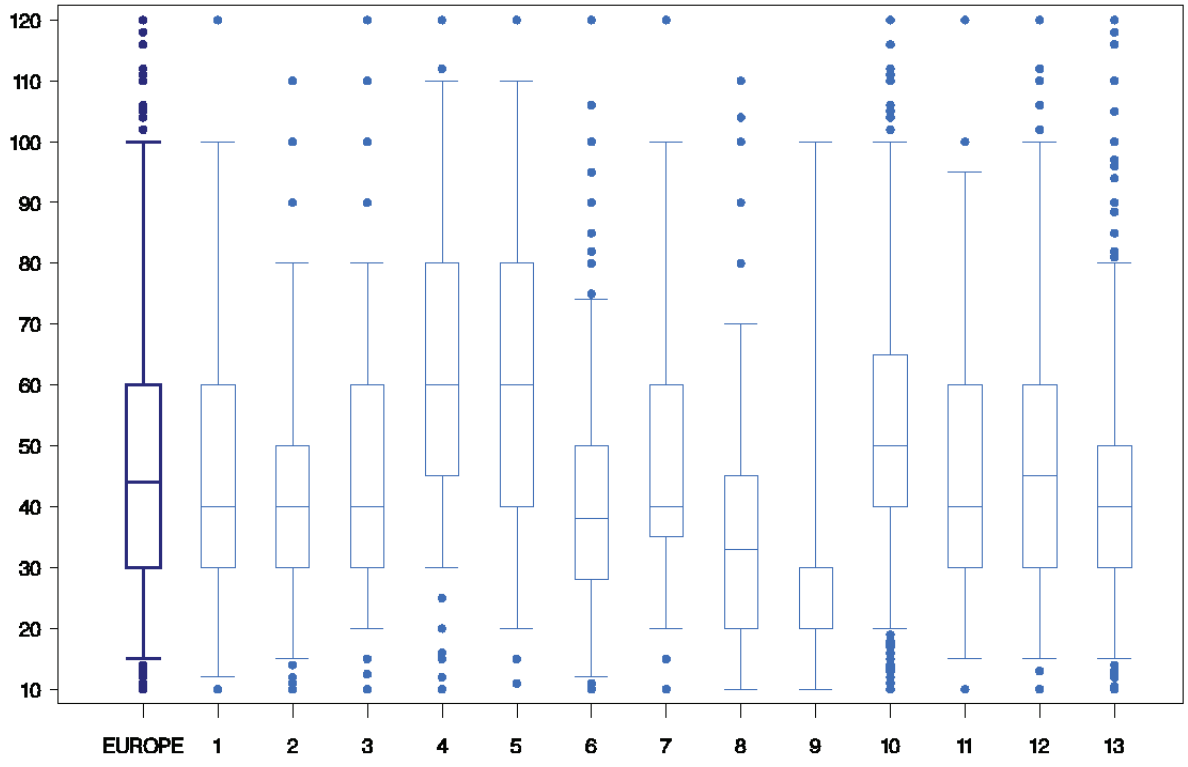


Table 60. Smoking history (pack-years) by sex: males.

	Patients	Median	P25–P75		P5–P95	
EUROPE	7317	50.0	35.0	60.0	20.0	100.0
1. Austria	342	47.5	30.0	60.0	15.0	100.0
2. Belgium	173	40.0	30.0	50.0	15.0	80.0
3. Croatia	193	45.0	35.0	60.0	20.0	100.0
4. Greece	738	65.0	50.0	90.0	30.0	120.0
5. Malta	53	60.0	40.0	90.0	15.0	120.0
6. Poland	413	40.0	30.0	50.0	20.0	75.0
7. Ireland	70	50.0	40.0	60.0	20.0	100.0
8. Romania	422	35.0	25.0	45.0	10.0	70.0
9. Slovakia	16	25.0	20.0	30.0	10.0	100.0
10. Spain	2950	50.0	40.0	70.0	20.0	100.0
11. Switzerland	127	50.0	40.0	60.0	17.0	100.0
12. Turkey	423	46.0	35.0	60.0	20.0	100.0
13. UK	1397	44.0	30.0	60.0	17.5	100.0

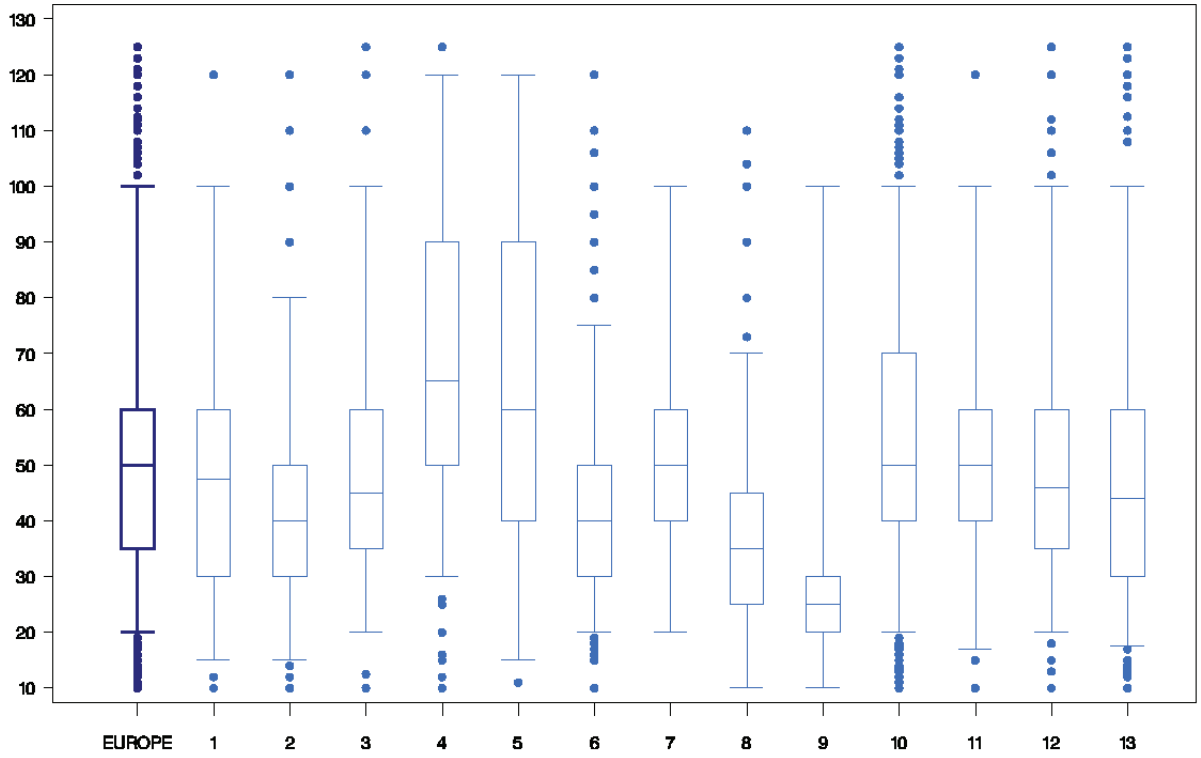
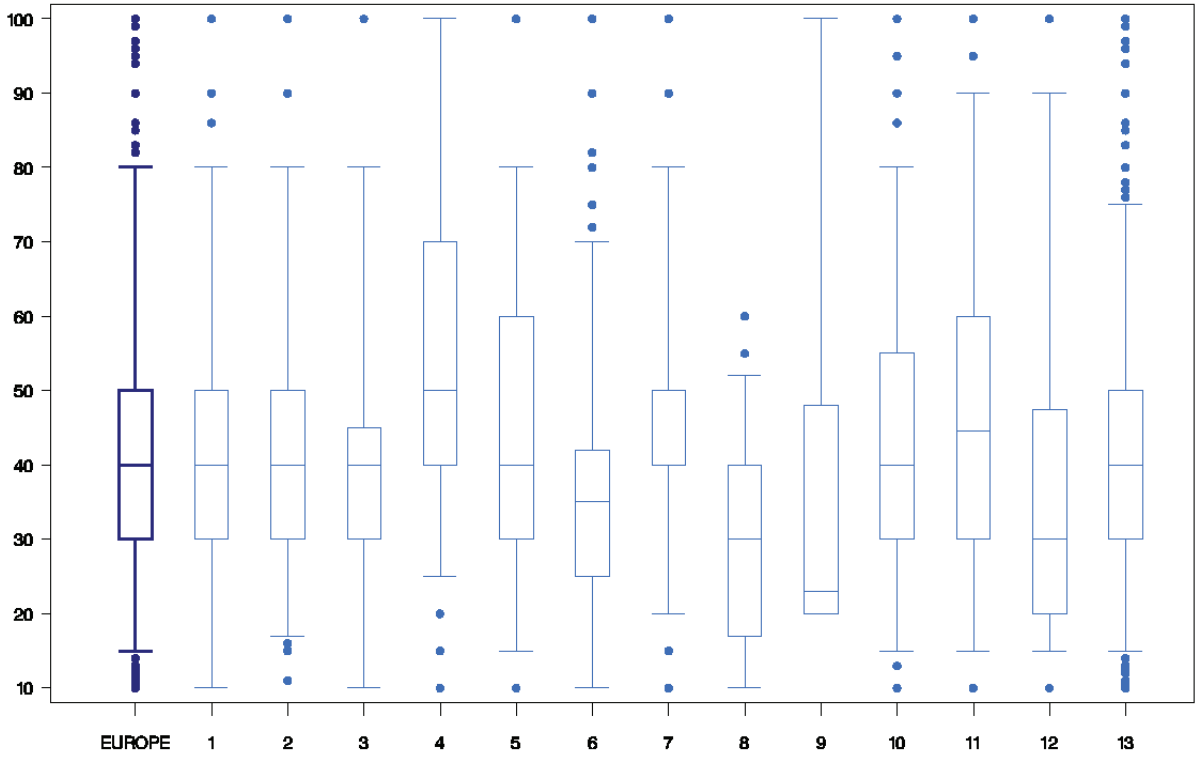


Table 61. Smoking history (pack-years) by sex: females.

	Patients	Median	P25–P75		P5–P95	
EUROPE	3016	40.0	30.0	50.0	15.0	80.0
1. Austria	198	40.0	30.0	50.0	10.0	80.0
2. Belgium	112	40.0	30.0	50.0	17.0	80.0
3. Croatia	67	40.0	30.0	45.0	10.0	80.0
4. Greece	208	50.0	40.0	70.0	25.0	100.0
5. Malta	25	40.0	30.0	60.0	15.0	80.0
6. Poland	157	35.0	25.0	42.0	10.0	70.0
7. Ireland	70	40.0	40.0	50.0	20.0	80.0
8. Romania	57	30.0	17.0	40.0	10.0	52.0
9. Slovakia	11	23.0	20.0	48.0	20.0	100.0
10. Spain	423	40.0	30.0	55.0	15.0	80.0
11. Switzerland	98	44.5	30.0	60.0	15.0	90.0
12. Turkey	44	30.0	20.0	47.5	15.0	90.0
13. UK	1546	40.0	30.0	50.0	15.0	75.0



Comorbidities

The Charlson index is an evidence-based measure of the influence of comorbidity on prognosis and patient outcome. A detailed explanation is provided in Appendix E. The median score was 1. The major comorbidities were other pulmonary disease (20.8%), congestive heart failure (20.1%) and diabetes (20%). Median for males was 1 and median for females was 1.

Comorbidities: Charlson index (consult Appendix E for specific index criteria)

Table 62. Charlson index.

	Patients	Median	P25–P75		P5–P95	
EUROPE	15585	1	0	2	0	4
1. Austria	813	1	0	2	0	4
2. Belgium	497	1	1	3	0	5
3. Croatia	439	1	0	2	0	4
4. Greece	1124	1	0	2	0	4
5. Malta	112	1	0	2	0	4
6. Poland	725	2	1	3	0	5
7. Ireland	235	1	0	2	0	4
8. Romania	623	1	1	2	0	4
9. Slovakia	32	2	1	3	0	5
10. Spain	5158	1	0	3	0	5
11. Switzerland	285	1	0	3	0	5
12. Turkey	611	1	0	1	0	3
13. UK	4931	1	0	2	0	4

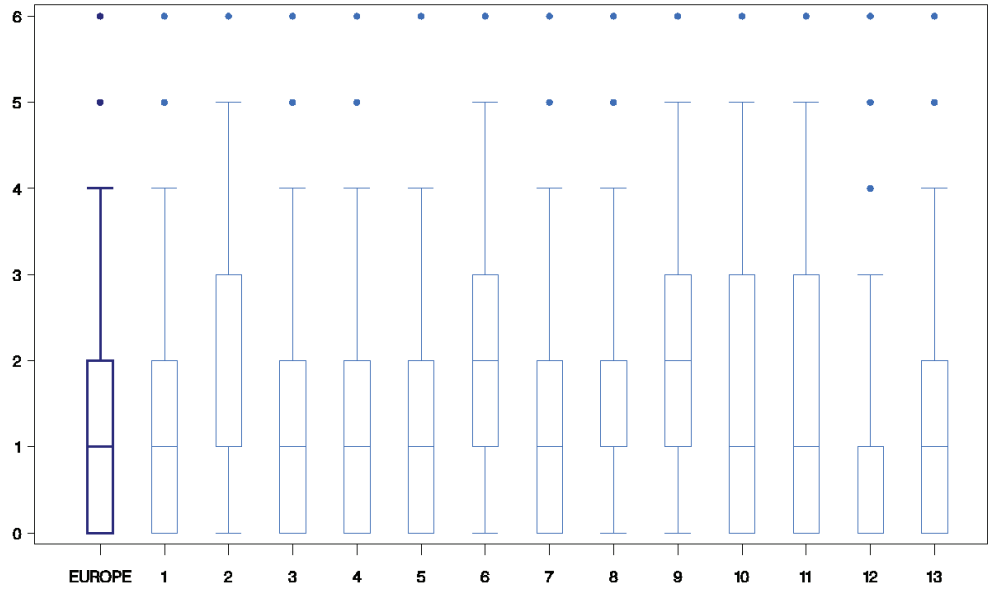


Table 63. Charlson index by gender.

	Patients	Median	P25–P75		P5–P95	
All	15585	1.00	0.00	2.00	0.00	4.00
Male	10588	1.00	0.00	2.00	0.00	4.00
Female	4997	1.00	0.00	2.00	0.00	4.00

Table 64. Charlson index by gender: males.

	Patients	Median	P25–P75		P5–P95	
EUROPE	10588	1.0	0.0	2.0	0.0	4.0
1. Austria	478	1.0	0.0	3.0	0.0	5.0
2. Belgium	313	2.0	1.0	3.0	0.0	5.0
3. Croatia	294	1.0	0.0	2.0	0.0	4.0
4. Greece	866	1.0	0.0	2.0	0.0	4.0
5. Malta	82	1.0	0.0	2.0	0.0	4.0
6. Poland	499	2.0	1.0	3.0	0.0	5.0
7. Ireland	122	1.0	1.0	2.0	0.0	4.0
8. Romania	507	1.0	1.0	2.0	0.0	4.0
9. Slovakia	19	2.0	1.0	3.0	1.0	6.0
10. Spain	4433	1.0	0.0	3.0	0.0	5.0
11. Switzerland	157	2.0	0.0	3.0	0.0	5.0
12. Turkey	487	0.0	0.0	1.0	0.0	3.0
13. UK	2331	1.0	0.0	2.0	0.0	4.0

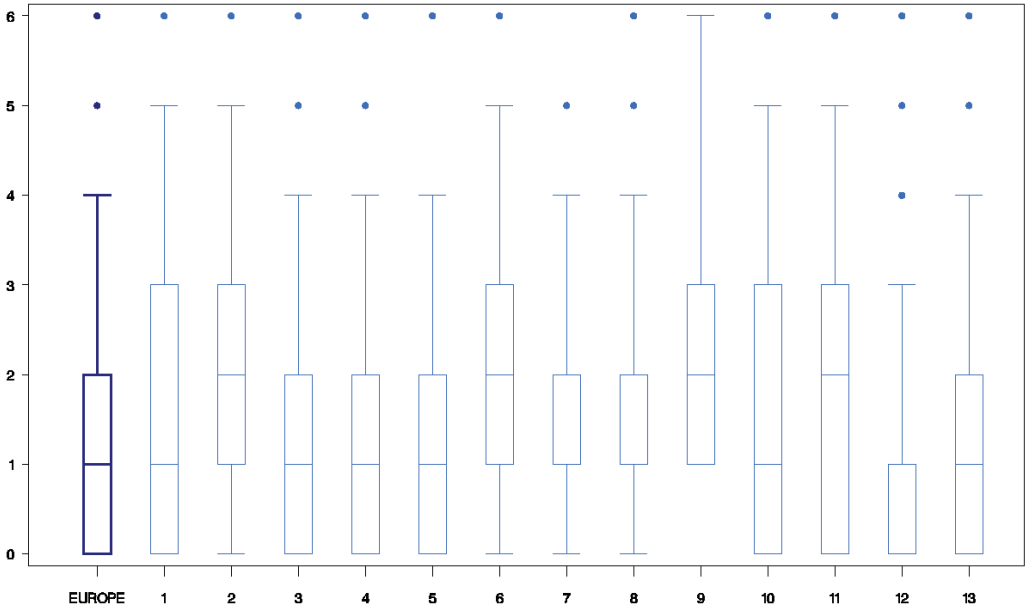
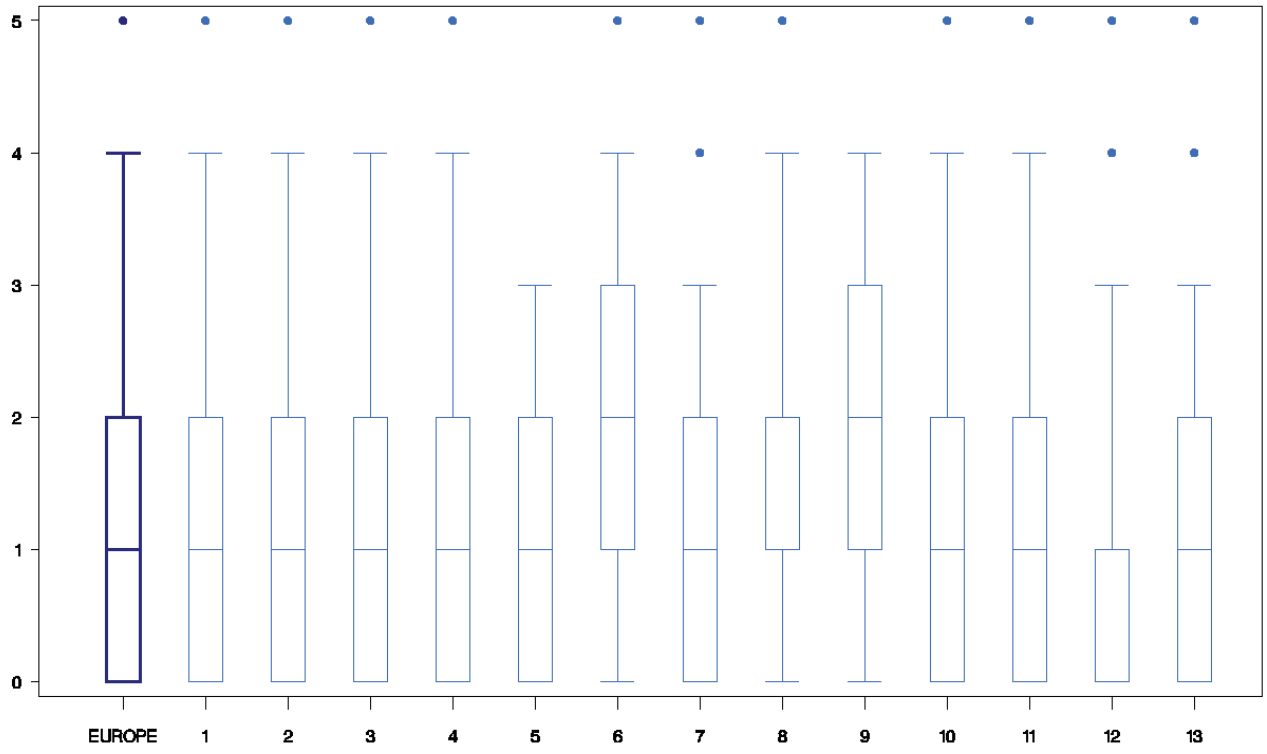


Table 65. Charlson index by gender: females.

	Patients	Median	P25–P75		P5–P95	
EUROPE	4948	1.0	0.0	2.0	0.0	4.0
1. Austria	333	1.0	0.0	2.0	0.0	4.0
2. Belgium	180	1.0	0.0	2.0	0.0	4.0
3. Croatia	143	1.0	0.0	2.0	0.0	4.0
4. Greece	256	1.0	0.0	2.0	0.0	4.0
5. Malta	30	1.0	0.0	2.0	0.0	3.0
6. Poland	225	2.0	1.0	3.0	0.0	4.0
7. Ireland	111	1.0	0.0	2.0	0.0	3.0
8. Romania	115	1.0	1.0	2.0	0.0	4.0
9. Slovakia	13	2.0	1.0	3.0	0.0	4.0
10. Spain	718	1.0	0.0	2.0	0.0	4.0
11. Switzerland	126	1.0	0.0	2.0	0.0	4.0
12. Turkey	124	1.0	0.0	1.0	0.0	3.0
13. UK	2574	1.0	0.0	2.0	0.0	3.0



Comorbid conditions documented in patients admitted with COPD exacerbation.

Table 66. Comorbidities: myocardial infarction.

	Patients	Number	%
EUROPE	15821	2090	13.2
1. Austria	823	76	9.2
2. Belgium	512	79	15.4
3. Croatia	445	27	6.1
4. Greece	1133	224	19.8
5. Malta	112	22	19.6
6. Poland	734	76	10.4
7. Ireland	237	43	18.1
8. Romania	629	33	5.2
9. Slovakia	32	10	31.3
10. Spain	5271	665	12.6
11. Switzerland	295	13	4.4
12. Turkey	612	46	7.5
13. UK	4986	776	15.6

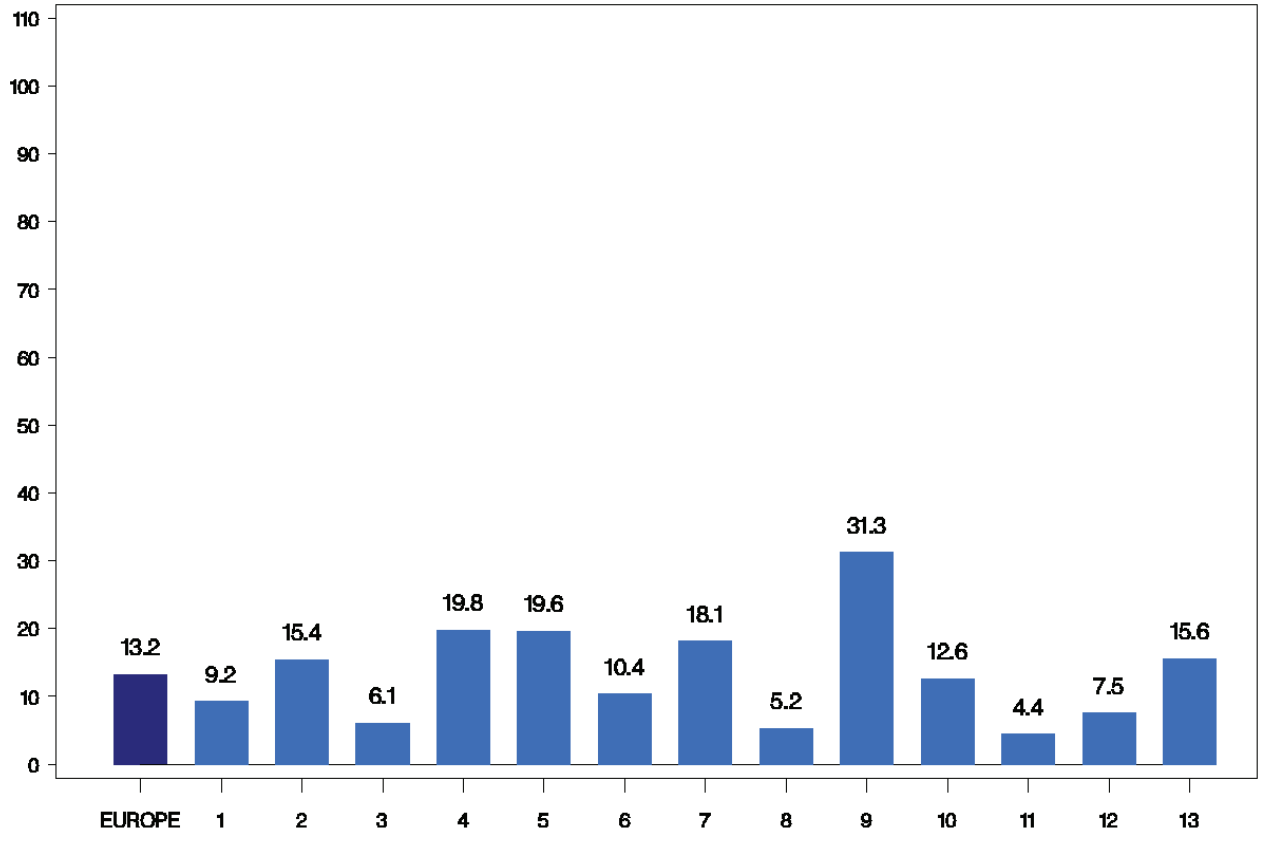


Table 67. Comorbidities: congestive heart failure.

	Patients	Number	%
EUROPE	15821	3174	20.1
1. Austria	823	185	22.5
2. Belgium	512	96	18.8
3. Croatia	445	143	32.1
4. Greece	1133	275	24.3
5. Malta	112	37	33.0
6. Poland	734	269	36.6
7. Ireland	237	52	21.9
8. Romania	629	185	29.4
9. Slovakia	32	10	31.3
10. Spain	5271	1042	19.8
11. Switzerland	295	99	33.6
12. Turkey	612	138	22.5
13. UK	4986	643	12.9

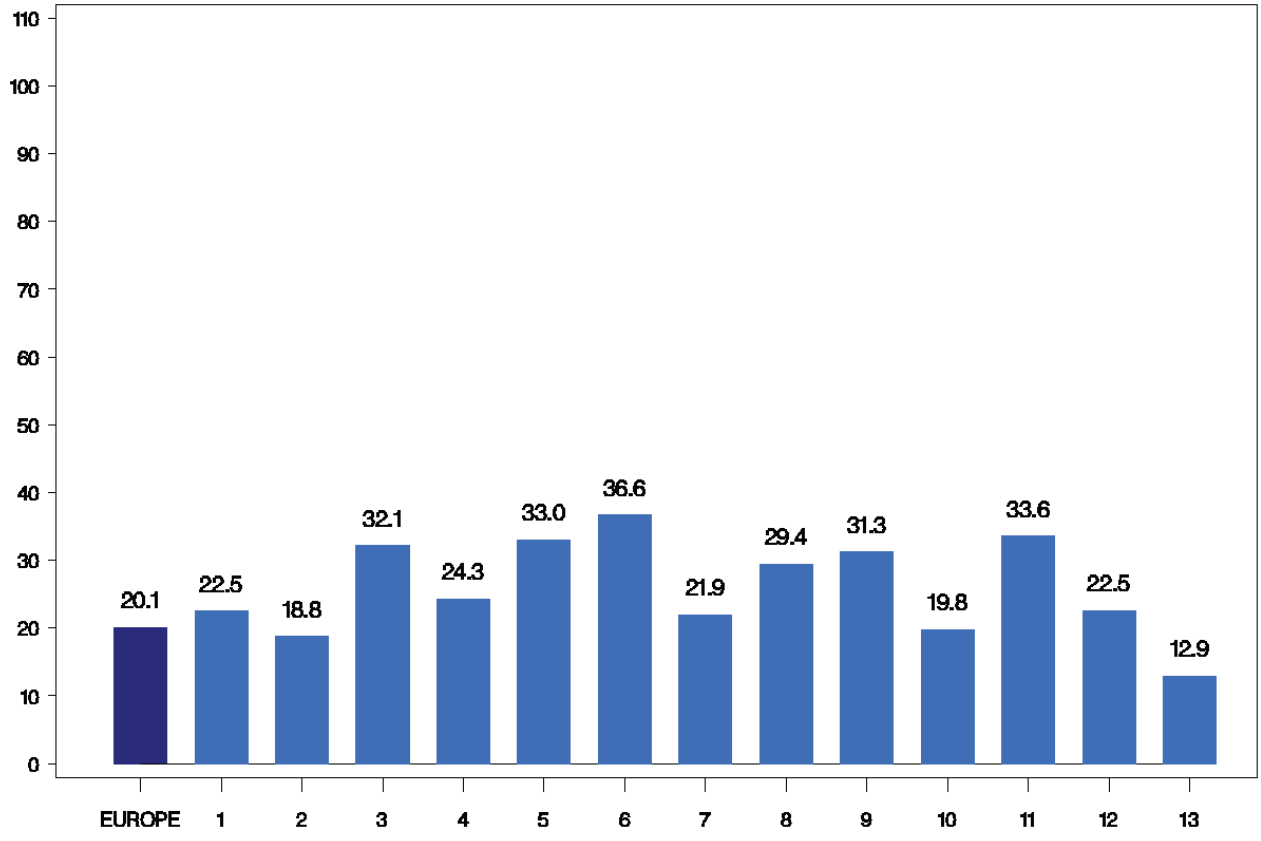


Table 68. Comorbidities: peripheral vascular disease.

	Patients	Number	%
EUROPE	15821	1654	10.5
1. Austria	823	95	11.5
2. Belgium	512	84	16.4
3. Croatia	445	35	7.9
4. Greece	1133	174	15.4
5. Malta	112	1	0.9
6. Poland	734	238	32.4
7. Ireland	237	20	8.4
8. Romania	629	82	13.0
9. Slovakia	32	5	15.6
10. Spain	5271	650	12.3
11. Switzerland	295	38	12.9
12. Turkey	612	38	6.2
13. UK	4986	194	3.9

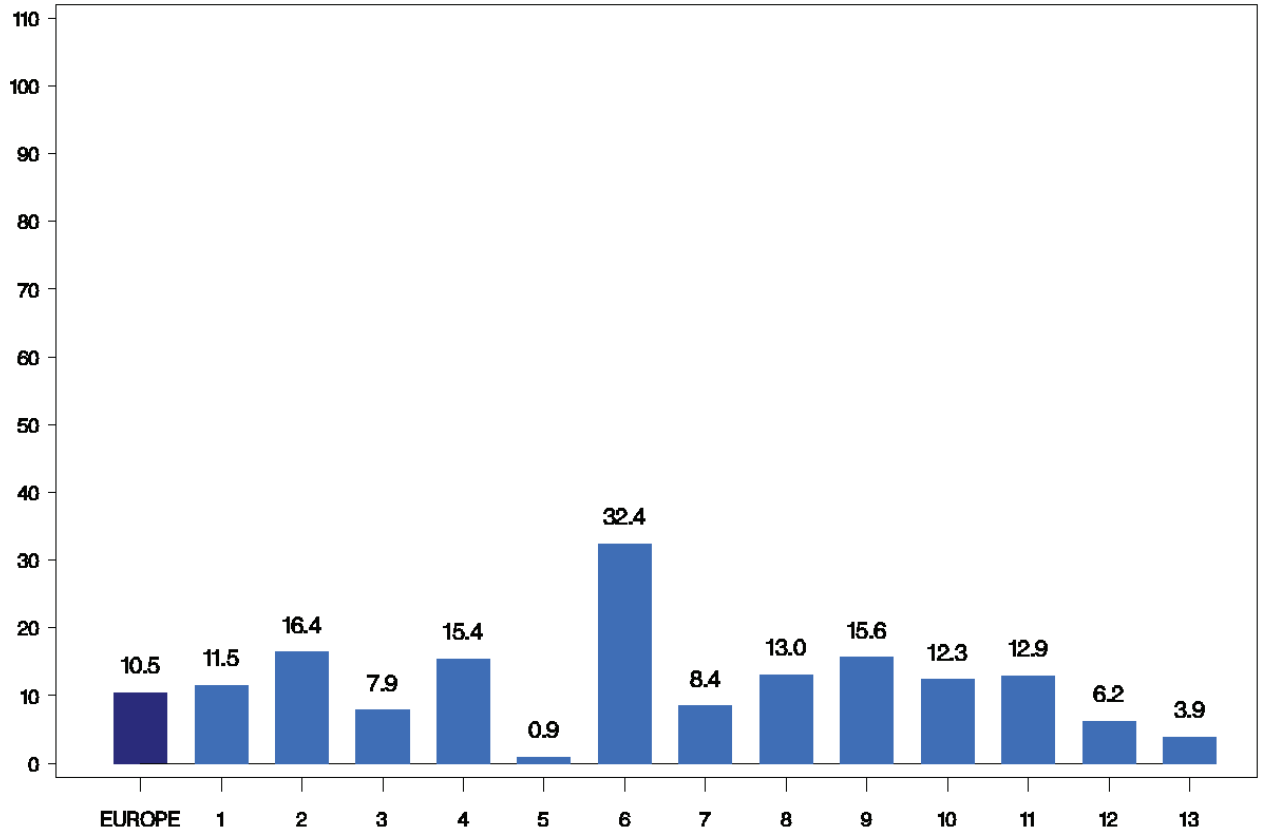


Table 69. Comorbidities: cerebrovascular disease.

	Patients	Number	%
EUROPE	15821	1407	8.9
1. Austria	823	71	8.6
2. Belgium	512	48	9.4
3. Croatia	445	70	15.7
4. Greece	1133	74	6.5
5. Malta	112	10	8.9
6. Poland	734	89	12.1
7. Ireland	237	13	5.5
8. Romania	629	28	4.5
9. Slovakia	32	5	15.6
10. Spain	5271	496	9.4
11. Switzerland	295	13	4.4
12. Turkey	612	12	2.0
13. UK	4986	478	9.6

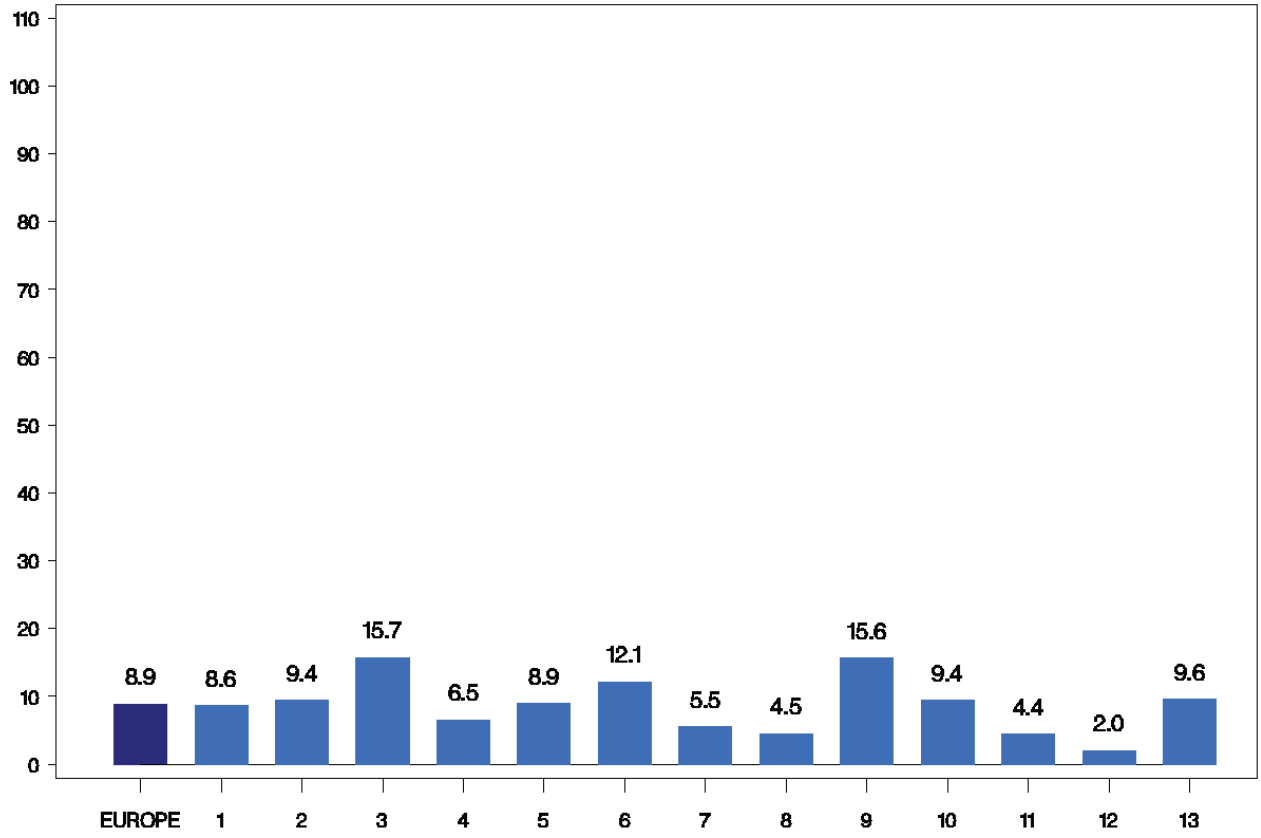


Table 70. Comorbidities: dementia.

	Patients	Number	%
EUROPE	15821	526	3.3
1. Austria	823	23	2.8
2. Belgium	512	5	1.0
3. Croatia	445	6	1.3
4. Greece	1133	78	6.9
5. Malta	112	1	0.9
6. Poland	734	48	6.5
7. Ireland	237	5	2.1
8. Romania	629	4	0.6
9. Slovakia	32	2	6.3
10. Spain	5271	174	3.3
11. Switzerland	295	22	7.5
12. Turkey	612	6	1.0
13. UK	4986	152	3.0

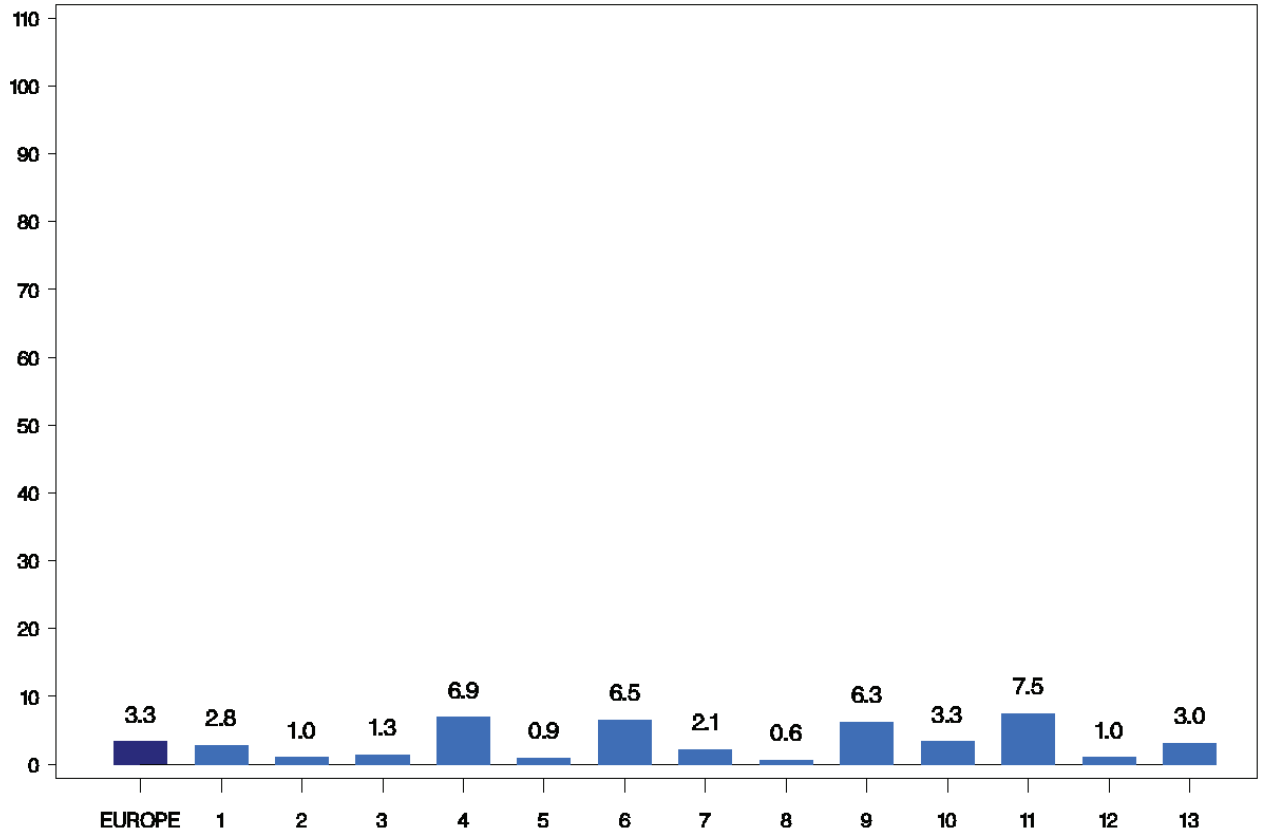


Table 71. Comorbidities: other chronic pulmonary disease.

	Patients	Number	%
EUROPE	15821	3285	20.8
1. Austria	823	237	28.8
2. Belgium	512	109	21.3
3. Croatia	445	63	14.2
4. Greece	1133	95	8.4
5. Malta	112	10	8.9
6. Poland	734	145	19.8
7. Ireland	237	46	19.4
8. Romania	629	233	37.0
9. Slovakia	32	9	28.1
10. Spain	5271	829	15.7
11. Switzerland	295	7	2.4
12. Turkey	612	49	8.0
13. UK	4986	1453	29.1

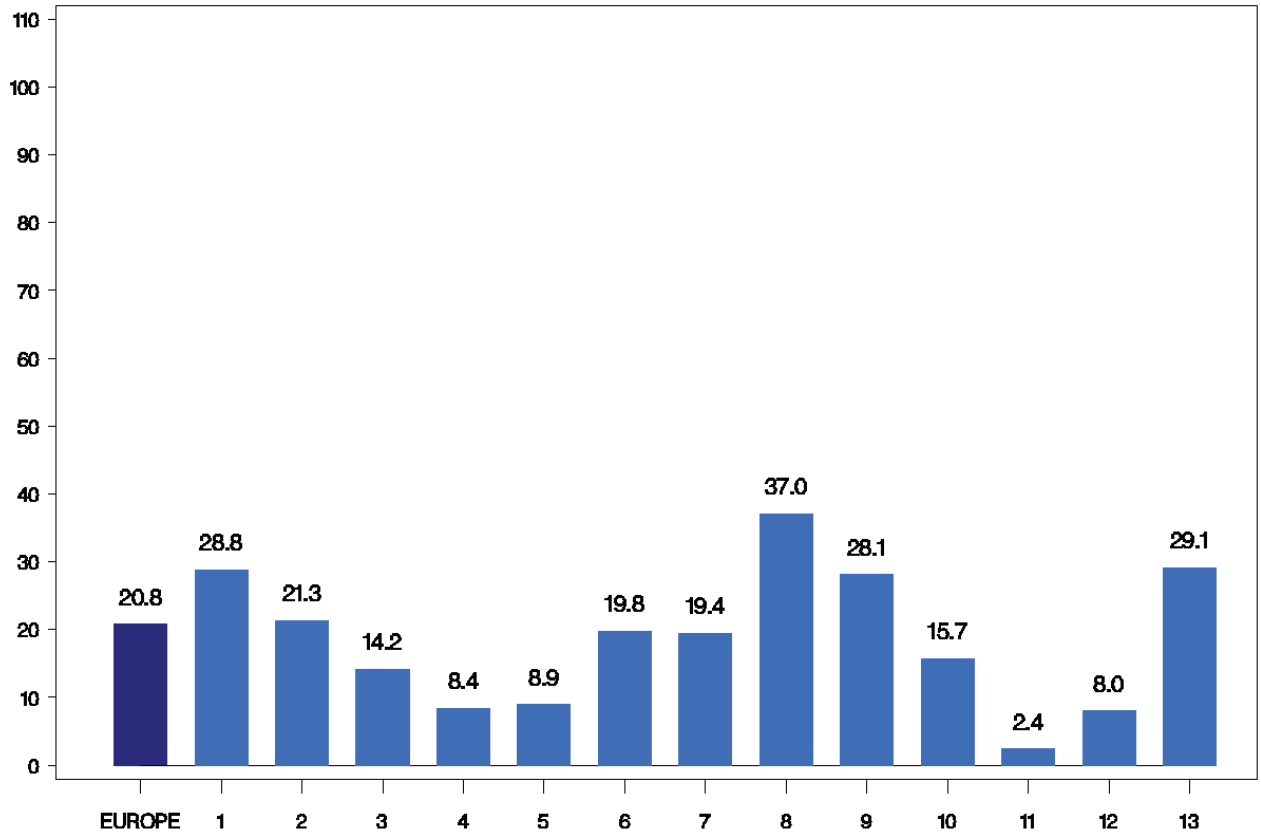


Table 72. Comorbidities: connective tissue disease.

	Patients	Number	%
EUROPE	15821	338	2.1
1. Austria	823	16	1.9
2. Belgium	512	7	1.4
3. Croatia	445	5	1.1
4. Greece	1133	18	1.6
5. Malta	112	0	0.0
6. Poland	734	9	1.2
7. Ireland	237	9	3.8
8. Romania	629	10	1.6
9. Slovakia	32	0	0.0
10. Spain	5271	106	2.0
11. Switzerland	295	3	1.0
12. Turkey	612	4	0.7
13. UK	4986	151	3.0

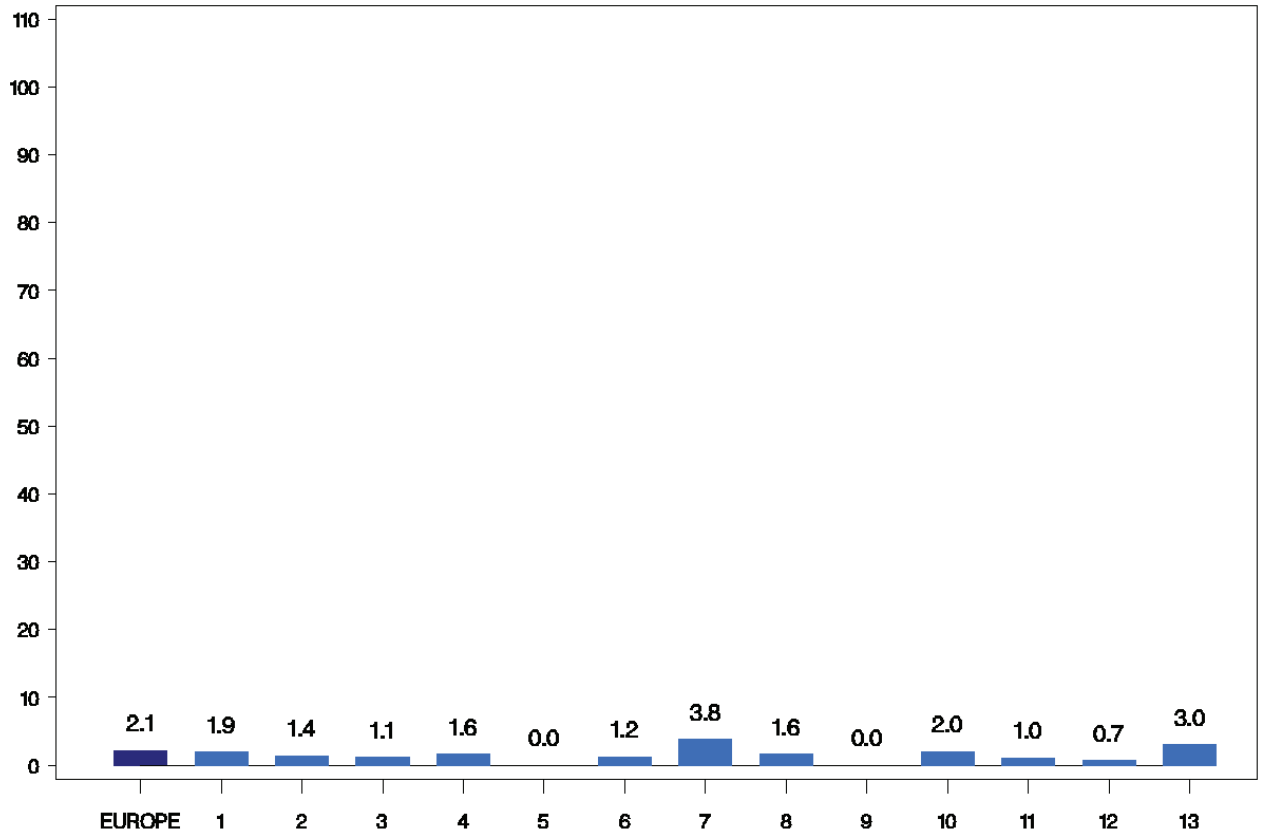


Table 73. Comorbidities: ulcer disease.

	Patients	Number	%
EUROPE	15821	1003	6.3
1. Austria	823	41	5.0
2. Belgium	512	80	15.6
3. Croatia	445	42	9.4
4. Greece	1133	54	4.8
5. Malta	112	3	2.7
6. Poland	734	73	9.9
7. Ireland	237	19	8.0
8. Romania	629	78	12.4
9. Slovakia	32	5	15.6
10. Spain	5271	433	8.2
11. Switzerland	295	8	2.7
12. Turkey	612	13	2.1
13. UK	4986	154	3.1

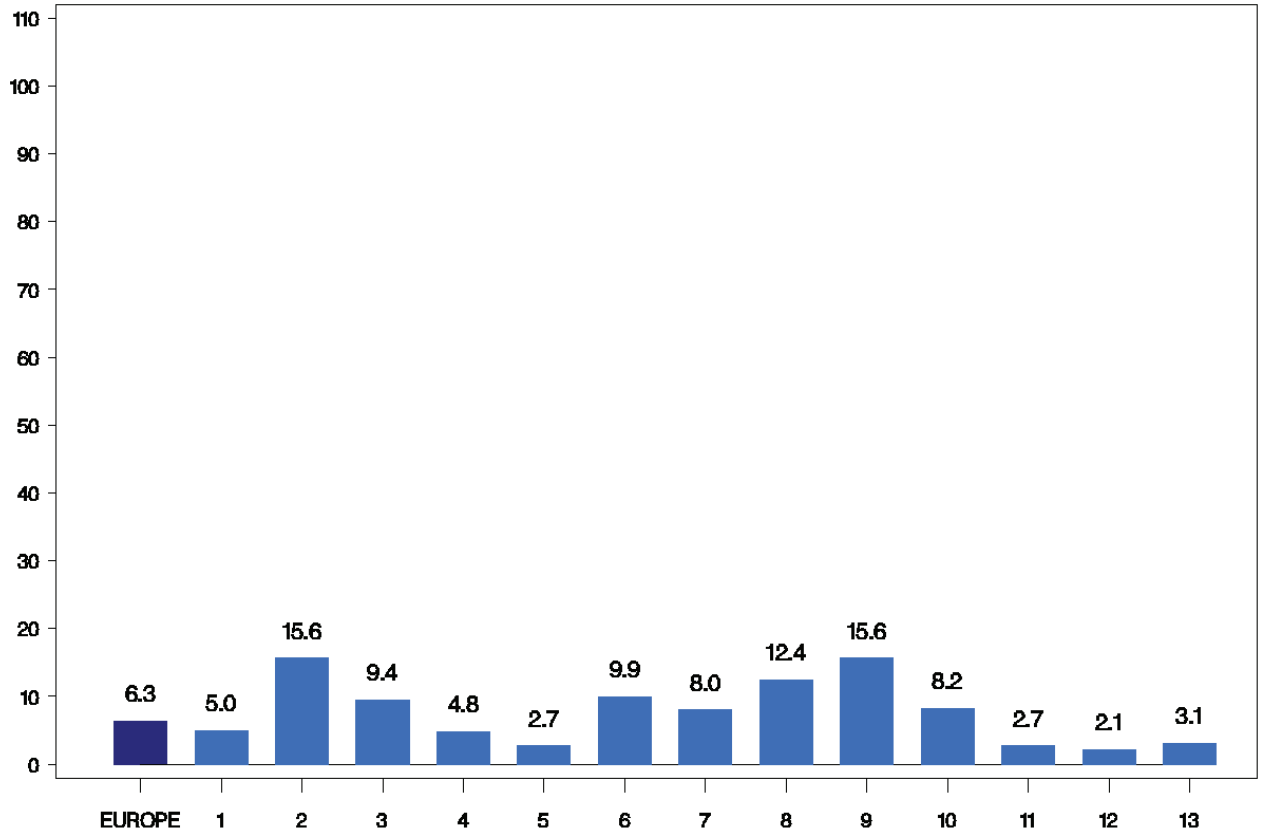


Table 74. Comorbidities: diabetes.

	Patients	Number	%
EUROPE	15821	3160	20.0
1. Austria	823	153	18.6
2. Belgium	512	102	19.9
3. Croatia	445	76	17.1
4. Greece	1133	278	24.5
5. Malta	112	15	13.4
6. Poland	734	202	27.5
7. Ireland	237	31	13.1
8. Romania	629	75	11.9
9. Slovakia	32	9	28.1
10. Spain	5271	1369	26.0
11. Switzerland	295	63	21.4
12. Turkey	612	109	17.8
13. UK	4986	678	13.6

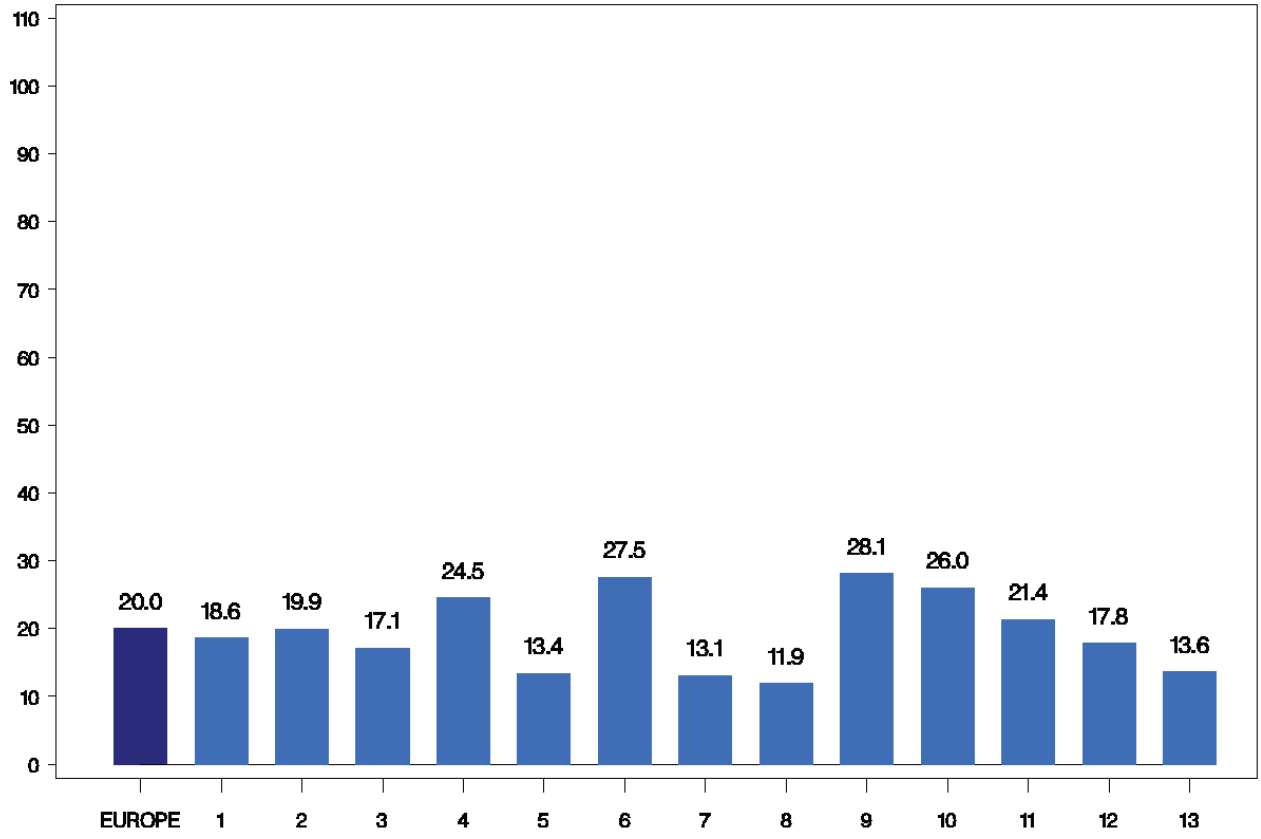


Table 75. Comorbidities: diabetes with end organ damage.

	Patients	Number	%
EUROPE	15821	299	1.9
1. Austria	823	44	5.3
2. Belgium	512	8	1.6
3. Croatia	445	19	4.3
4. Greece	1133	10	0.9
5. Malta	112	7	6.3
6. Poland	734	17	2.3
7. Ireland	237	3	1.3
8. Romania	629	7	1.1
9. Slovakia	32	2	6.3
10. Spain	5271	110	2.1
11. Switzerland	295	8	2.7
12. Turkey	612	2	0.3
13. UK	4986	62	1.2

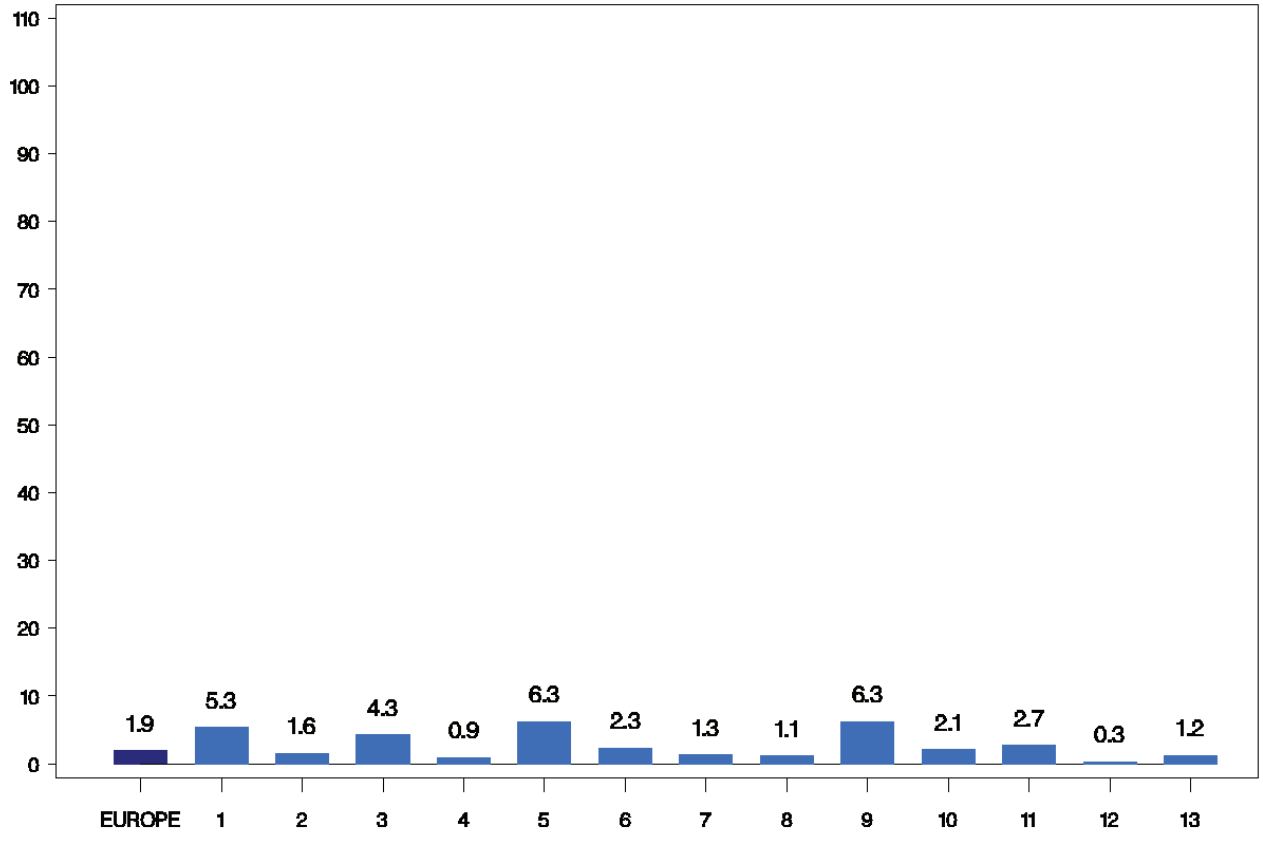


Table 76. Comorbidities: hemiplegia.

	Patients	Number	%
EUROPE	15821	101	0.6
1. Austria	823	5	0.6
2. Belgium	512	4	0.8
3. Croatia	445	6	1.3
4. Greece	1133	3	0.3
5. Malta	112	0	0.0
6. Poland	734	4	0.5
7. Ireland	237	0	0.0
8. Romania	629	1	0.2
9. Slovakia	32	1	3.1
10. Spain	5271	32	0.6
11. Switzerland	295	0	0.0
12. Turkey	612	3	0.5
13. UK	4986	42	0.8

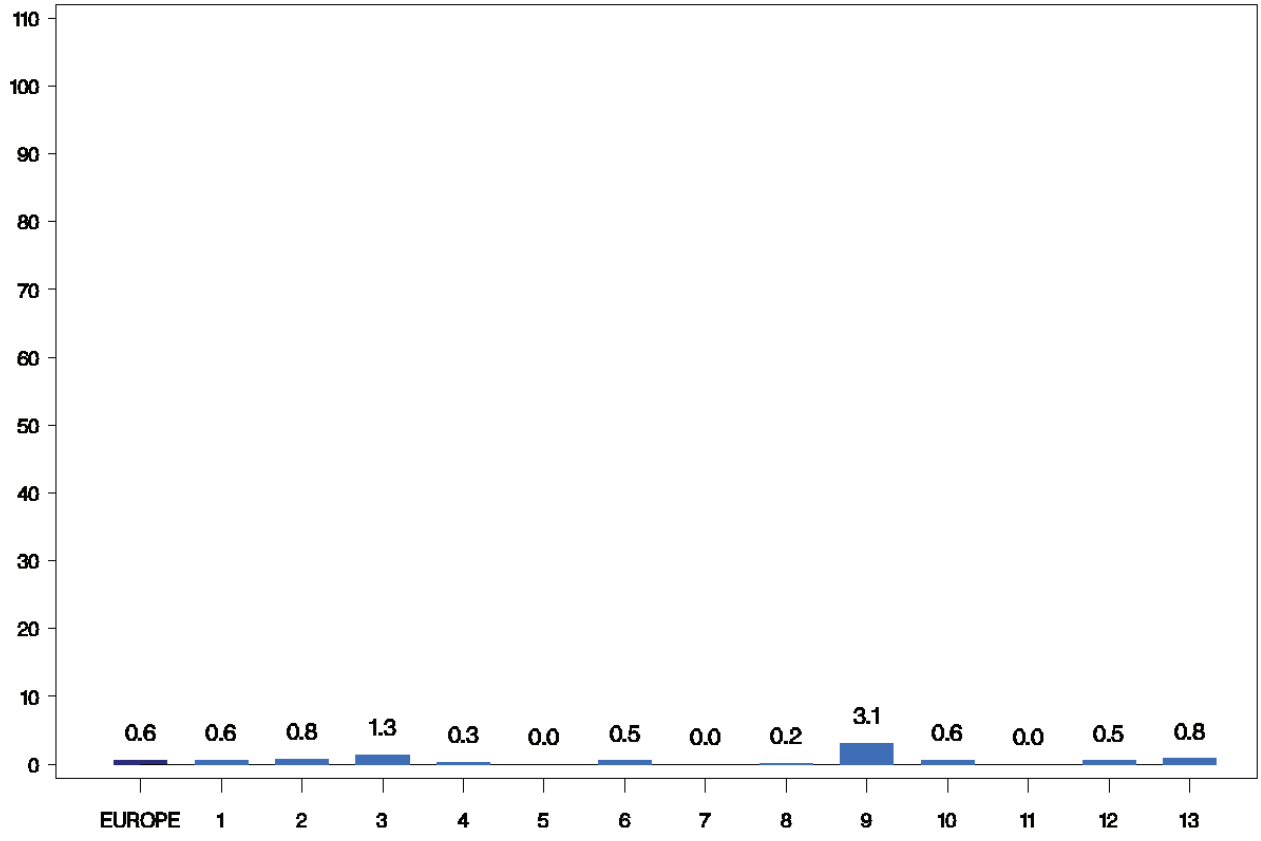


Table 77. Comorbidities: renal disease (moderate or severe).

	Patients	Number	%
EUROPE	15821	896	5.7
1. Austria	823	50	6.1
2. Belgium	512	42	8.2
3. Croatia	445	28	6.3
4. Greece	1133	56	4.9
5. Malta	112	5	4.5
6. Poland	734	47	6.4
7. Ireland	237	14	5.9
8. Romania	629	16	2.5
9. Slovakia	32	0	0.0
10. Spain	5271	325	6.2
11. Switzerland	295	54	18.3
12. Turkey	612	18	2.9
13. UK	4986	241	4.8

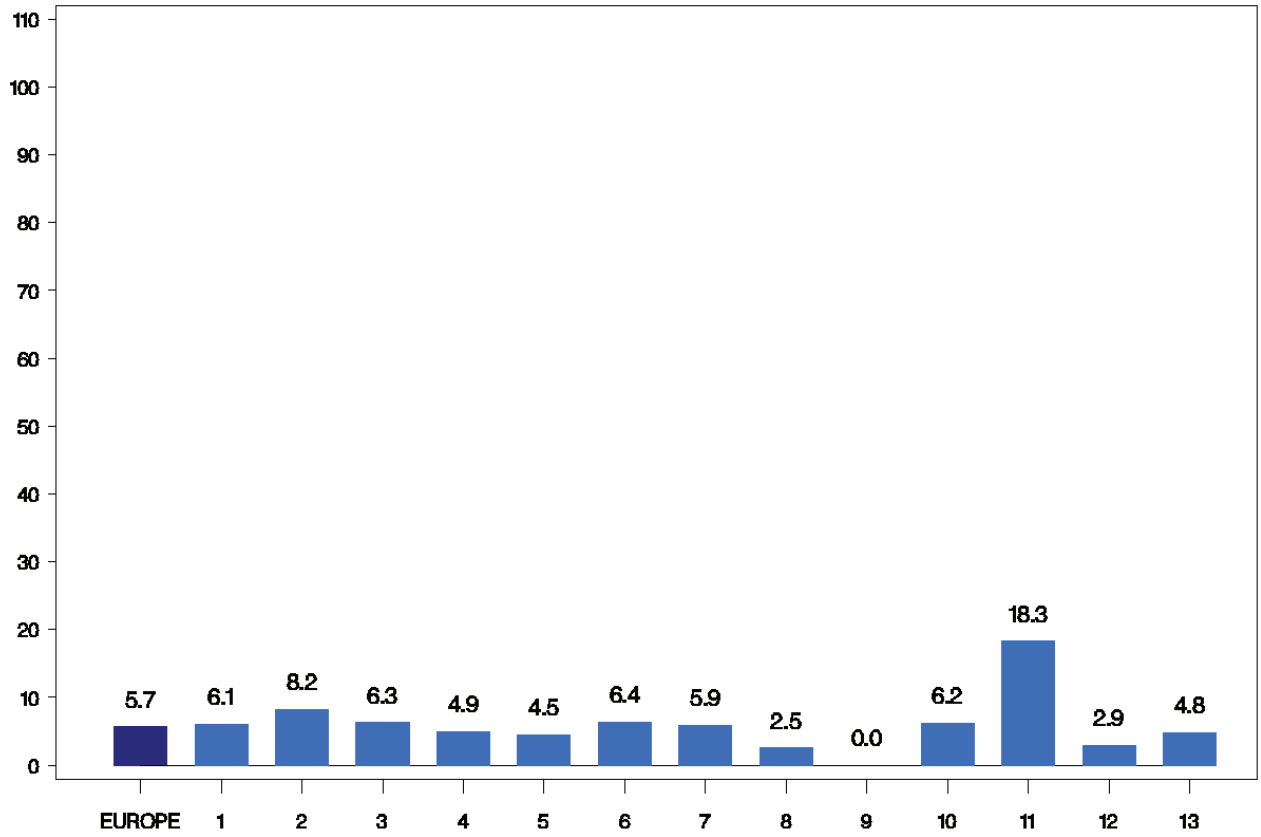


Table 78. Comorbidities: any tumour.

	Patients	Number	%
EUROPE	15821	1690	10.7
1. Austria	823	86	10.4
2. Belgium	512	83	16.2
3. Croatia	445	51	11.5
4. Greece	1133	94	8.3
5. Malta	112	8	7.1
6. Poland	734	78	10.6
7. Ireland	237	25	10.5
8. Romania	629	38	6.0
9. Slovakia	32	2	6.3
10. Spain	5271	741	14.1
11. Switzerland	295	54	18.3
12. Turkey	612	15	2.5
13. UK	4986	415	8.3

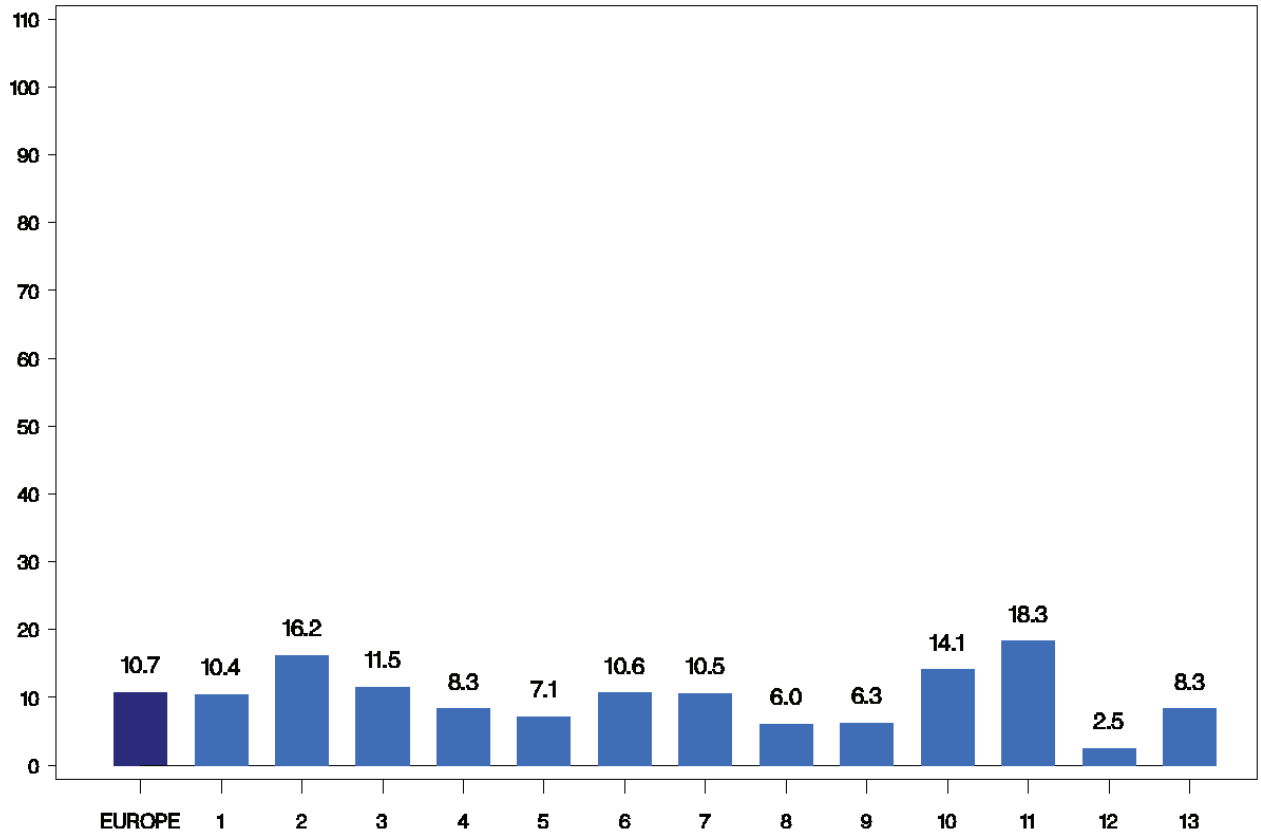


Table 79. Comorbidities: leukaemia.

	Patients	Number	%
EUROPE	15821	68	0.4
1. Austria	823	3	0.4
2. Belgium	512	3	0.6
3. Croatia	445	4	0.9
4. Greece	1133	4	0.4
5. Malta	112	0	0.0
6. Poland	734	1	0.1
7. Ireland	237	1	0.4
8. Romania	629	1	0.2
9. Slovakia	32	0	0.0
10. Spain	5271	30	0.6
11. Switzerland	295	0	0.0
12. Turkey	612	1	0.2
13. UK	4986	20	0.4

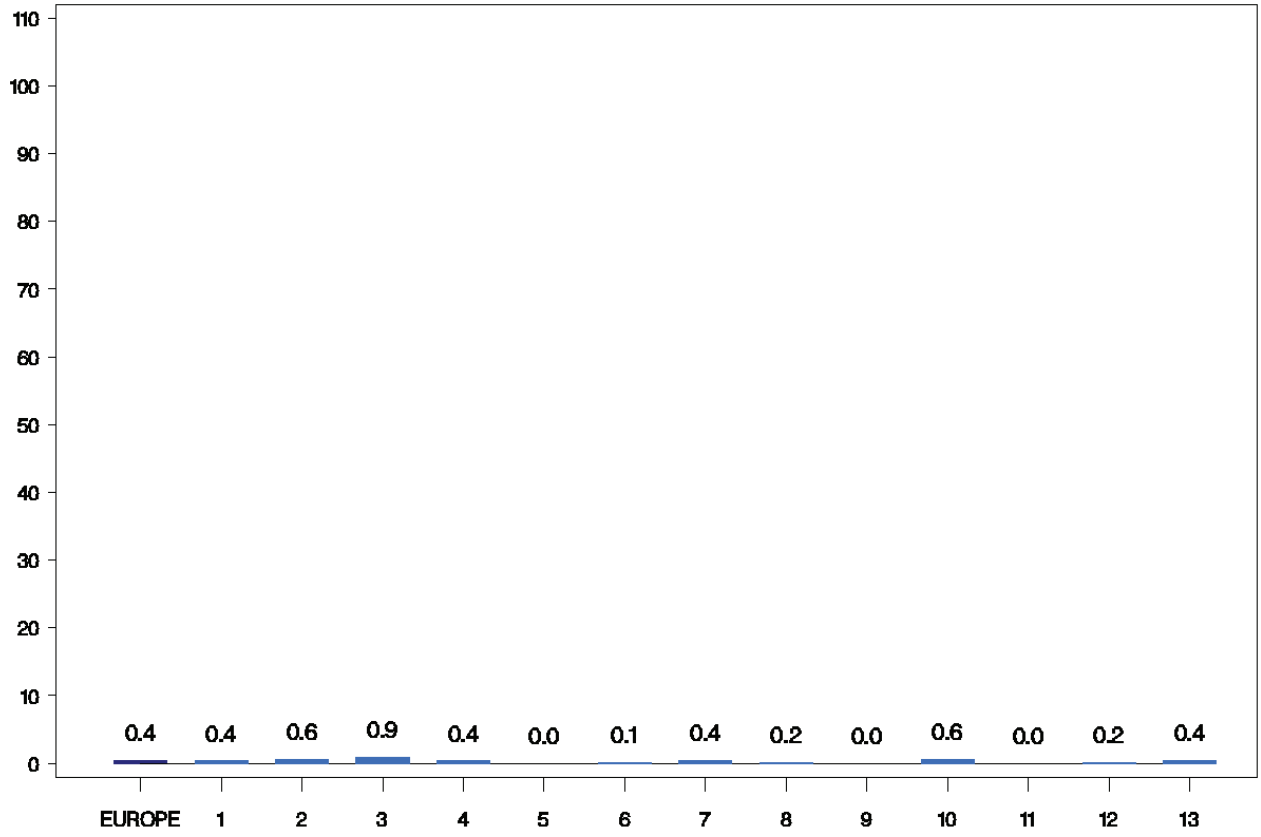


Table 80. Comorbidities: malignant lymphoma.

	Patients	Number	%
EUROPE	15821	65	0.4
1. Austria	823	8	1.0
2. Belgium	512	5	1.0
3. Croatia	445	1	0.2
4. Greece	1133	3	0.3
5. Malta	112	1	0.9
6. Poland	734	1	0.1
7. Ireland	237	0	0.0
8. Romania	629	1	0.2
9. Slovakia	32	0	0.0
10. Spain	5271	22	0.4
11. Switzerland	295	1	0.3
12. Turkey	612	0	0.0
13. UK	4986	22	0.4

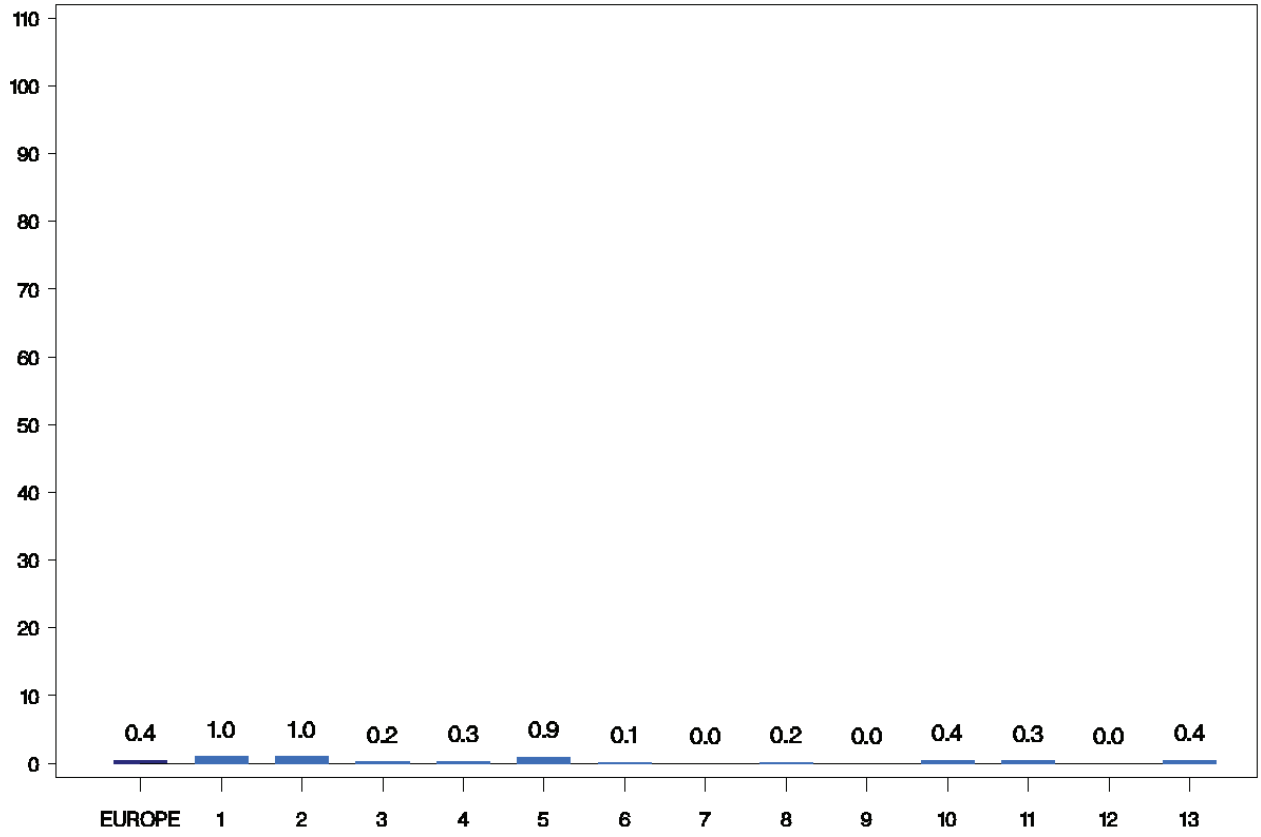
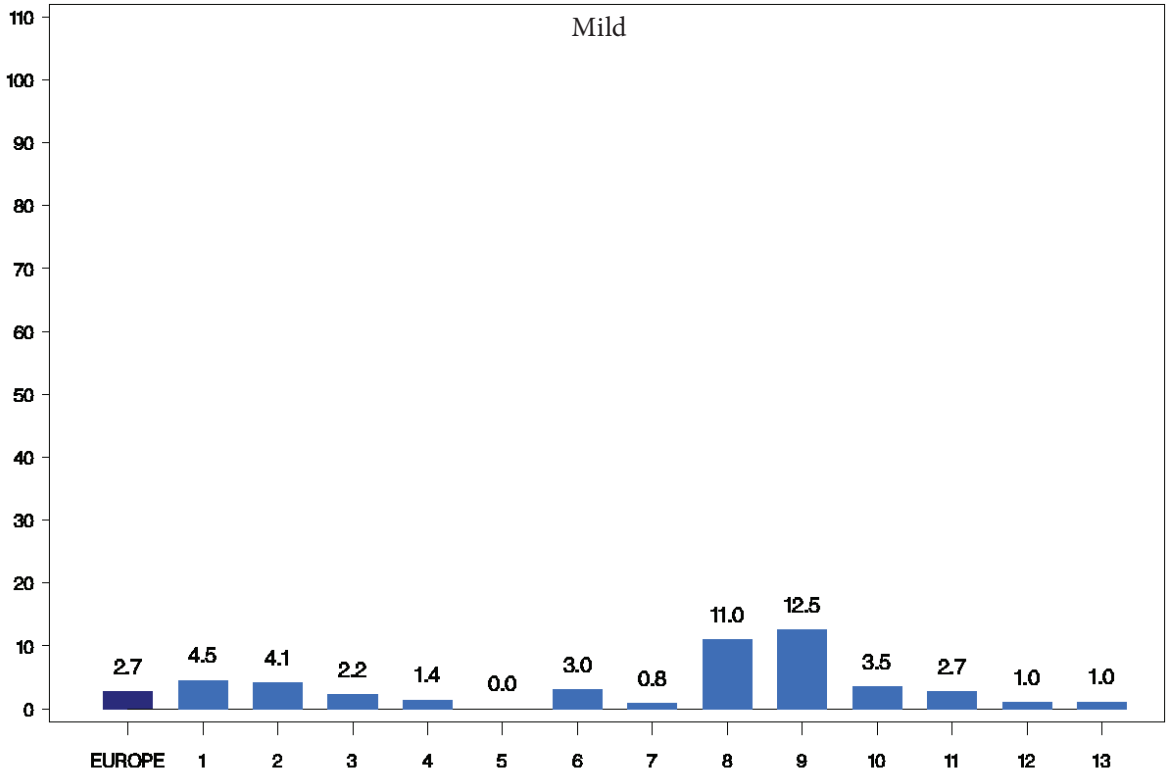


Table 81. Comorbidities: liver disease.

	Mild			Moderate or severe	
	Patients	Number	%	Number	%
EUROPE	15821	431	2.7	213	1.3
1. Austria	823	37	4.5	7	0.9
2. Belgium	512	21	4.1	7	1.4
3. Croatia	445	10	2.2	7	1.6
4. Greece	1133	16	1.4	3	0.3
5. Malta	112	0	0.0	0	0.0
6. Poland	734	22	3.0	8	1.1
7. Ireland	237	2	0.8	0	0.0
8. Romania	629	69	11.0	23	3.7
9. Slovakia	32	4	12.5	1	3.1
10. Spain	5271	185	3.5	119	2.3
11. Switzerland	295	8	2.7	4	1.4
12. Turkey	612	6	1.0	0	0.0
13. UK	4986	51	1.0	34	0.7


Mild
110
100
90
80
70
60
50
40
30
20
10
0
2.7
4.5
4.1
2.2
1.4
0.0
3.0
0.8
11.0
12.5
3.5
2.7
1.0
1.0
EUROPE
1
2
3
4
5
6
7
8
9
10
11
12
13

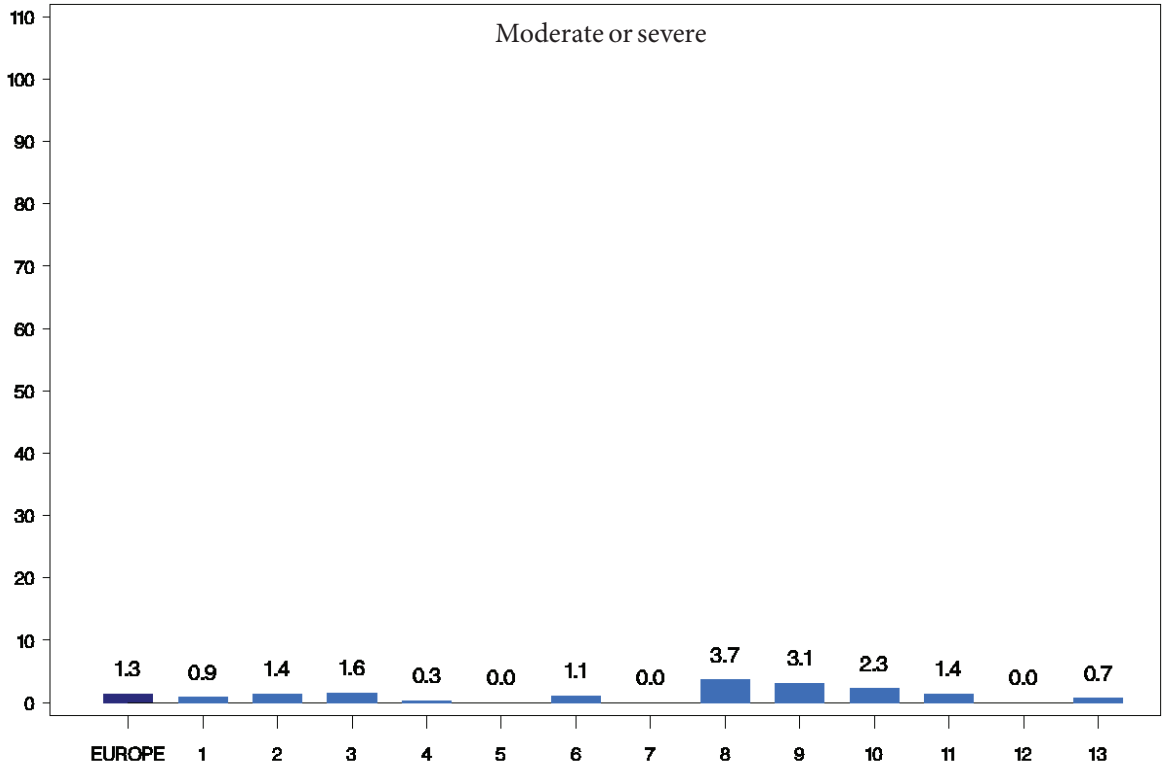

Moderate or severe
110
100
90
80
70
60
50
40
30
20
10
0
1.3
0.9
1.4
1.6
0.3
0.0
1.1
0.0
3.7
3.1
2.3
1.4
0.0
0.7
EUROPE
1
2
3
4
5
6
7
8
9
10
11
12
13

Table 82. Comorbidities: metastatic solid malignancy.

	Patients	Number	%
EUROPE	15821	147	0.9
1. Austria	823	2	0.2
2. Belgium	512	12	2.3
3. Croatia	445	1	0.2
4. Greece	1133	4	0.4
5. Malta	112	0	0.0
6. Poland	734	1	0.1
7. Ireland	237	2	0.8
8. Romania	629	1	0.2
9. Slovakia	32	0	0.0
10. Spain	5271	54	1.0
11. Switzerland	295	9	3.1
12. Turkey	612	0	0.0
13. UK	4986	61	1.2

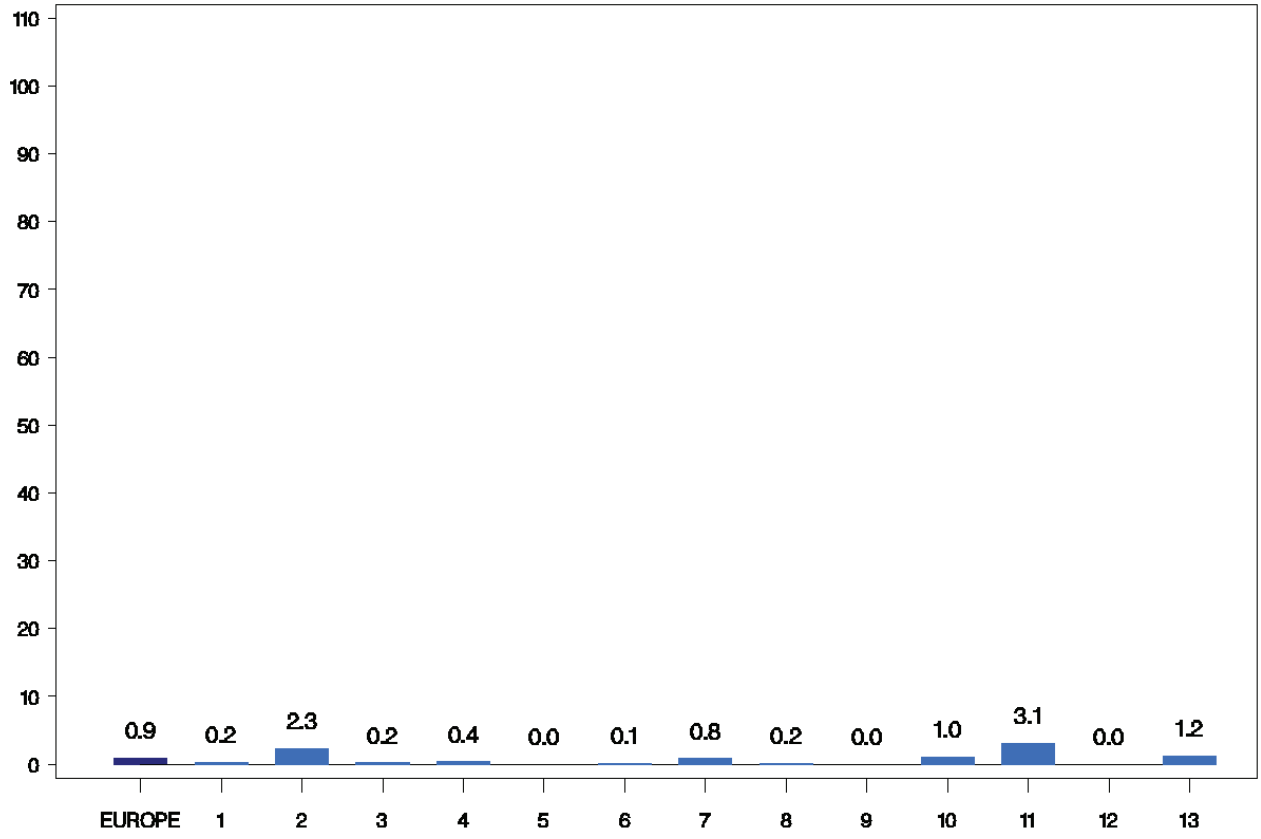
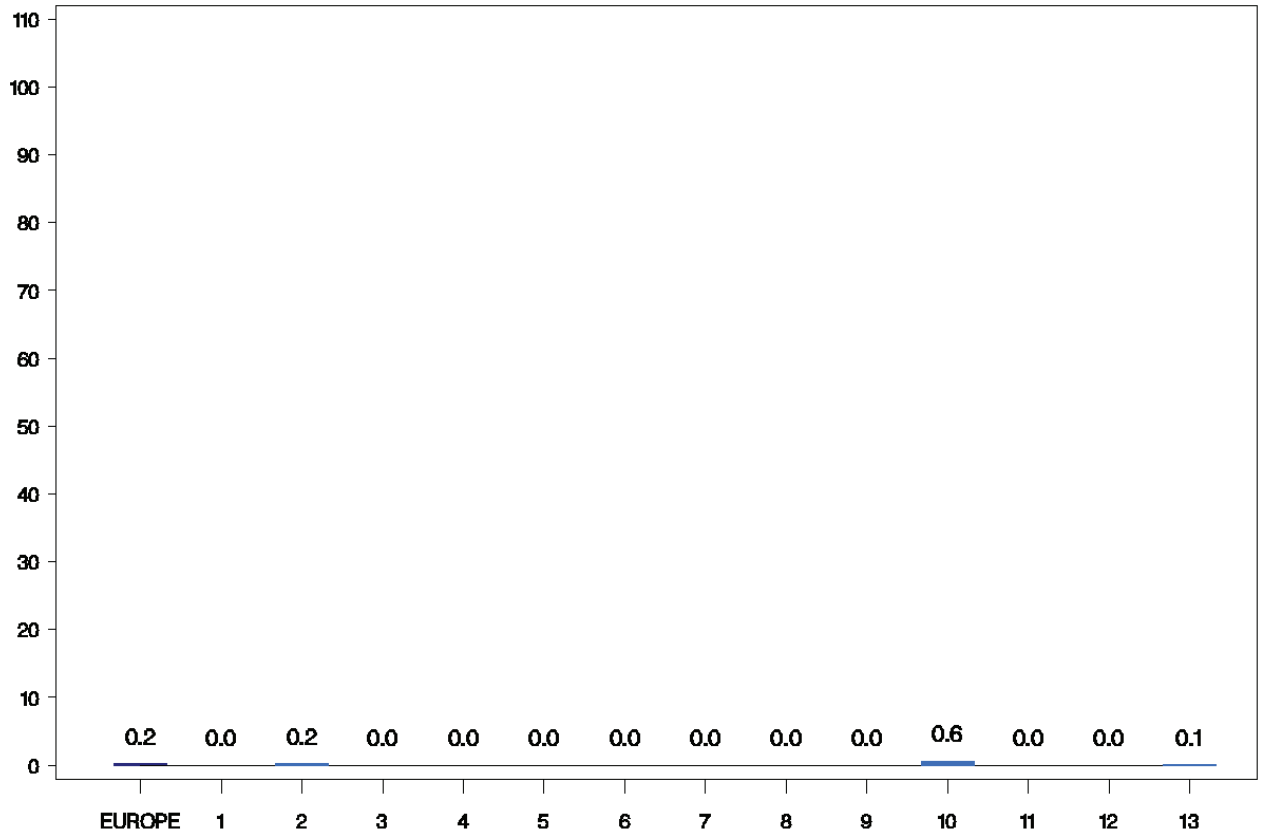


Table 83. Comorbidities: HIV/AIDS.

	Patients	Number	%
EUROPE	15821	33	0.2
1. Austria	823	0	0.0
2. Belgium	512	1	0.2
3. Croatia	445	0	0.0
4. Greece	1133	0	0.0
5. Malta	112	0	0.0
6. Poland	734	0	0.0
7. Ireland	237	0	0.0
8. Romania	629	0	0.0
9. Slovakia	32	0	0.0
10. Spain	5271	29	0.6
11. Switzerland	295	0	0.0
12. Turkey	612	0	0.0
13. UK	4986	3	0.1



Previous admissions

Admission during the previous year reflects an important indicator of the prognosis and clinical course of COPD. Men were more likely to have had more previous admissions than were women.

Table 84. Admissions for COPD exacerbation in the previous 12 months.

	Patients	Median	P25–P75		P5–P95	
EUROPE	14176	1	0	2	0	4
1. Austria	684	1	0	2	0	4
2. Belgium	468	0	0	2	0	4
3. Croatia	438	0	0	1	0	3
4. Greece	1021	0	0	1	0	3
5. Malta	108	0	0	1	0	4
6. Poland	621	1	0	2	0	4
7. Ireland	227	1	0	2	0	5
8. Romania	527	1	0	2	0	4
9. Slovakia	30	0	0	1	0	2
10. Spain	4817	1	0	2	0	4
11. Switzerland	235	0	0	1	0	2
12. Turkey	476	1	0	2	0	5
13. UK	4524	1	0	2	0	4

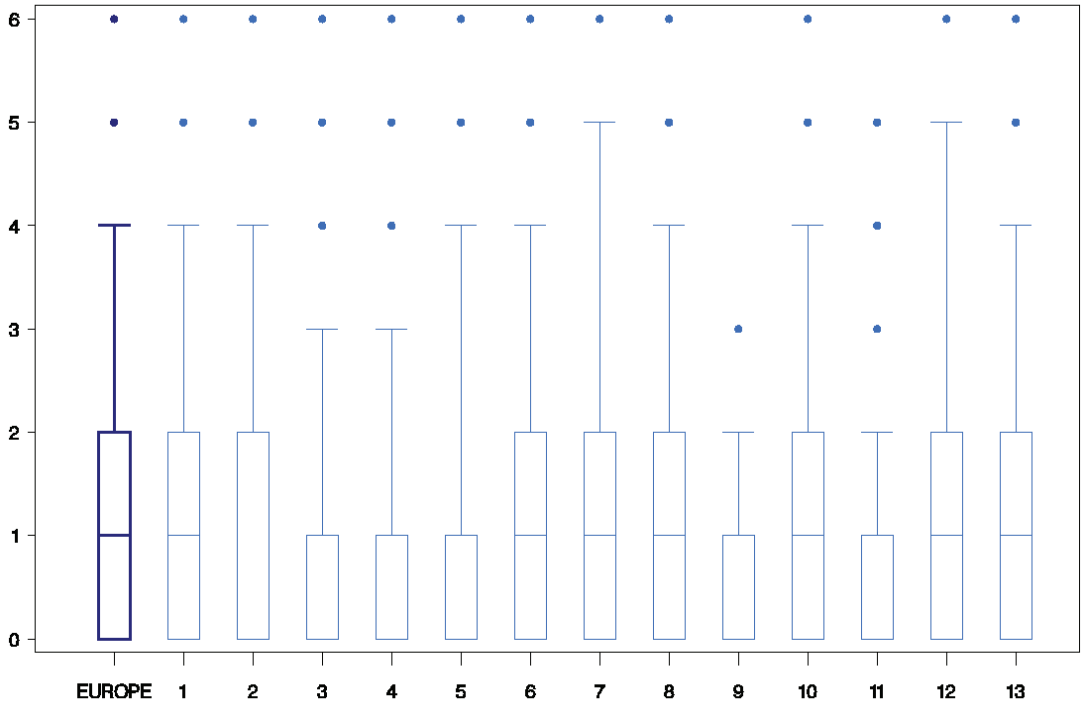


Table 85. Admissions for COPD exacerbation in the previous 12 months by sex.

	Patients	Median	P25–P75		P5–P95	
All	14176	1.00	0.00	2.00	0.00	4.00
Male	9648	1.00	0.00	2.00	0.00	4.00
Female	4528	0.00	0.00	2.00	0.00	4.00

Spirometry

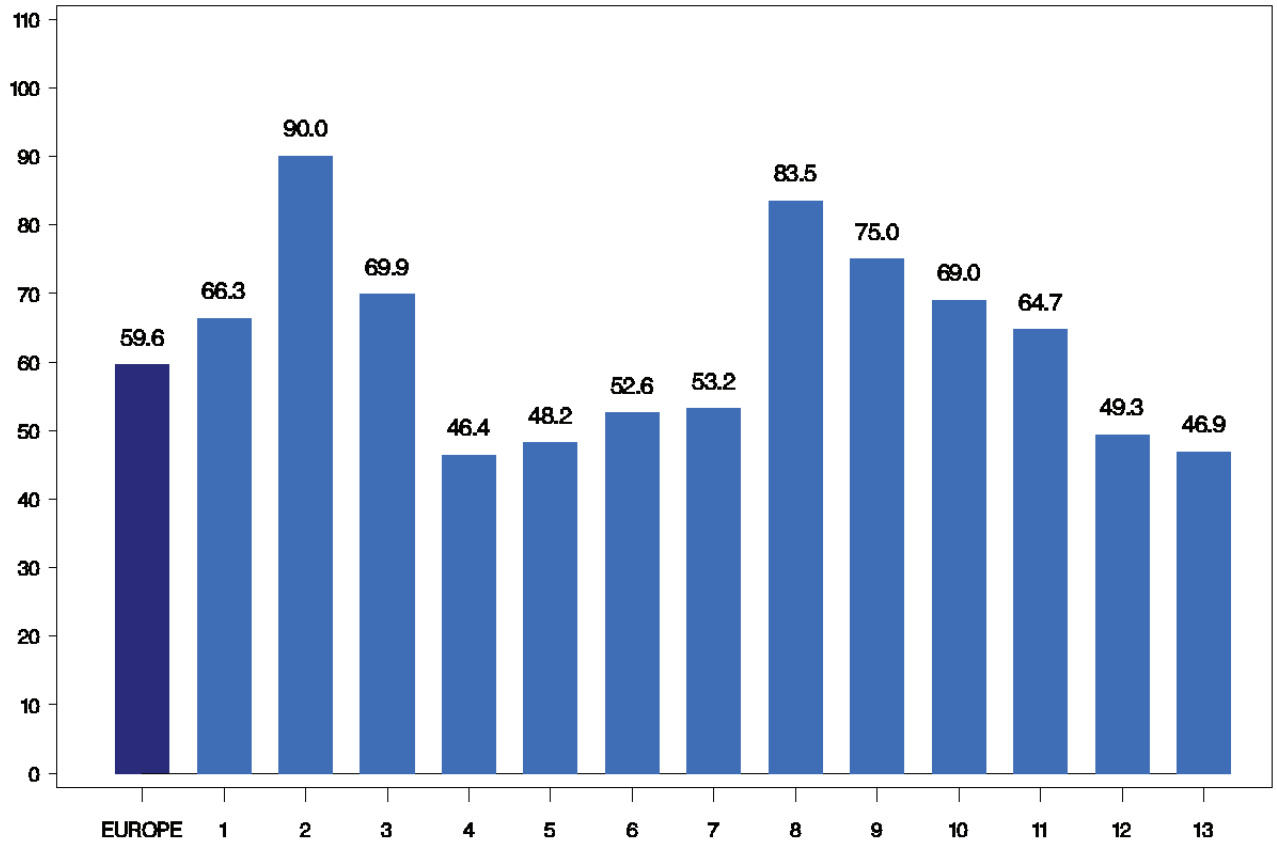
Are spirometry results available on admission?

Spirometry is important for the characterisation of disease severity. In line with all guideline recommendations, the therapy on admission and the therapy prescription at discharge should rely on disease severity. This is why the question of availability of spirometry test results in the history of the patient in relation to the medication recorded was considered important. Unexpected low numbers of spirometry proven results cannot be explained by the audit report, but is indicating a potential weakness that shall be followed up individually by each participating hospital.

All conclusions about disease severity on admission and guideline driven therapy standards of medication therefore will have to rely on the number of patients with spirometry results available (n=9,425)

Table 86. Spirometry results available on admission

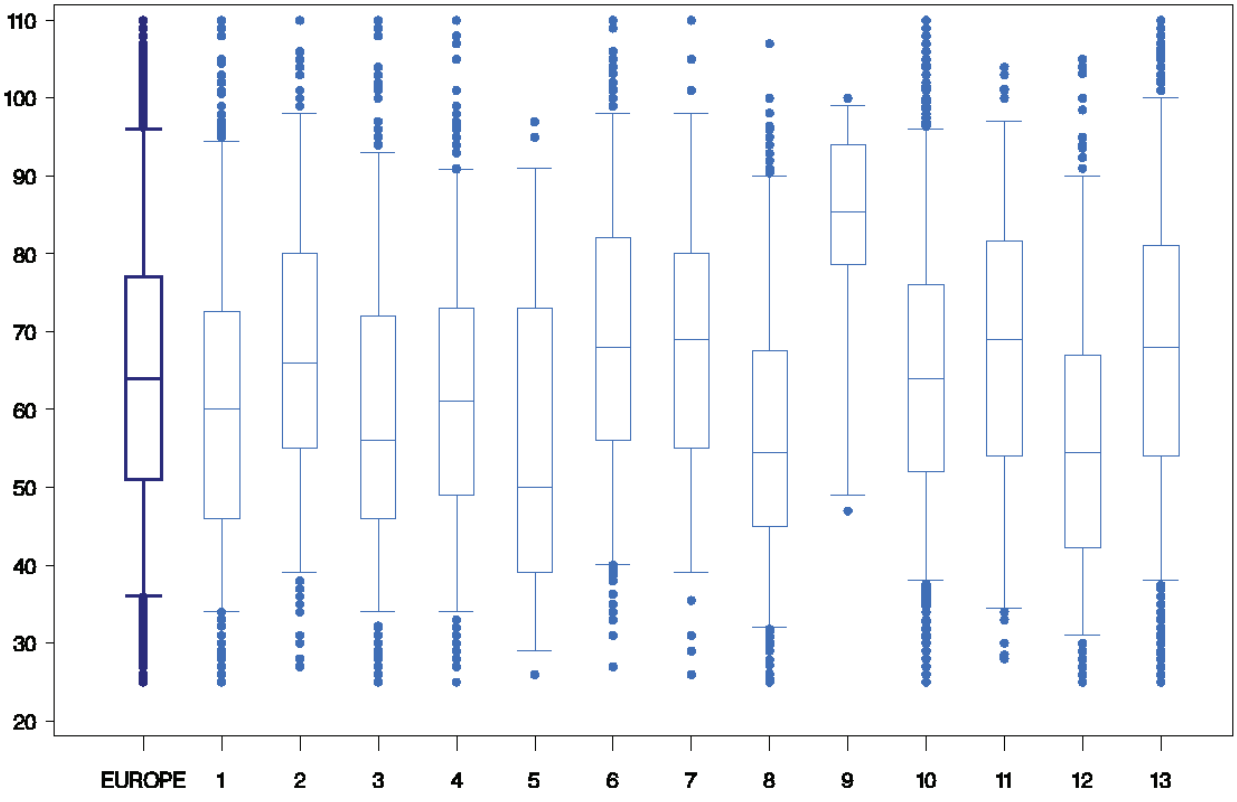
	Patients	Number	%
EUROPE	15821	9425	59.6
1. Austria	823	546	66.3
2. Belgium	512	461	90.0
3. Croatia	445	311	69.9
4. Greece	1133	526	46.4
5. Malta	112	54	48.2
6. Poland	734	386	52.6
7. Ireland	237	126	53.2
8. Romania	629	525	83.5
9. Slovakia	32	24	75.0
10. Spain	5271	3636	69.0
11. Switzerland	295	191	64.7
12. Turkey	612	302	49.3
13. UK	4986	2337	46.9



If so, what is the forced vital capacity (FVC)?

Table 87. Spirometry results: FVC % predicted.

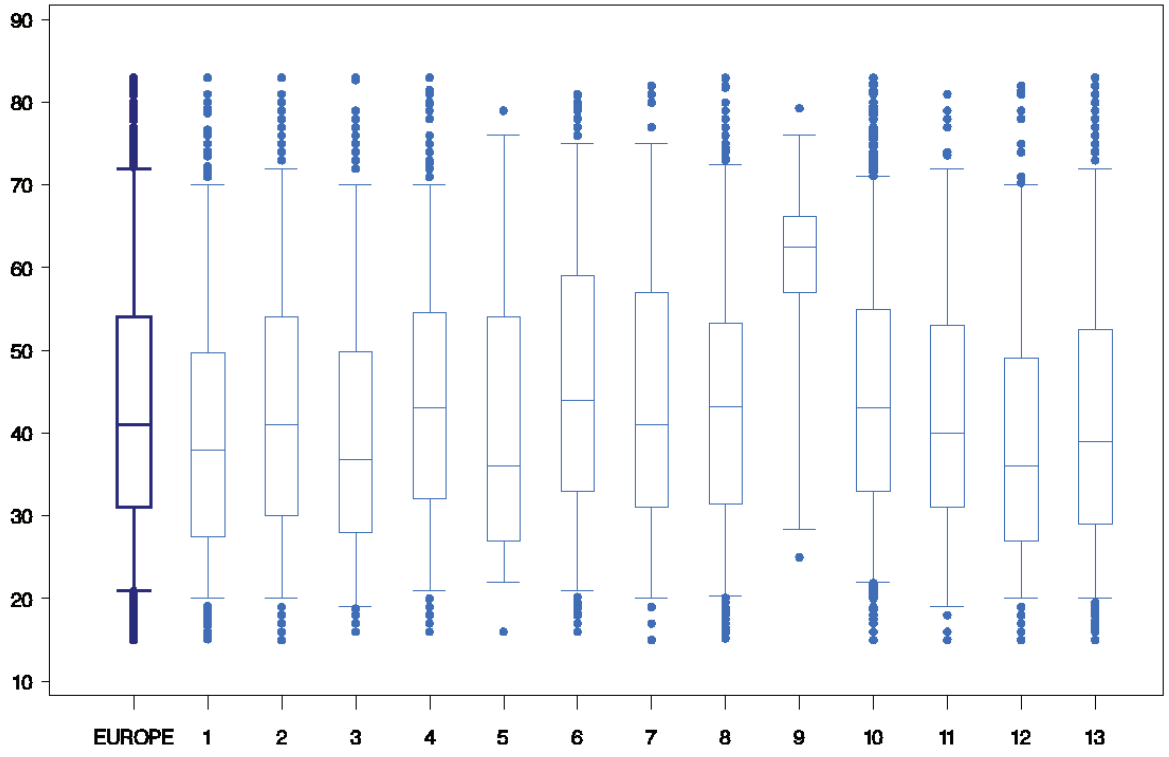
	Patients	Median	P25–P75		P5–P95	
EUROPE	8637	64.00	51.00	77.00	36.00	96.00
1. Austria	533	60.00	46.00	72.60	34.10	94.50
2. Belgium	414	66.00	55.00	80.00	39.00	98.00
3. Croatia	300	56.00	46.00	72.00	34.00	93.00
4. Greece	515	61.00	49.00	73.00	34.00	90.80
5. Malta	53	50.00	39.00	73.00	29.00	91.00
6. Poland	373	68.00	56.00	82.00	40.10	98.00
7. Ireland	117	69.00	55.00	80.00	39.00	98.00
8. Romania	491	54.50	45.00	67.50	32.00	90.00
9. Slovakia	24	85.39	78.65	94.03	49.00	99.00
10. Spain	3414	64.00	52.00	76.00	38.00	96.00
11. Switzerland	137	69.00	54.00	81.60	34.50	97.00
12. Turkey	292	54.50	42.20	67.00	31.00	90.00
13. UK	1974	68.00	54.00	81.00	38.00	100.00



If so, what is the forced expiratory volume in 1 s (FEV_1)?

Table 88. Spirometry results: FEV_1 % predicted.

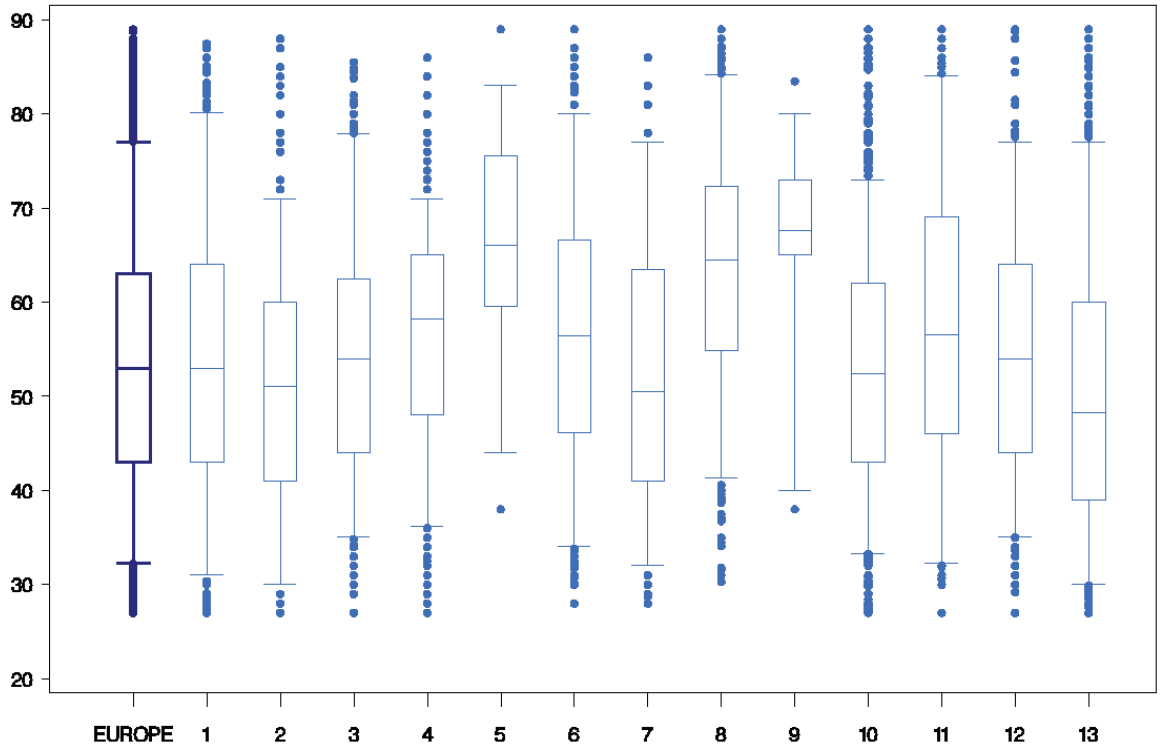
	Patients	Median	P25–P75		P5–P95	
EUROPE	8911	41.00	31.00	54.00	21.00	72.00
1. Austria	527	38.00	27.40	49.70	20.00	70.00
2. Belgium	439	41.00	30.00	54.00	20.00	72.00
3. Croatia	303	36.80	28.00	49.80	19.00	70.00
4. Greece	516	43.00	32.00	54.50	21.00	70.00
5. Malta	51	36.00	27.00	54.00	22.00	76.00
6. Poland	365	44.00	33.00	59.00	21.00	75.00
7. Ireland	117	41.00	31.00	57.00	20.00	75.00
8. Romania	494	43.15	31.40	53.30	20.30	72.50
9. Slovakia	22	62.50	57.00	66.20	28.40	76.00
10. Spain	3533	43.00	33.00	55.00	22.00	71.00
11. Switzerland	175	40.00	31.00	53.00	19.00	72.00
12. Turkey	290	36.00	27.00	49.00	20.00	70.00
13. UK	2079	39.00	29.00	52.54	20.00	72.00



If so, what is the FEV1/FVC?

Table 89. Spirometry results: FEV1/FVC %.

	Patients	Median	P25–P75		P5–P95	
EUROPE	8729	53.00	43.00	63.00	32.22	77.00
1. Austria	510	53.00	43.00	64.00	31.00	80.10
2. Belgium	439	51.00	41.00	60.00	30.00	71.00
3. Croatia	302	53.93	44.00	62.40	35.00	77.92
4. Greece	514	58.25	48.00	65.00	36.20	71.00
5. Malta	48	66.00	59.50	75.50	44.00	83.00
6. Poland	348	56.40	46.15	66.55	34.00	80.00
7. Ireland	116	50.50	41.00	63.50	32.00	77.00
8. Romania	427	64.50	54.80	72.30	41.30	84.10
9. Slovakia	22	67.60	65.00	73.00	40.00	80.00
10. Spain	3452	52.39	43.00	62.00	33.28	73.00
11. Switzerland	142	56.49	46.05	69.00	32.24	84.00
12. Turkey	298	53.95	44.00	64.00	35.00	77.00
13. UK	2111	48.20	39.00	60.00	30.00	77.00



Of male patients, 22.96% had moderate (GOLD stage II), 40.54 % severe (GOLD stage III) and 23.13% very severe (GOLD stage IV) COPD.

GOLD stage	Severity	Symptoms	Spirometry
I	Mild	With or without chronic cough or sputum production	FEV1/FVC <0.7 and FEV1 ≥80% predicted
II	Moderate	With or without chronic cough or sputum production	FEV1/FVC <0.7 and 50% ≤ FEV1 < 80% predicted
III	Severe	With or without chronic cough or sputum production	FEV1/FVC <0.7 and 30% ≤ FEV1 < 50% predicted
IV	Very Severe	With or without chronic cough or sputum production	FEV1/FVC <0.7 and FEV1 <30% predicted

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Table 90. GOLD stage.

	Patients		GOLD							
			Stage I		Stage II		Stage III		Stage IV	
	N	%	N	%	N	%	N	%	N	%
EUROPE	9118	100.0	1399	15.34	2121	23.26	3585	39.32	2013	22.08
1. Austria	542	5.94	111	20.48	77	14.21	201	37.08	153	28.23
2. Belgium	456	5.00	39	8.55	120	26.32	178	39.04	119	26.10
3. Croatia	308	3.38	44	14.29	55	17.86	127	41.23	82	26.62
4. Greece	521	5.71	44	8.45	152	29.17	229	43.95	96	18.43
5. Malta	54	0.59	25	46.30	3	5.56	13	24.07	13	24.07
6. Poland	386	4.23	93	24.09	95	24.61	140	36.27	58	15.03
7. Ireland	124	1.36	29	23.39	25	20.16	46	37.10	24	19.35
8. Romania	502	5.51	217	43.23	54	10.76	142	28.29	89	17.73
9. Slovakia	24	0.26	12	50.00	10	41.67	1	4.17	1	4.17
10. Spain	3518	38.58	366	10.40	1003	28.51	1544	43.89	605	17.20
11. Switzerland	147	1.61	39	26.53	24	16.33	55	37.41	29	19.73
12. Turkey	301	3.30	43	14.29	46	15.28	115	38.21	97	32.23
13. UK	2235	24.51	337	15.08	457	20.45	794	35.53	647	28.95

Table 91. GOLD stage by sex.

	Patients		GOLD							
			Stage I		Stage II		Stage III		Stage IV	
	N	%	N	%	N	%	N	%	N	%
EUROPE	9118	100.0	1399	15.34	2121	23.26	3585	39.32	2013	22.08
Male	6477	71.04	866	13.37	1487	22.96	2626	40.54	1498	23.13
Female	2641	28.96	533	20.18	634	24.01	959	36.31	515	19.50

Table 92. GOLD stage by sex: males.

	Patients		GOLD (males)							
			Stage I		Stage II		Stage III		Stage IV	
	N	%	N	%	N	%	N	%	N	%
EUROPE	6477	100.0	866	13.37	1487	22.96	2626	40.54	1498	23.13
1. Austria	338	5.22	73	21.60	37	10.95	125	36.98	103	30.47
2. Belgium	290	4.48	18	6.21	71	24.48	114	39.31	87	30.00
3. Croatia	216	3.33	23	10.65	28	12.96	102	47.22	63	29.17
4. Greece	411	6.35	28	6.81	118	28.71	187	45.50	78	18.98
5. Malta	39	0.60	15	38.46	2	5.13	12	30.77	10	25.64
6. Poland	274	4.23	54	19.71	67	24.45	106	38.69	47	17.15
7. Ireland	67	1.03	14	20.90	9	13.43	28	41.79	16	23.88
8. Romania	409	6.31	167	40.83	41	10.02	124	30.32	77	18.83
9. Slovakia	13	0.20	3	23.08	9	69.23	0		1	7.69
10. Spain	3059	47.23	283	9.25	867	28.34	1355	44.30	554	18.11
11. Switzerland	83	1.28	21	25.30	11	13.25	28	33.73	23	27.71
12. Turkey	248	3.83	28	11.29	34	13.71	100	40.32	86	34.68
13. UK	1030	15.90	139	13.50	193	18.74	345	33.50	353	34.27

Table 93. GOLD stage by sex: females.

	Patients		GOLD (females)							
			Stage I		Stage II		Stage III		Stage IV	
	N	%	N	%	N	%	N	%	N	%
EUROPE	2641	100.0	533	20.18	634	24.01	959	36.31	515	19.50
1. Austria	204	7.72	38	18.63	40	19.61	76	37.25	50	24.51
2. Belgium	166	6.29	21	12.65	49	29.52	64	38.55	32	19.28
3. Croatia	92	3.48	21	22.83	27	29.35	25	27.17	19	20.65
4. Greece	110	4.17	16	14.55	34	30.91	42	38.18	18	16.36
5. Malta	15	0.57	10	66.67	1	6.67	1	6.67	3	20.00
6. Poland	112	4.24	39	34.82	28	25.00	34	30.36	11	9.82
7. Ireland	57	2.16	15	26.32	16	28.07	18	31.58	8	14.04
8. Romania	93	3.52	50	53.76	13	13.98	18	19.35	12	12.90
9. Slovakia	11	0.42	9	81.82	1	9.09	1	9.09	0	
10. Spain	459	17.38	83	18.08	136	29.63	189	41.18	51	11.11
11. Switzerland	64	2.42	18	28.13	13	20.31	27	42.19	6	9.38
12. Turkey	53	2.01	15	28.30	12	22.64	15	28.30	11	20.75
13. UK	1205	45.63	198	16.43	264	21.91	449	37.26	294	24.40

GOLD, 2010: For the diagnosis and assessment of COPD, spirometry is the gold standard as it is the most reproducible, standardised, and objective way of measuring airflow limitation. The presence of a postbronchodilator $FEV_1/FVC < 0.7$ confirms the presence of airflow limitation that is not fully reversible. It provides a useful description of the severity of pathological changes in COPD. In a study with a random population sample, some cases exceeded the postbronchodilator FEV_1/FVC 0.70 in all age groups (shown), which supports the use of the fixed ratio.

Even simple spirometry tests can be difficult for a sick patient to perform properly. These measurements are not accurate during an acute exacerbation; therefore, their routine use is not recommended. Still, spirometry should be performed after stabilisation of the exacerbation before discharge and/or results should be available on admission derived from the patient's medical file.

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Assessment of exacerbation

Assessment of severity of an exacerbation is based on the patient's medical history before the exacerbation, pre-existing comorbidities, symptoms, physical examination, arterial blood gas measurements and other laboratory tests.

GOLD, 2010: An exacerbation of COPD is defined as an event in the natural course of the disease characterised by a change in the patient's baseline dyspnoea, cough, and/or sputum that is beyond normal day to day variations, is acute in onset, and may warrant a change in regular medication in a patient with underlying COPD.

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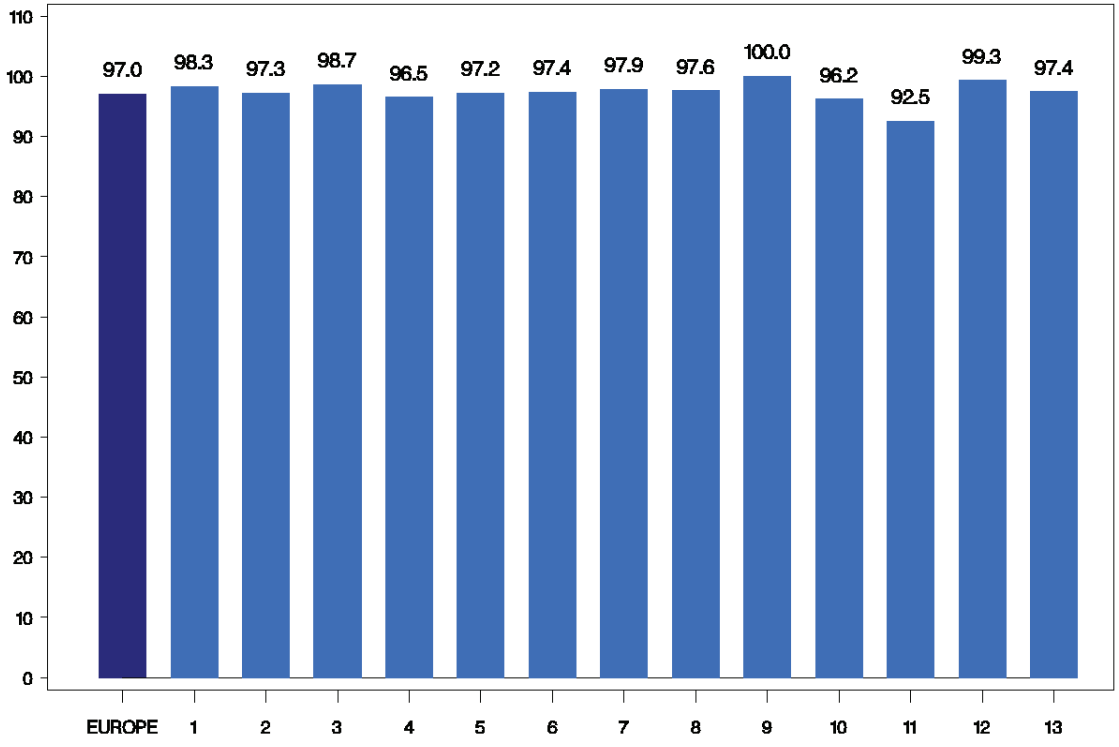
Symptoms and signs

Recording of changes in breathlessness and sputum quantity and colour are key to clinical decision making regarding appropriate use of systemic steroids and antibiotics.

Has dyspnoea increased?

Table 94. Dyspnoea increase.

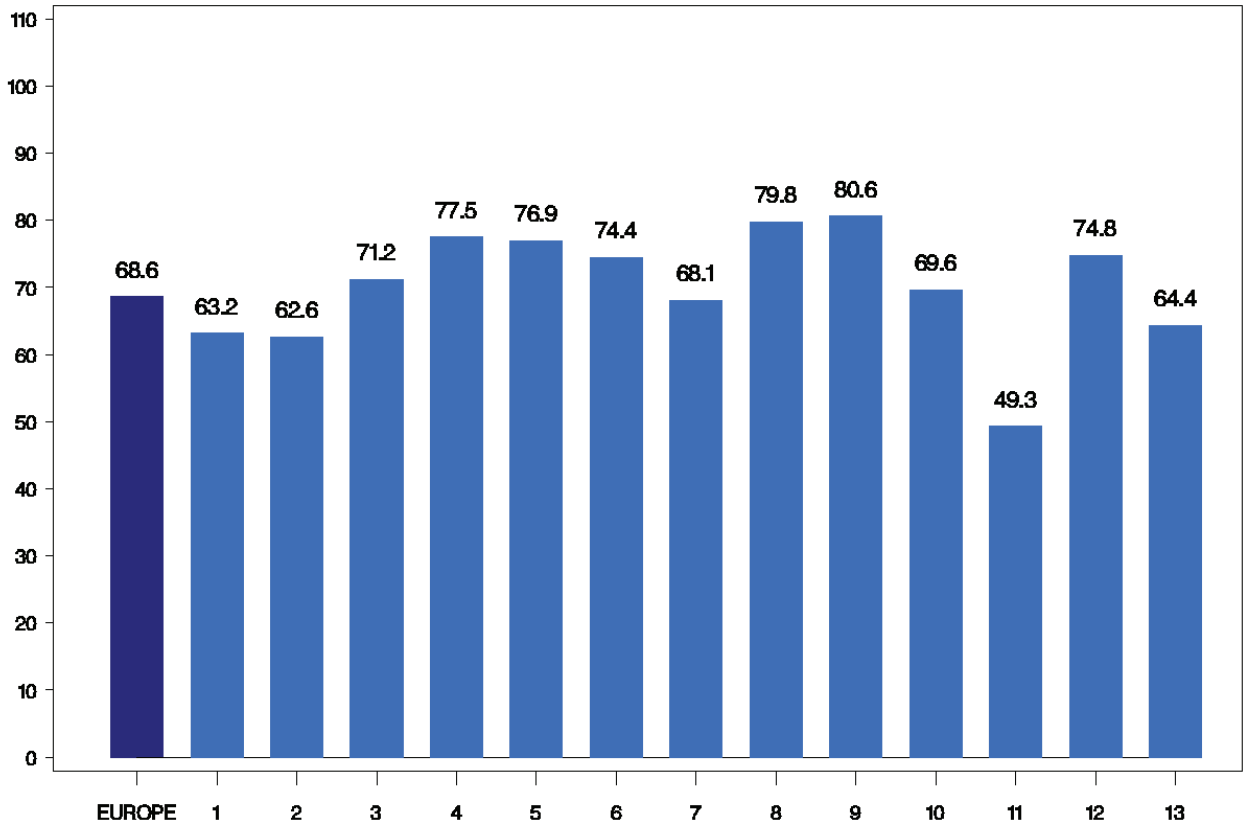
	Patients	Number	%
EUROPE	15683	15219	97.0
1. Austria	813	799	98.3
2. Belgium	510	496	97.3
3. Croatia	445	439	98.7
4. Greece	1129	1090	96.5
5. Malta	109	106	97.2
6. Poland	734	715	97.4
7. Ireland	236	231	97.9
8. Romania	629	614	97.6
9. Slovakia	32	32	100.0
10. Spain	5215	5018	96.2
11. Switzerland	295	273	92.5
12. Turkey	612	608	99.3
13. UK	4924	4798	97.4



Has the sputum volume increased?

Table 95. Sputum volume increase.

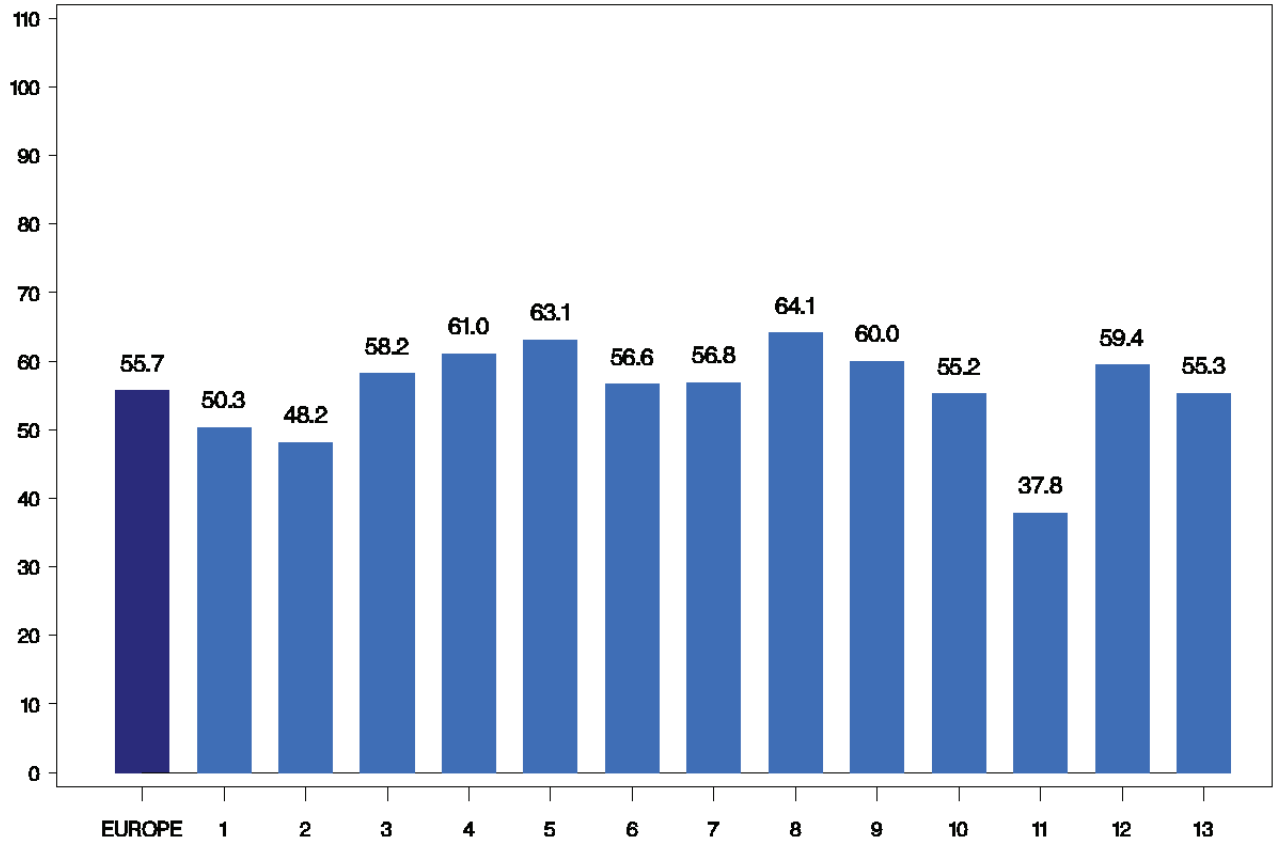
	Patients	Number	%
EUROPE	14942	10254	68.6
1. Austria	739	467	63.2
2. Belgium	500	313	62.6
3. Croatia	441	314	71.2
4. Greece	1112	862	77.5
5. Malta	91	70	76.9
6. Poland	724	539	74.4
7. Ireland	232	158	68.1
8. Romania	623	497	79.8
9. Slovakia	31	25	80.6
10. Spain	5033	3504	69.6
11. Switzerland	294	145	49.3
12. Turkey	606	453	74.8
13. UK	4516	2907	64.4



Has the sputum colour changed?

Table 96. Sputum colour change.

	Patients	Number	%
EUROPE	14437	8036	55.7
1. Austria	723	364	50.3
2. Belgium	465	224	48.2
3. Croatia	435	253	58.2
4. Greece	1091	666	61.0
5. Malta	84	53	63.1
6. Poland	708	401	56.6
7. Ireland	227	129	56.8
8. Romania	621	398	64.1
9. Slovakia	30	18	60.0
10. Spain	4788	2645	55.2
11. Switzerland	288	109	37.8
12. Turkey	601	357	59.4
13. UK	4376	2419	55.3



GOLD (2010) advises a more all-embracing method to assess the severity of exacerbation.

> GOLD 2010: Specific information is required on the frequency and severity of attacks of breathlessness and cough, sputum volume and colour, and limitation of daily activities. When available, prior arterial blood gas measurements are extremely useful for comparison with those made during the acute episode.
>
> From the *Global Strategy for Diagnosis, Management, and Prevention of COPD updated 2010*, used with permission from the Global Initiative for Chronic Obstructive Lung Disease (GOLD), www.goldcopd.org

Before admission

Pharmacological treatment before admission

What was the treatment for the exacerbation before admission?

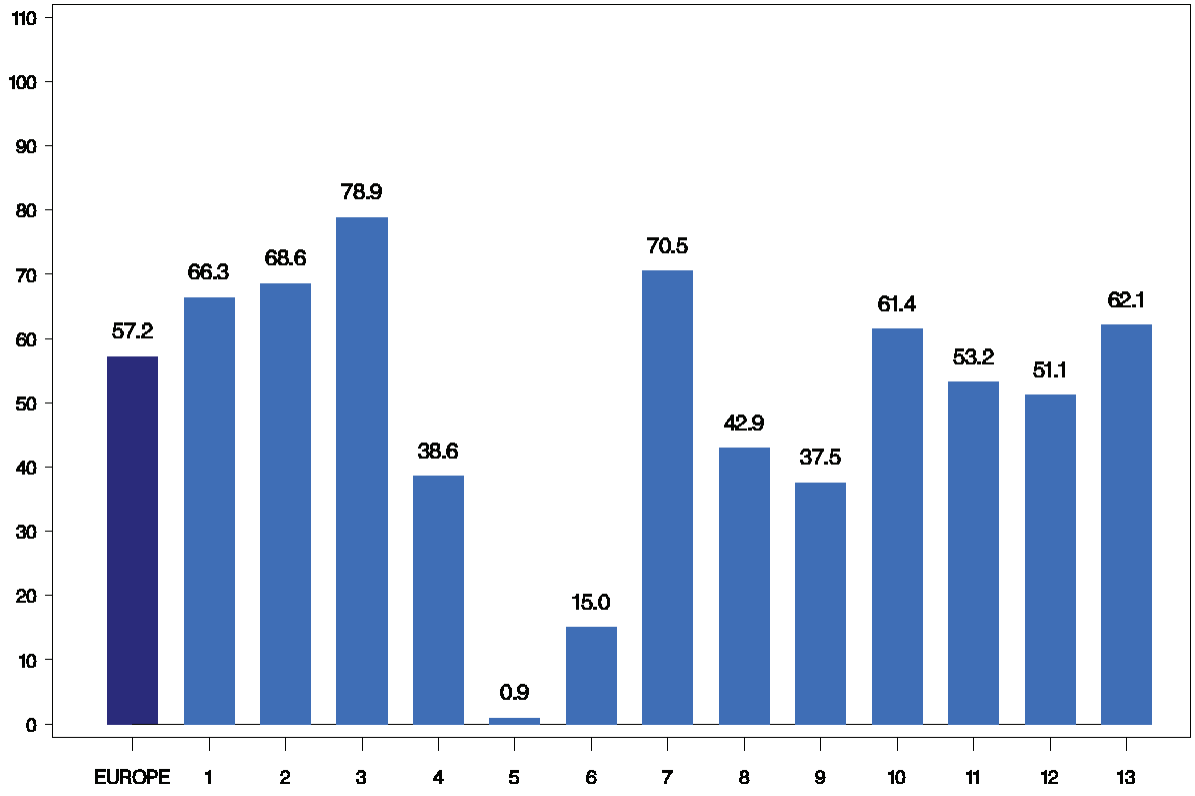
Pre-admission treatment will be interpreted as COPD medication for all patients included as having a COPD exacerbation in the study. In this report, the top five medications will be used to compare differences in participating countries. The distribution of all medications recorded, including wider disparities in Europe, are depicted to encourage discussions at the national levels about unusual findings.

Later correlations to COPD stages will only include data from patients with spirometry results available.

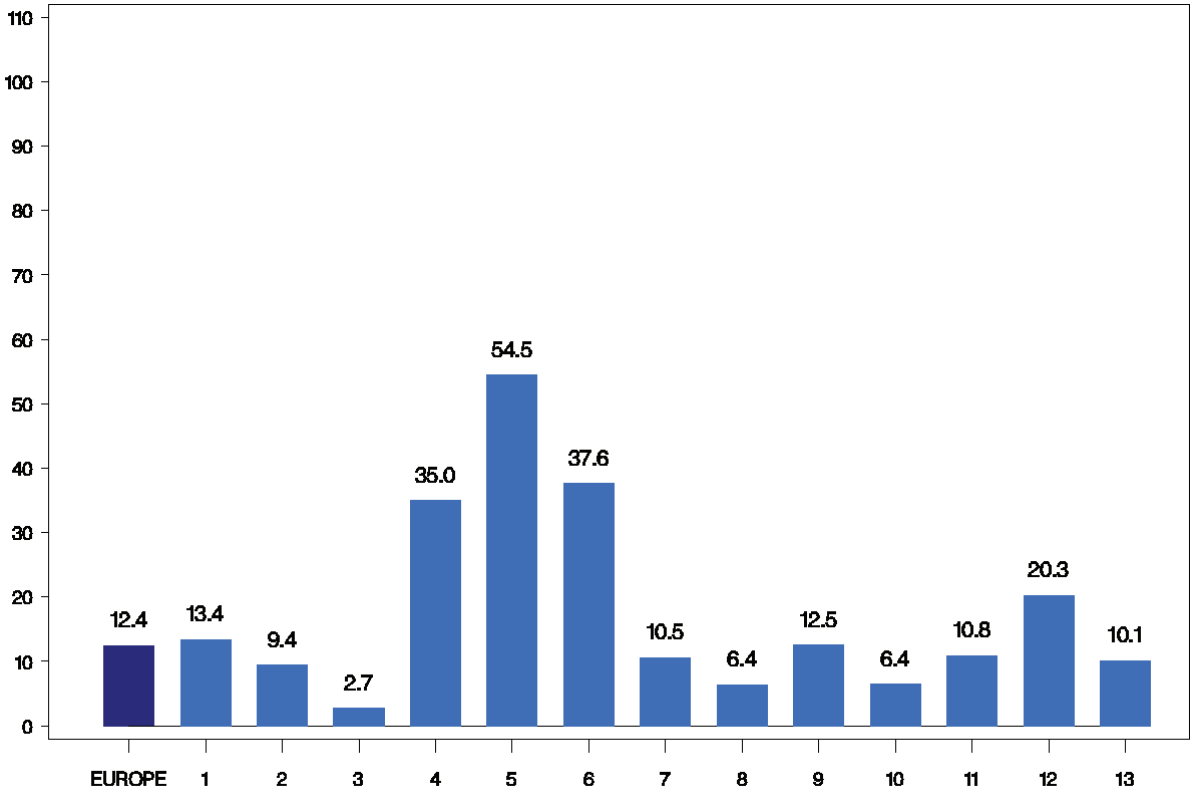
Table 97. Pharmacological treatment before admission.

	Patients	Combined (LABA and ICS)		Inhaled corticosteroids		Long-acting β_2-agonists		Long-acting anticholinergics		Short-acting β_2-agonists		Short-acting anticholinergics	
		N	%	N	%	N	%	N	%	N	%	N	%
EUROPE	15821	9049	57.2	1969	12.4	1472	9.3	7344	46.4	9432	59.6	4250	26.9
1. Austria	823	546	66.3	110	13.4	118	14.3	598	72.7	539	65.5	297	36.1
2. Belgium	512	351	68.6	48	9.4	65	12.7	329	64.3	310	60.5	267	52.1
3. Croatia	445	351	78.9	12	2.7	24	5.4	137	30.8	148	33.3	168	37.8
4. Greece	1133	437	38.6	396	35.0	127	11.2	315	27.8	494	43.6	340	30.0
5. Malta	112	1	0.9	61	54.5	14	12.5	4	3.6	88	78.6	75	67.0
6. Poland	734	110	15.0	276	37.6	337	45.9	211	28.7	328	44.7	415	56.5
7. Ireland	237	167	70.5	25	10.5	42	17.7	125	52.7	169	71.3	85	35.9
8. Romania	629	270	42.9	40	6.4	4	0.6	153	24.3	280	44.5	33	5.2
9. Slovakia	32	12	37.5	4	12.5	8	25.0	8	25.0	8	25.0	10	31.3
10. Spain	5271	3239	61.4	338	6.4	310	5.9	2734	51.9	2499	47.4	1174	22.3
11. Switzerland	295	157	53.2	32	10.8	23	7.8	132	44.7	102	34.6	80	27.1
12. Turkey	612	313	51.1	124	20.3	59	9.6	195	31.9	396	64.7	310	50.7
13. UK	4986	3095	62.1	503	10.1	341	6.8	2403	48.2	4071	81.6	996	20.0

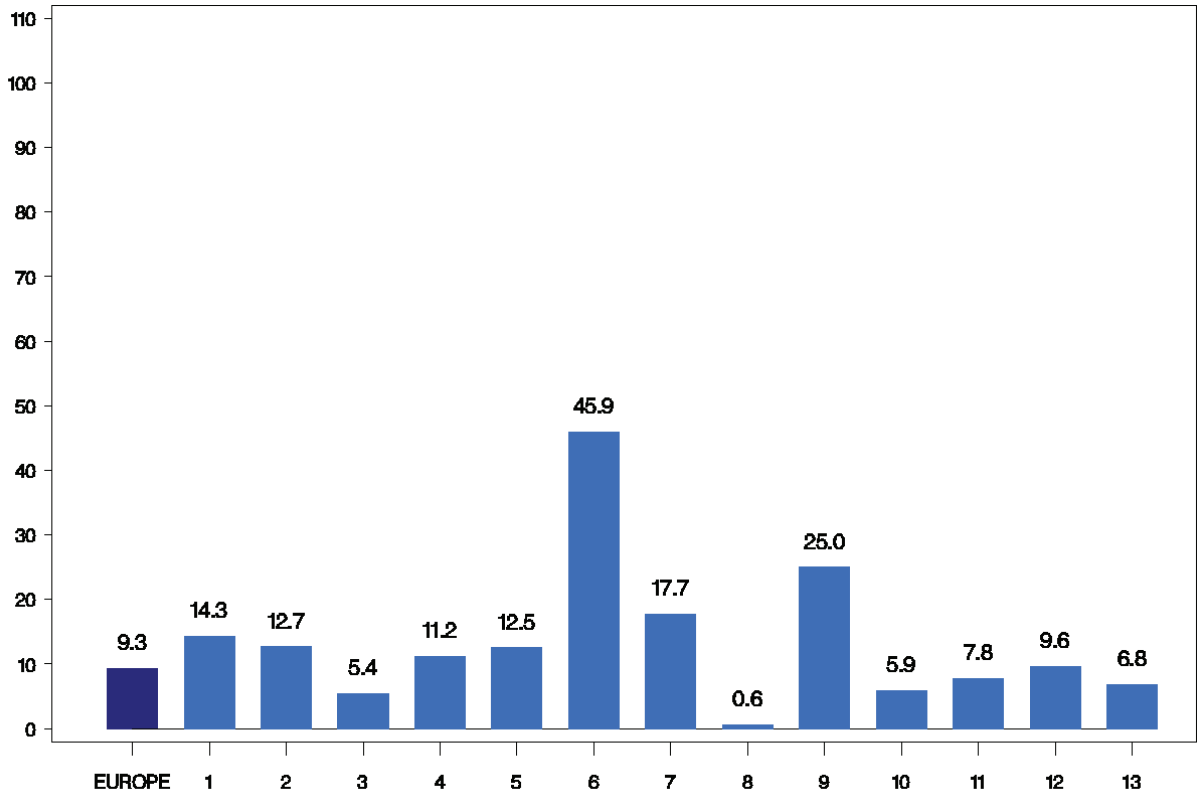
Combined (LABA and ICS)



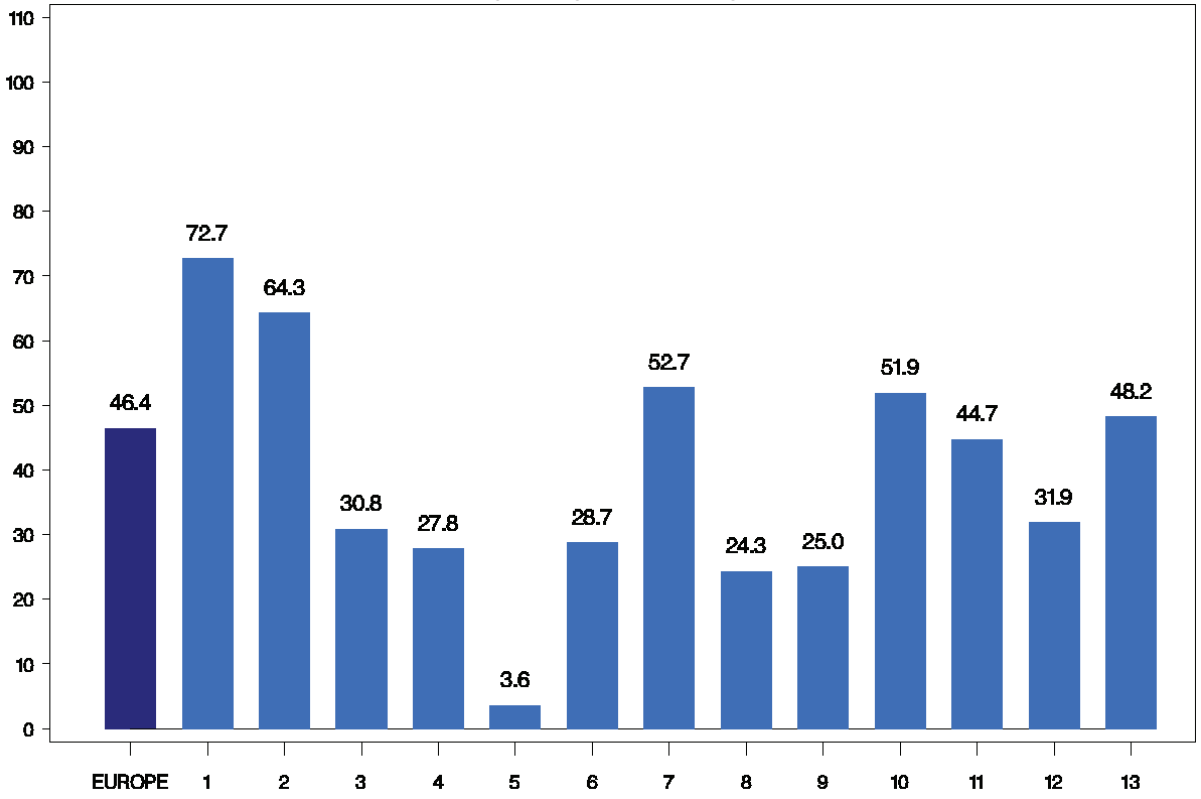
Inhaled corticosteroids



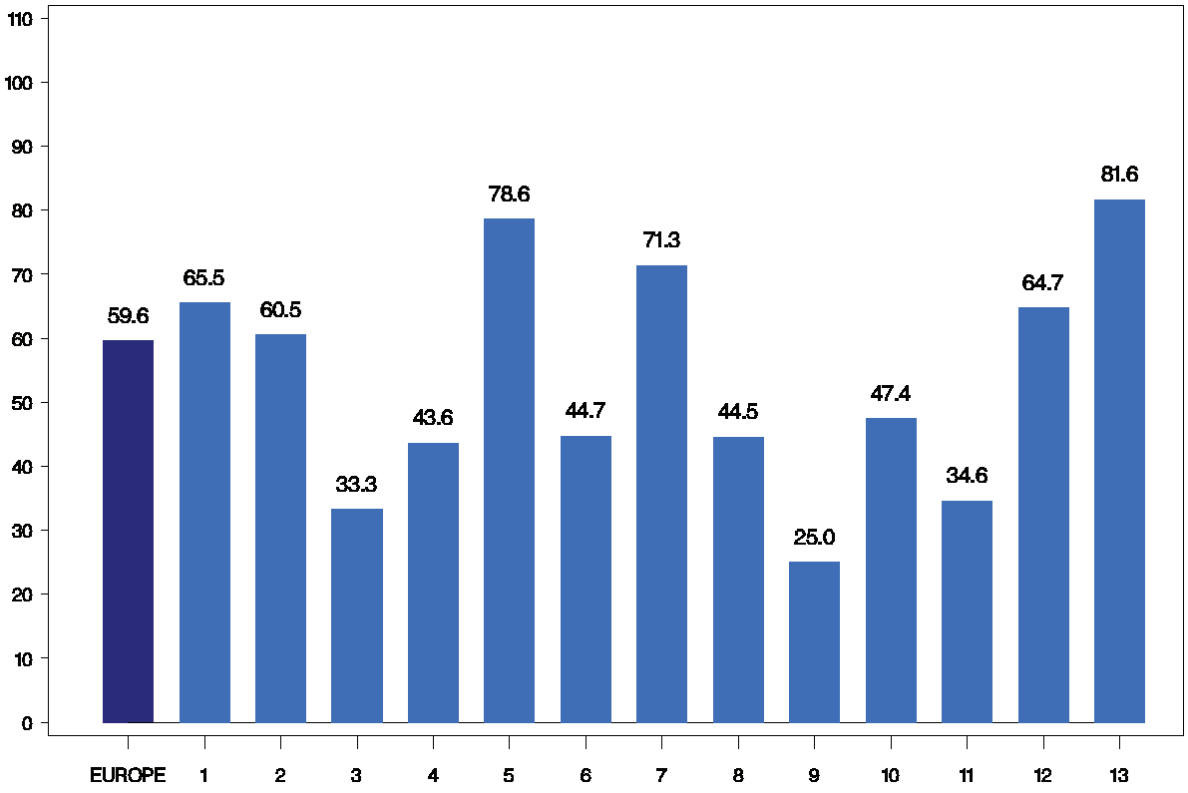
Long-acting β_2-agonist



Long-acting anticholinergics



Short-acting β_2-agonist



Short-acting anticholinergics

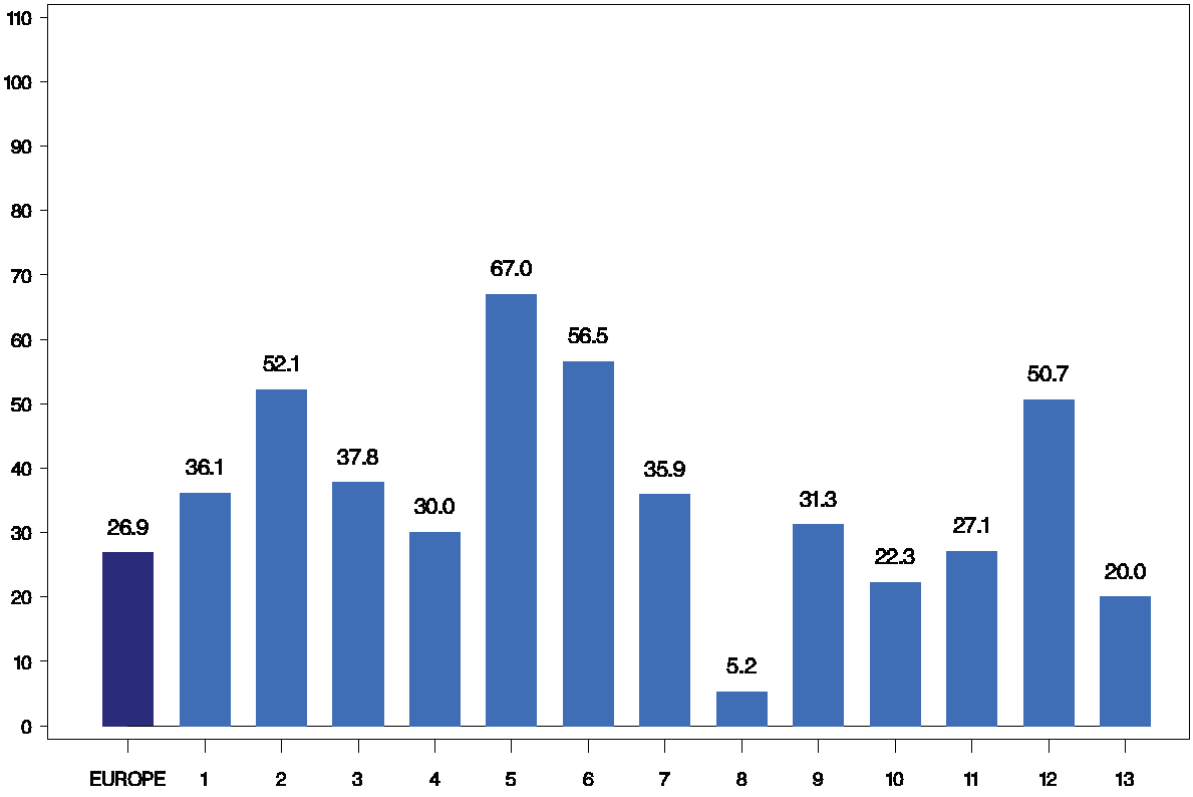
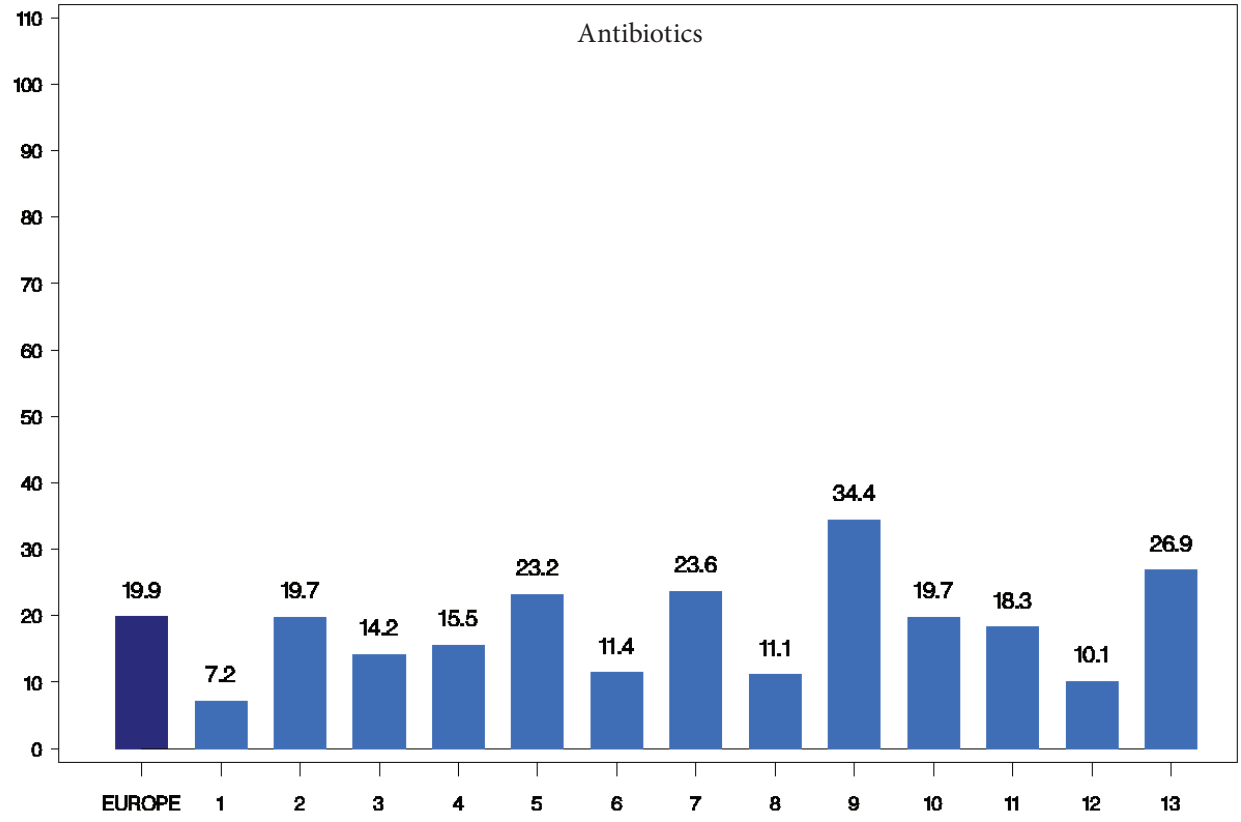


Table 98. Pharmacological treatment before admission.

	Patients	Antibiotics		Systemic corticosteroids		Oral theophylline		Oxygen		High flow oxygen before admission		Non-invasive mechanical ventilation		Other	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%
EUROPE	15821	3143	19.9	2927	18.5	2588	16.4	3921	24.8	3485	24.4	438	2.8	1707	10.8
1. Austria	823	59	7.2	129	15.7	248	30.1	203	24.7	288	35.2	15	1.8	51	6.2
2. Belgium	512	101	19.7	167	32.6	87	17.0	106	20.7	91	19.4	5	1.0	47	9.2
3. Croatia	445	63	14.2	52	11.7	250	56.2	78	17.5	61	14.0	9	2.0	16	3.6
4. Greece	1133	176	15.5	62	5.5	103	9.1	346	30.5	301	27.4	37	3.3	82	7.2
5. Malta	112	26	23.2	17	15.2	5	4.5	25	22.3	17	15.2	0	0.0	29	25.9
6. Poland	734	84	11.4	91	12.4	343	46.7	87	11.9	195	26.7	6	0.8	95	12.9
7. Ireland	237	56	23.6	51	21.5	26	11.0	45	19.0	78	34.5	11	4.6	14	5.9
8. Romania	629	70	11.1	9	1.4	236	37.5	43	6.8	129	20.8	3	0.5	81	12.9
9. Slovakia	32	11	34.4	1	3.1	9	28.1	3	9.4	8	25.0	0	0.0	2	6.3
10. Spain	5271	1041	19.7	892	16.9	457	8.7	1726	32.7	1190	26.6	222	4.2	724	13.7
11. Switzerland	295	54	18.3	78	26.4	11	3.7	51	17.3	21	10.9	22	7.5	81	27.5
12. Turkey	612	62	10.1	97	15.8	128	20.9	233	38.1	110	18.1	35	5.7	13	2.1
13. UK	4986	1340	26.9	1281	25.7	685	13.7	975	19.6	996	22.3	73	1.5	472	9.5


Antibiotics
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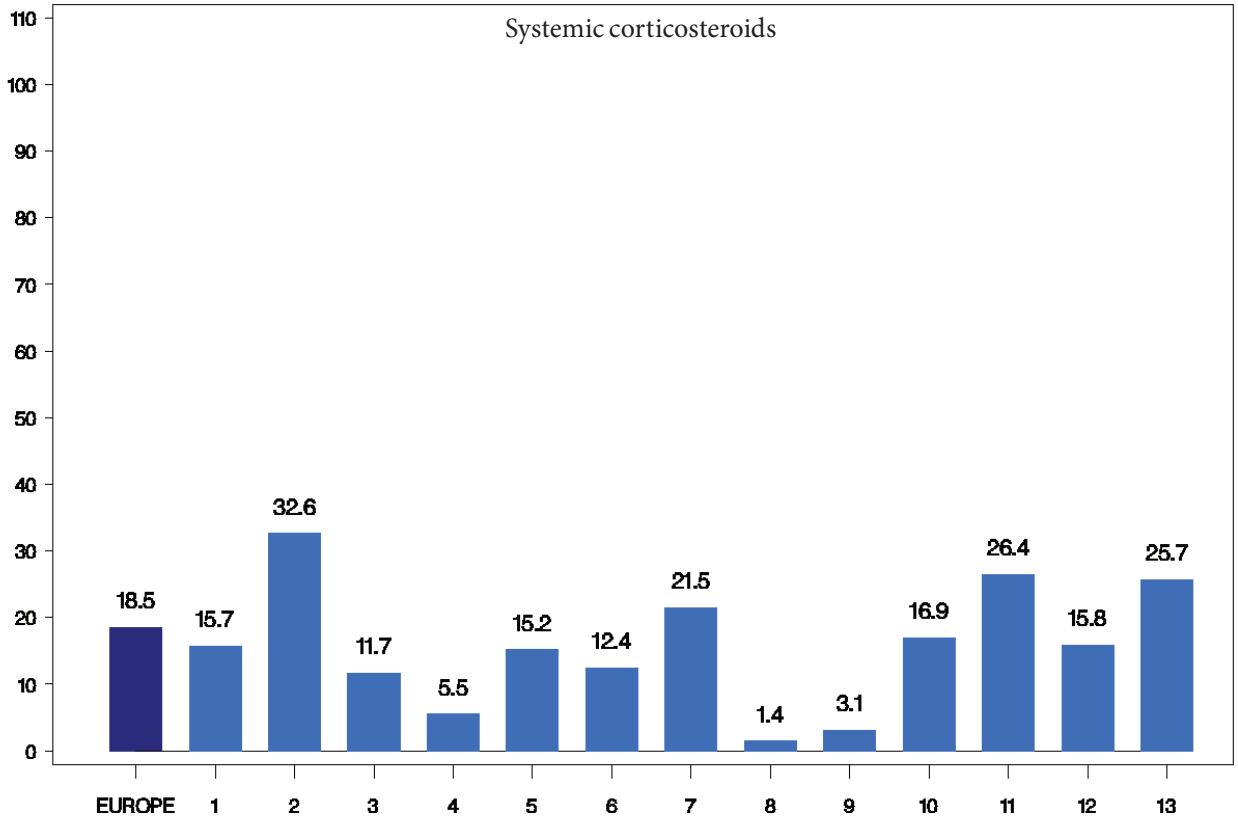
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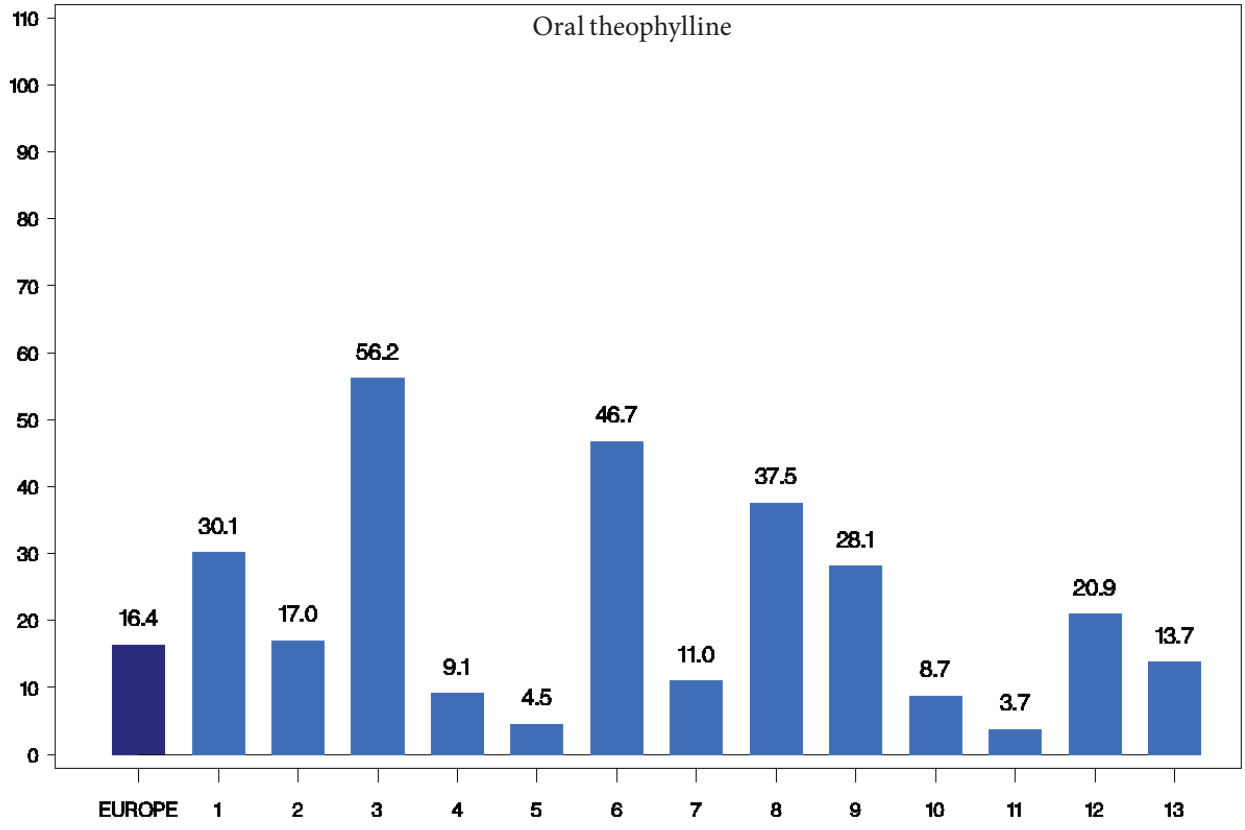
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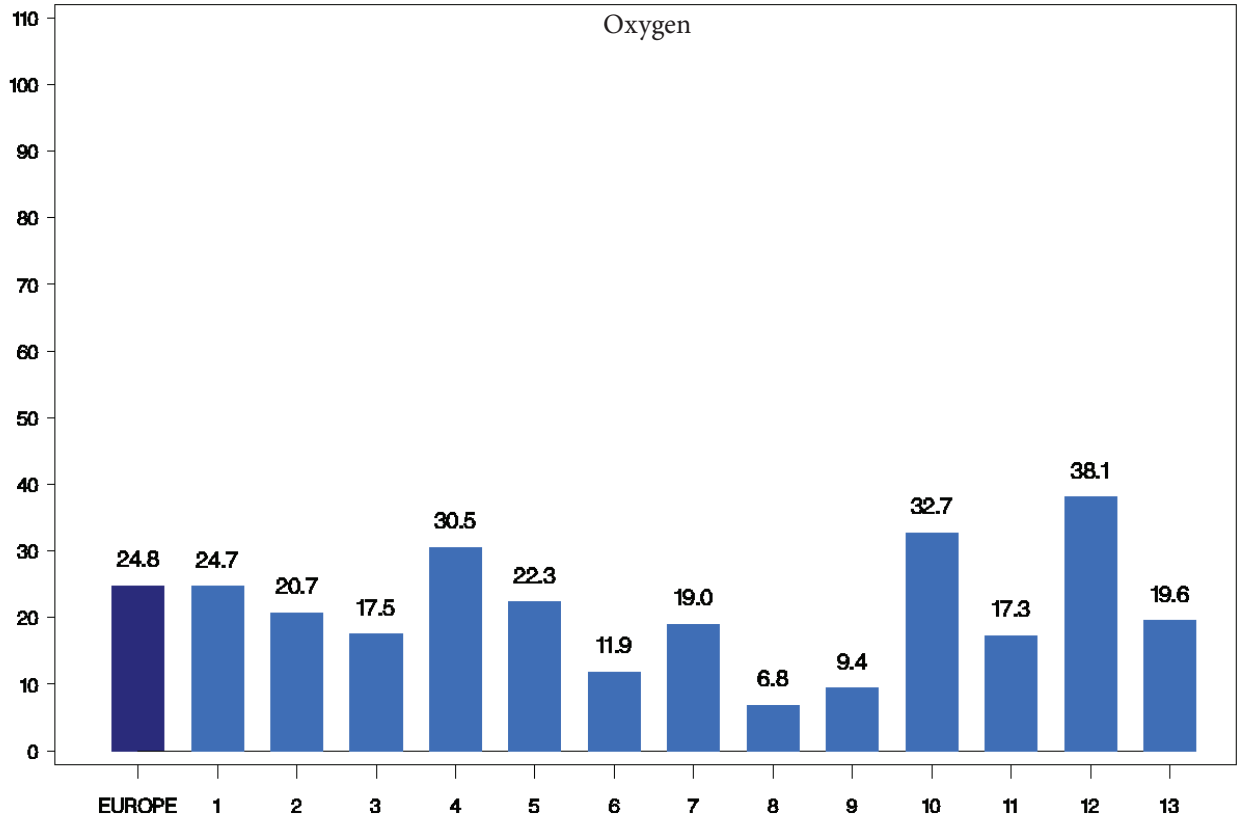
Oxygen
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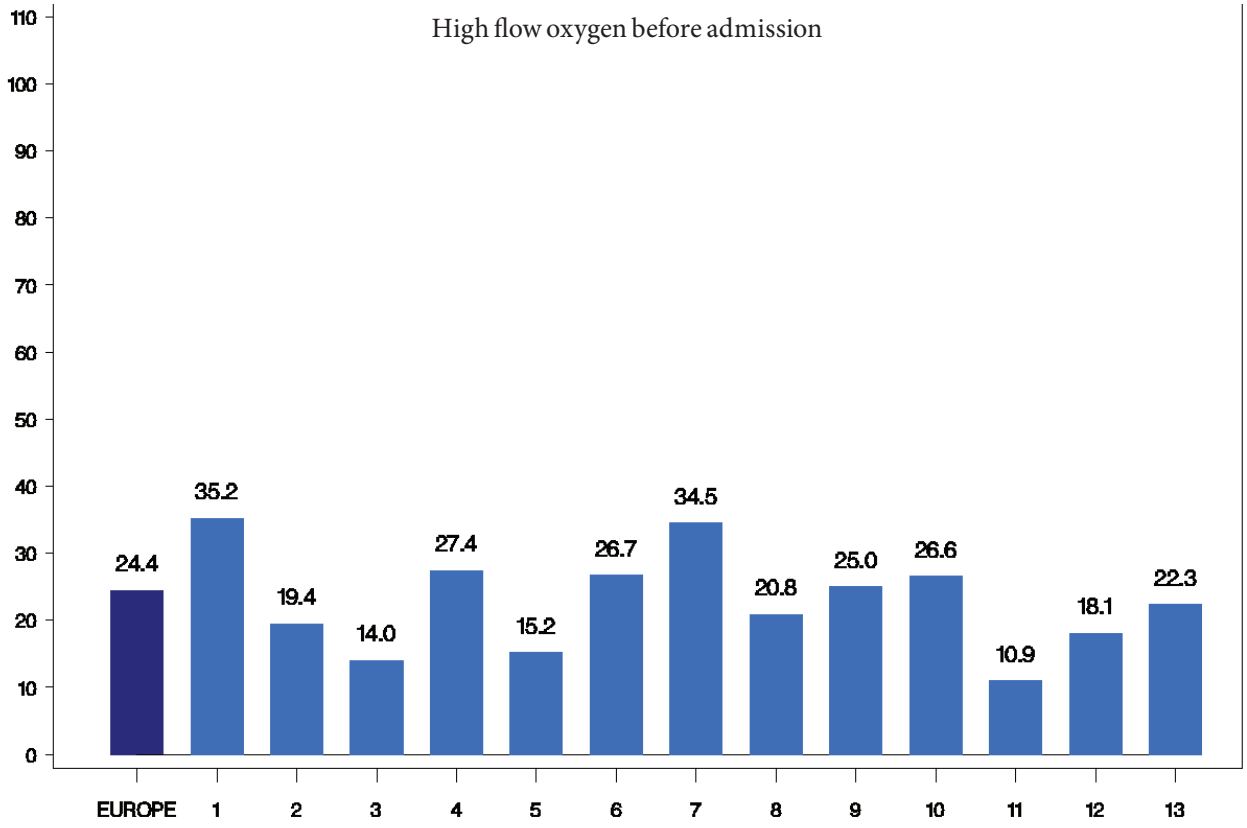
High flow oxygen before admission
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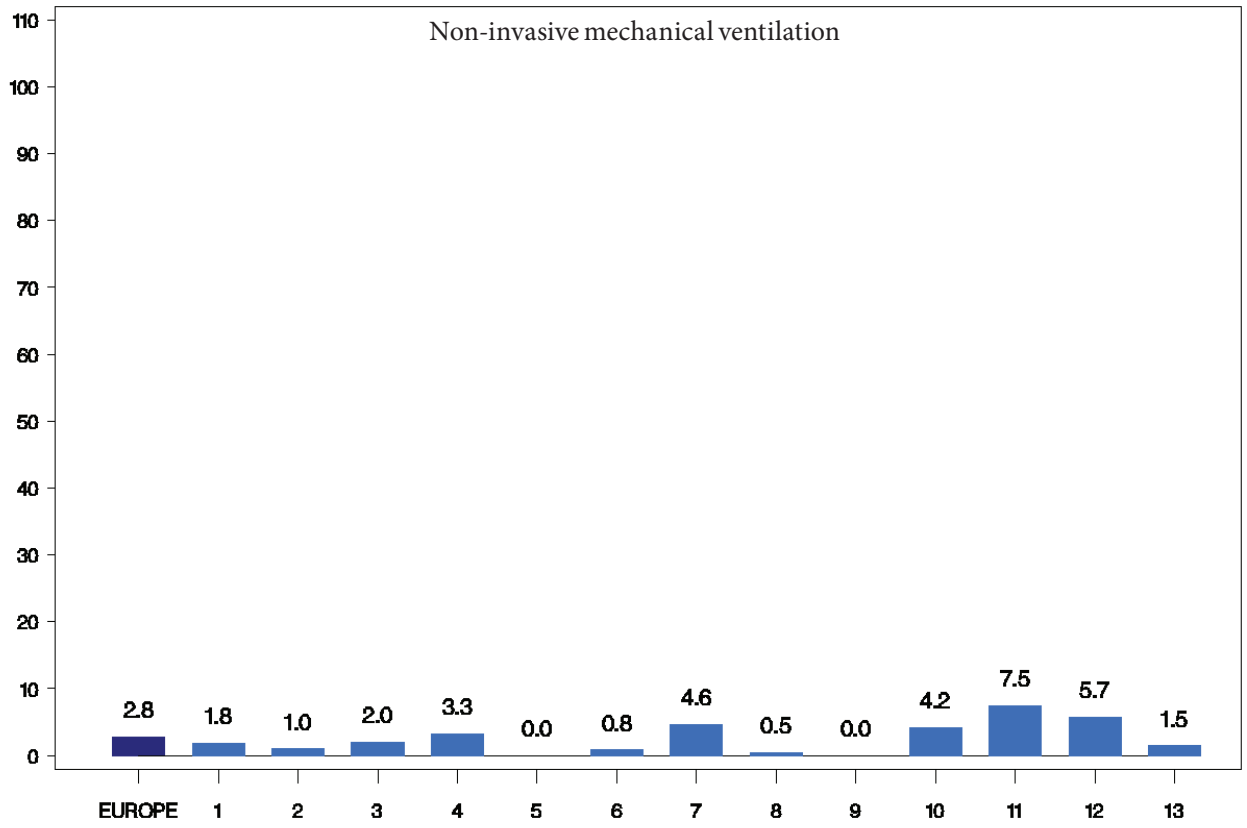
Non-invasive mechanical ventilation
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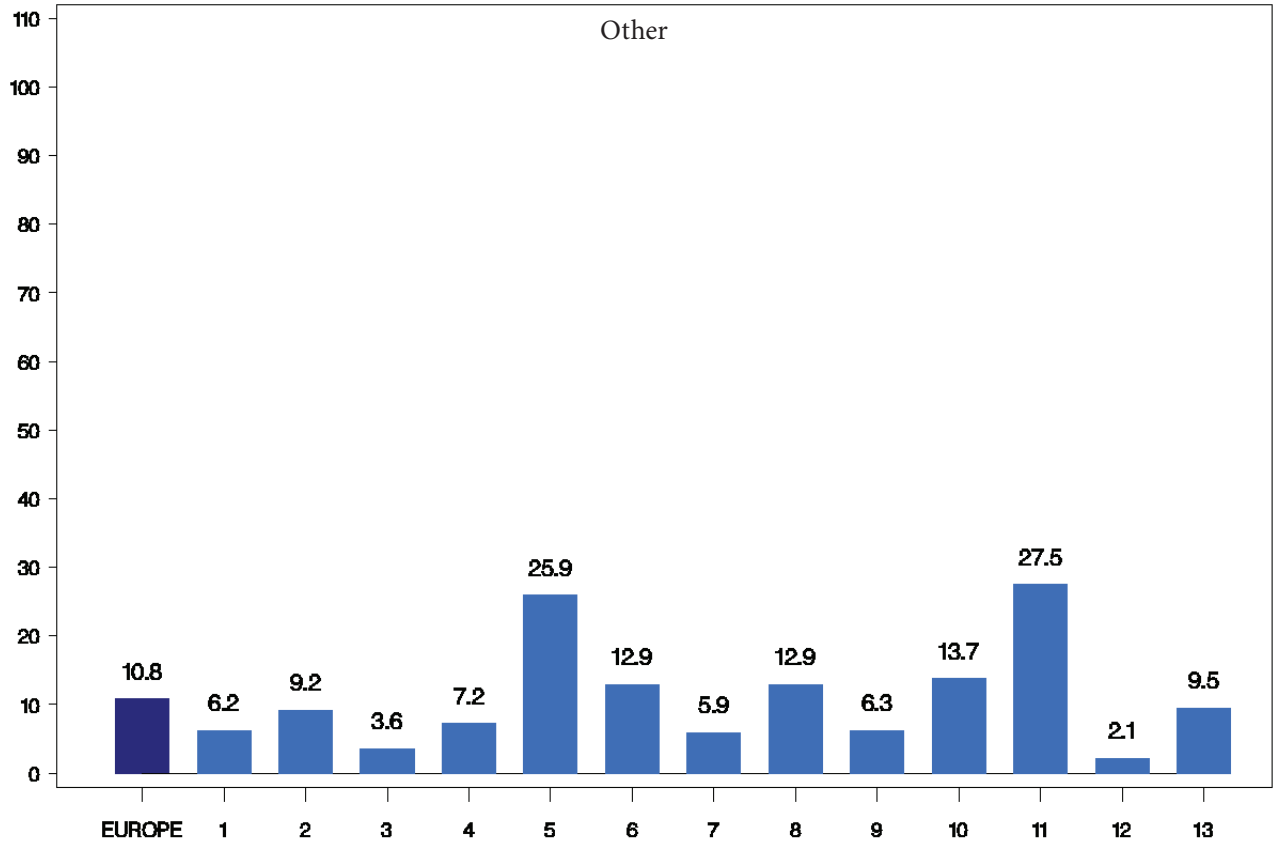
Other
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EUROPE
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Oxygen before admission

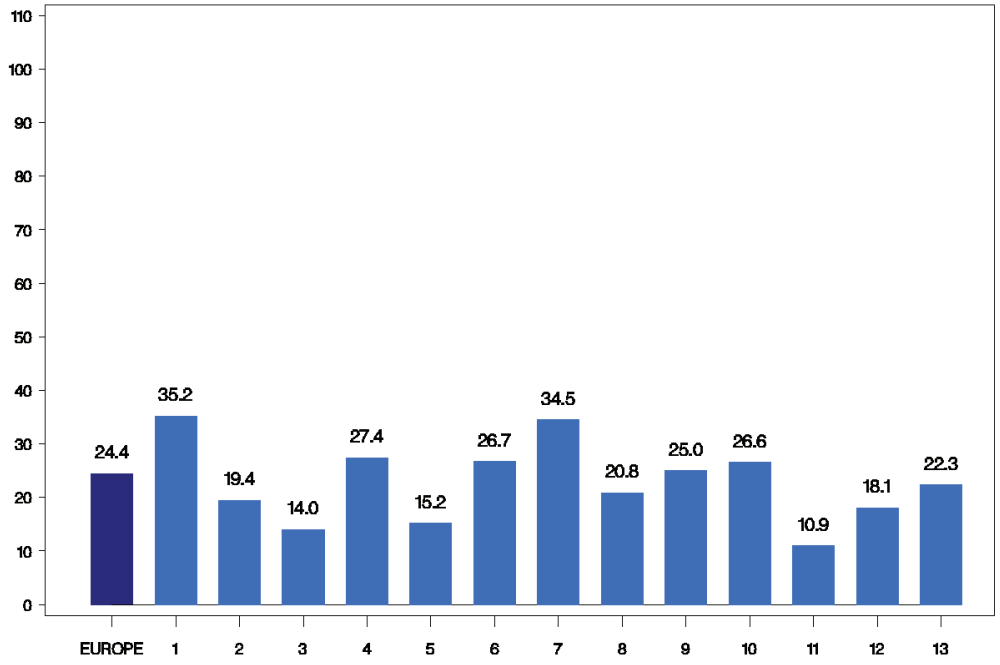
Was the patient given high flow oxygen in the hour before admission?

Oxygen is an established emergency therapy for acute dyspnoea, and is recommended during transport to the hospital, preferably with oximetry monitoring. High flow oxygen administration in the pre-admission period, however, may contribute to acidosis in patients with a predisposition to type II respiratory failure.

The risk stratification for additional ventilatory support will be guided by clinical assessment and blood gas results in the initial admission period.

Table 99. High flow oxygen before admission.

	Patients	Number	%
EUROPE	14276	3485	24.4
1. Austria	819	288	35.2
2. Belgium	468	91	19.4
3. Croatia	435	61	14.0
4. Greece	1097	301	27.4
5. Malta	112	17	15.2
6. Poland	731	195	26.7
7. Ireland	226	78	34.5
8. Romania	619	129	20.8
9. Slovakia	32	8	25.0
10. Spain	4478	1190	26.6
11. Switzerland	192	21	10.9
12. Turkey	608	110	18.1
13. UK	4459	996	22.3



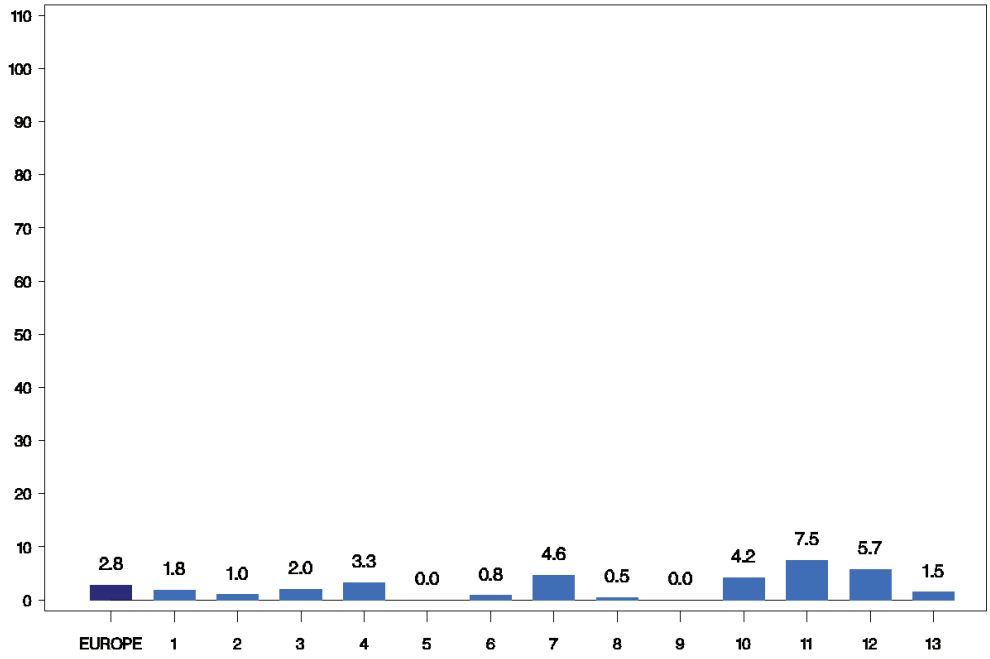
Ventilatory support before admission

Patients on ventilatory support on admission are classified as having acute respiratory failure and will be triaged immediately: for the acute management it is secondary whether this is an acute on chronic failure or first respiratory decompensation. In terms of prognosis and long-term management of the patient it might be relevant to explore if the patient has been on prior home mechanical ventilation.

Our results did not differentiate these options.

Table 100. Non-invasive ventilatory support before admission.

	Patients	Number	%
EUROPE	15821	438	2.8
1. Austria	823	15	1.8
2. Belgium	512	5	1.0
3. Croatia	445	9	2.0
4. Greece	1133	37	3.3
5. Malta	112	0	0.0
6. Poland	734	6	0.8
7. Ireland	237	11	4.6
8. Romania	629	3	0.5
9. Slovakia	32	0	0.0
10. Spain	5271	222	4.2
11. Switzerland	295	22	7.5
12. Turkey	612	35	5.7
13. UK	4986	73	1.5



Admission

In which ward did the patient receive the majority of care during their entire admission (not only in the first 24 hours)?

Over half the patients received the majority of their care in a respiratory ward, with a quarter cared for in general or geriatric wards, and only 2% in a high dependency unit or ICU facility.

Table 101. Care received in respiratory ward.

	Patients	Number	%
EUROPE	15797	9059	57.3
1. Austria	823	626	76.1
2. Belgium	512	261	51.0
3. Croatia	445	380	85.4
4. Greece	1133	872	77.0
5. Malta	112	34	30.4
6. Poland	734	618	84.2
7. Ireland	237	43	18.1
8. Romania	629	565	89.8
9. Slovakia	32	26	81.3
10. Spain	5271	3034	57.6
11. Switzerland	295	36	12.2
12. Turkey	612	552	90.2
13. UK	4962	2012	40.5

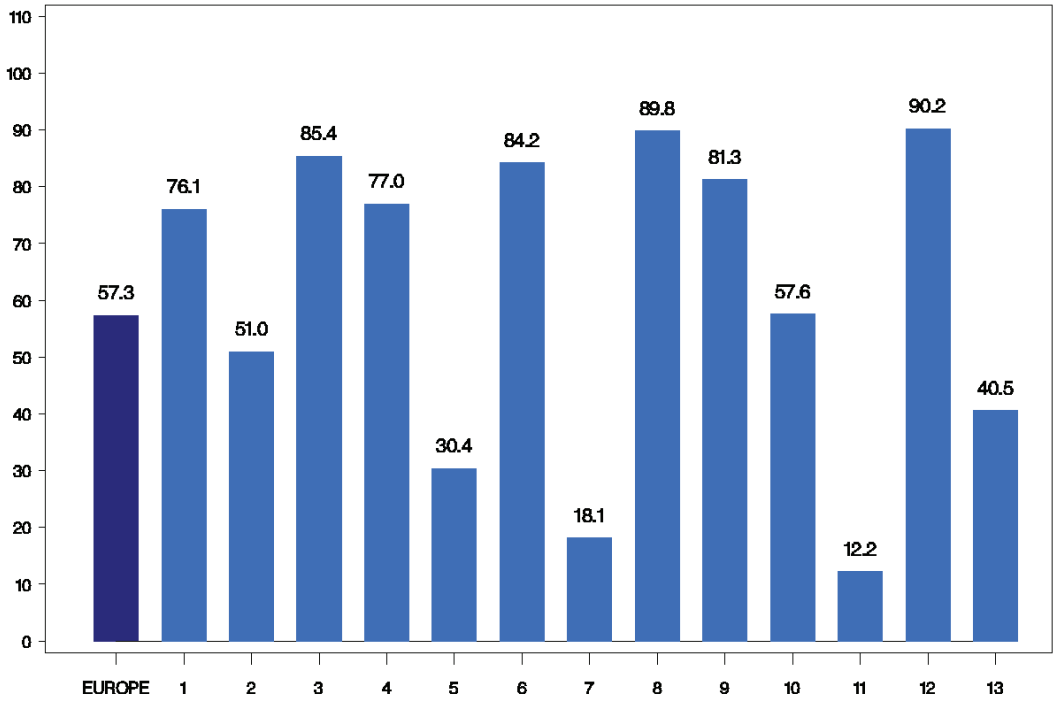


Table 102. Care received in general medical ward.

	Patients	Number	%
EUROPE	15797	3805	24.1
1. Austria	823	158	19.2
2. Belgium	512	41	8.0
3. Croatia	445	12	2.7
4. Greece	1133	89	7.9
5. Malta	112	75	67.0
6. Poland	734	95	12.9
7. Ireland	237	141	59.5
8. Romania	629	2	0.3
9. Slovakia	32	5	15.6
10. Spain	5271	1777	33.7
11. Switzerland	295	147	49.8
12. Turkey	612	4	0.7
13. UK	4962	1259	25.4

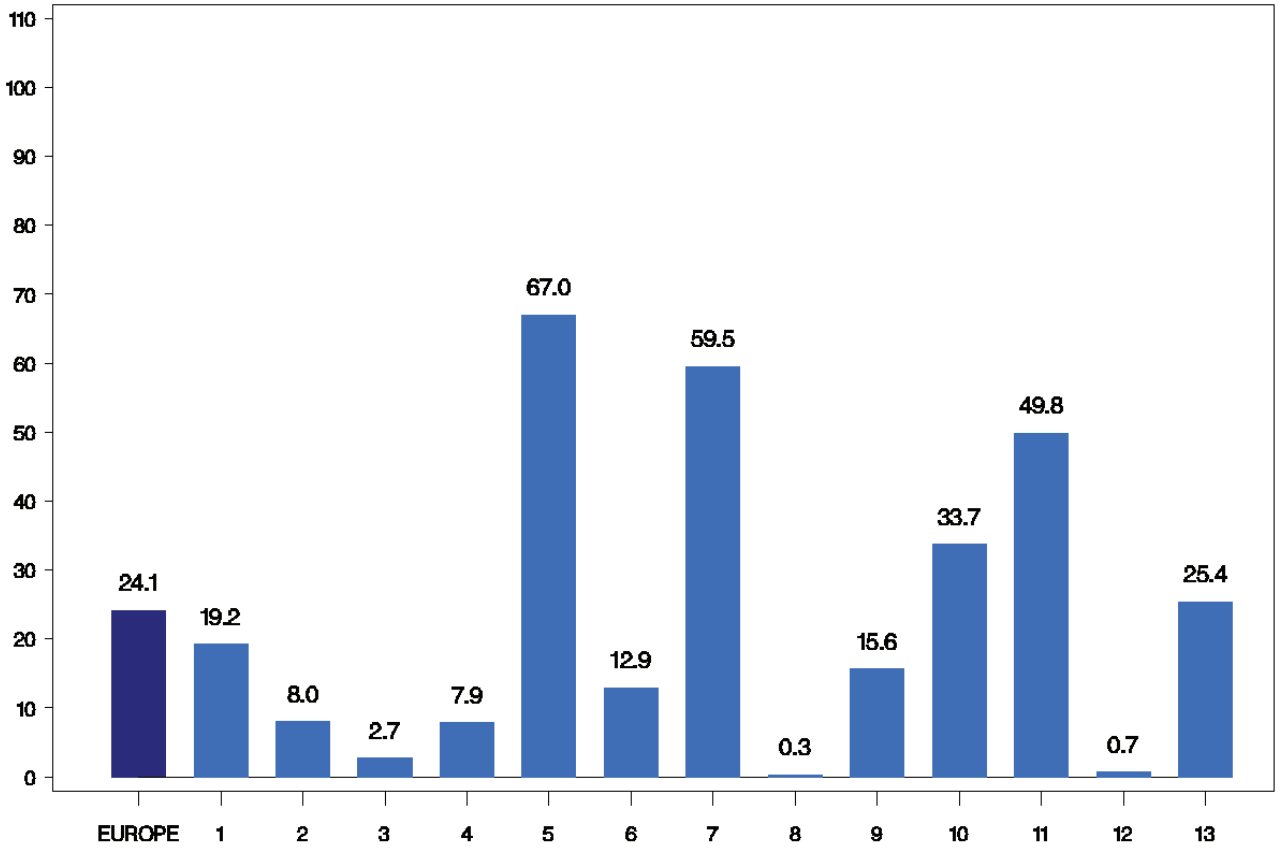


Table 103. Care received in emergency ward.

	Patients	Number	%
EUROPE	15797	1846	11.7
1. Austria	823	5	0.6
2. Belgium	512	160	31.3
3. Croatia	445	10	2.2
4. Greece	1133	153	13.5
5. Malta	112	0	0.0
6. Poland	734	12	1.6
7. Ireland	237	39	16.5
8. Romania	629	27	4.3
9. Slovakia	32	0	0.0
10. Spain	5271	191	3.6
11. Switzerland	295	91	30.8
12. Turkey	612	24	3.9
13. UK	4962	1134	22.9

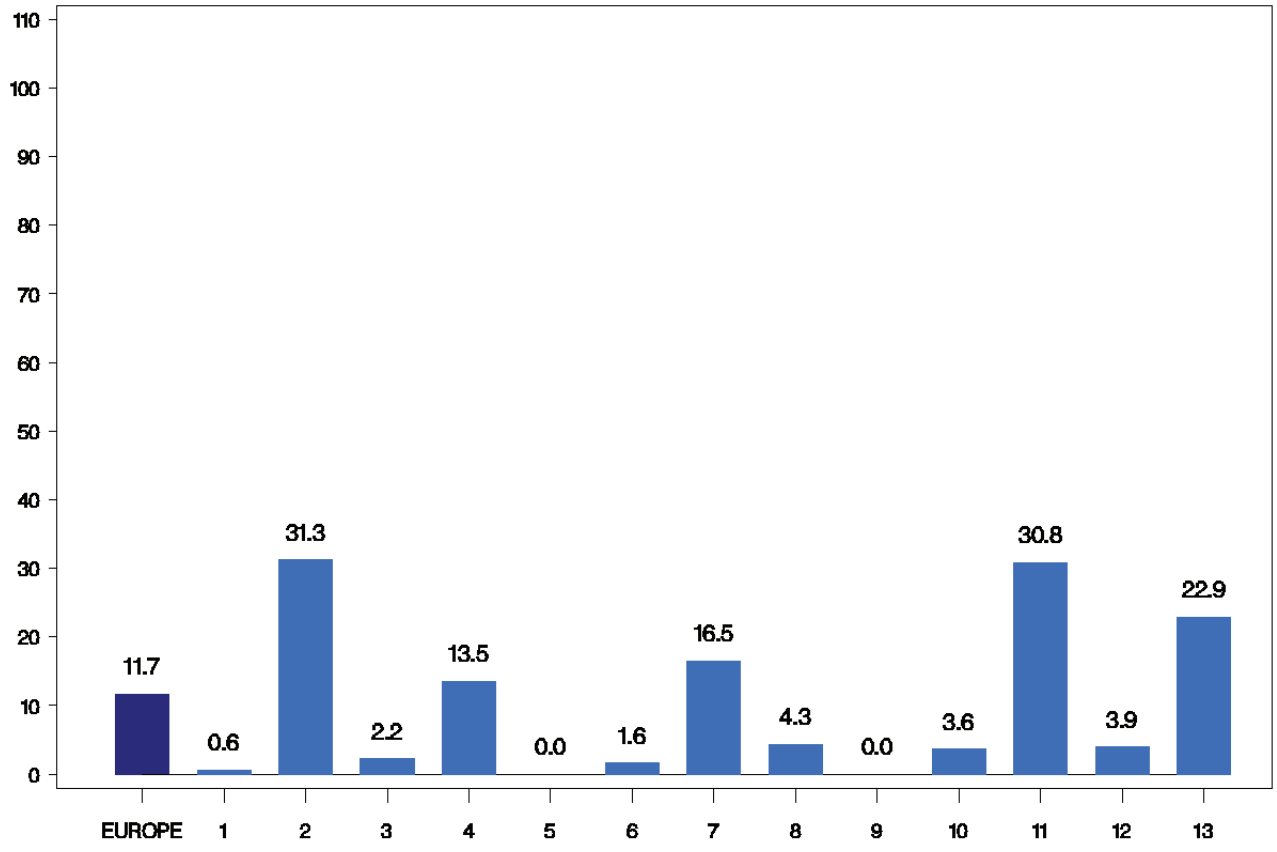


Table 104. Care received in elderly/geriatric ward

	Patients	Number	%
EUROPE	15797	332	2.1
1. Austria	823	0	0.0
2. Belgium	512	5	1.0
3. Croatia	445	2	0.4
4. Greece	1133	1	0.1
5. Malta	112	0	0.0
6. Poland	734	0	0.0
7. Ireland	237	0	0.0
8. Romania	629	1	0.2
9. Slovakia	32	0	0.0
10. Spain	5271	66	1.3
11. Switzerland	295	2	0.7
12. Turkey	612	0	0.0
13. UK	4962	255	5.1

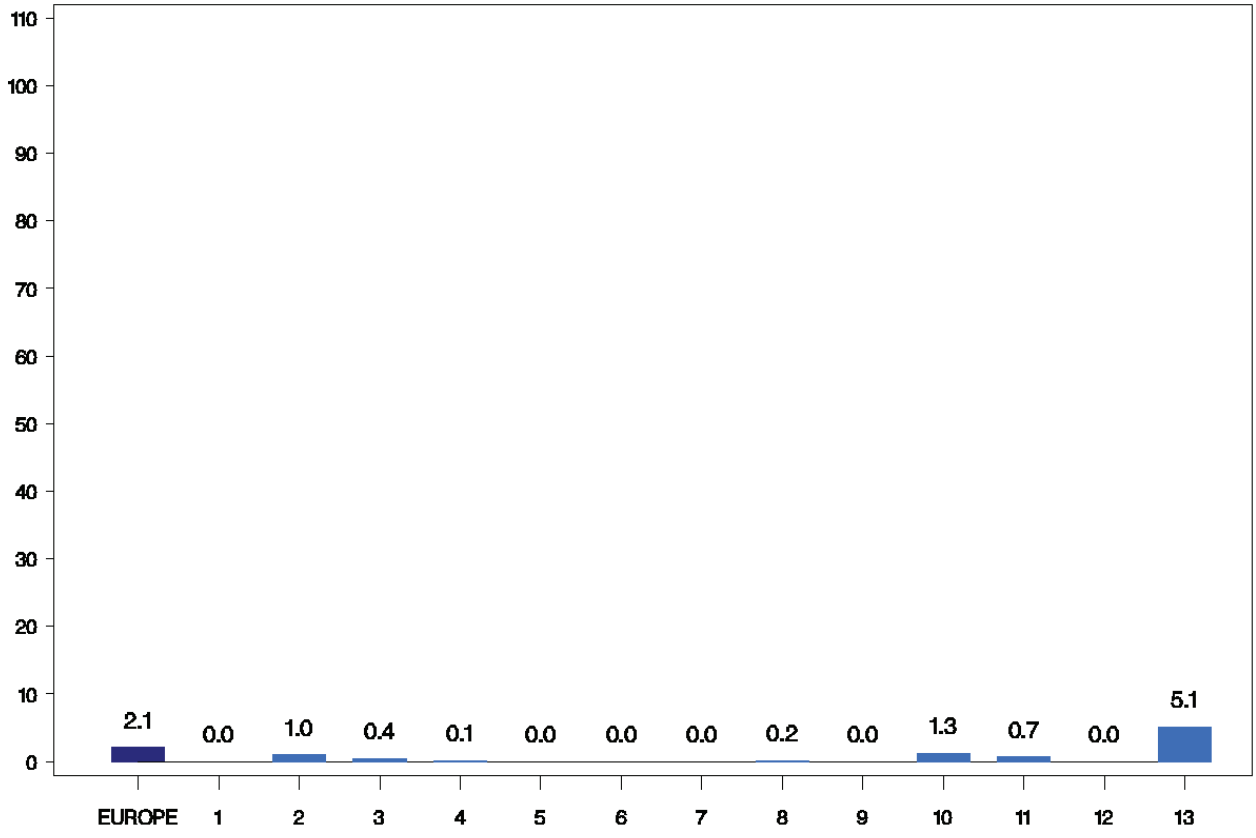


Table 105. Care received in high dependency unit/ICU.

	Patients	Number	%
EUROPE	15797	322	2.0
1. Austria	823	29	3.5
2. Belgium	512	36	7.0
3. Croatia	445	35	7.9
4. Greece	1133	16	1.4
5. Malta	112	3	2.7
6. Poland	734	7	1.0
7. Ireland	237	3	1.3
8. Romania	629	3	0.5
9. Slovakia	32	1	3.1
10. Spain	5271	55	1.0
11. Switzerland	295	15	5.1
12. Turkey	612	32	5.2
13. UK	4962	87	1.8

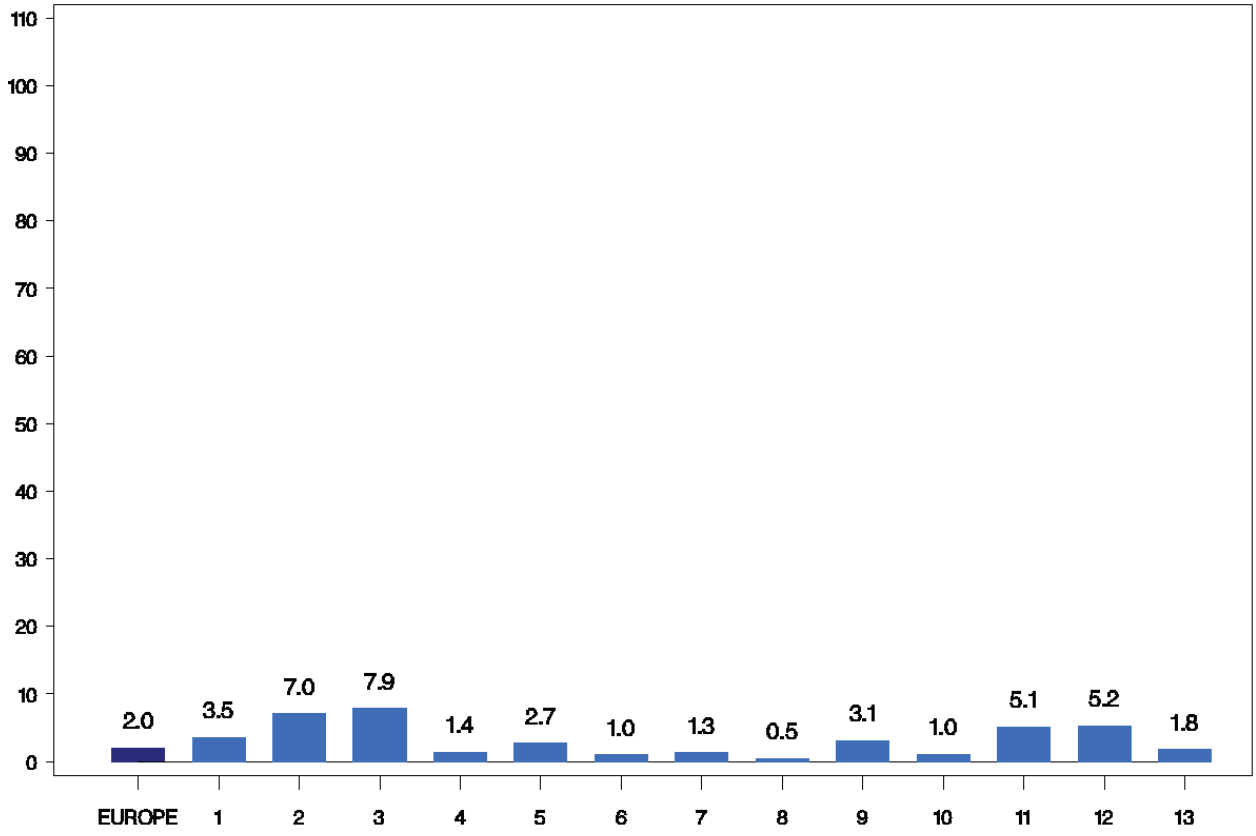
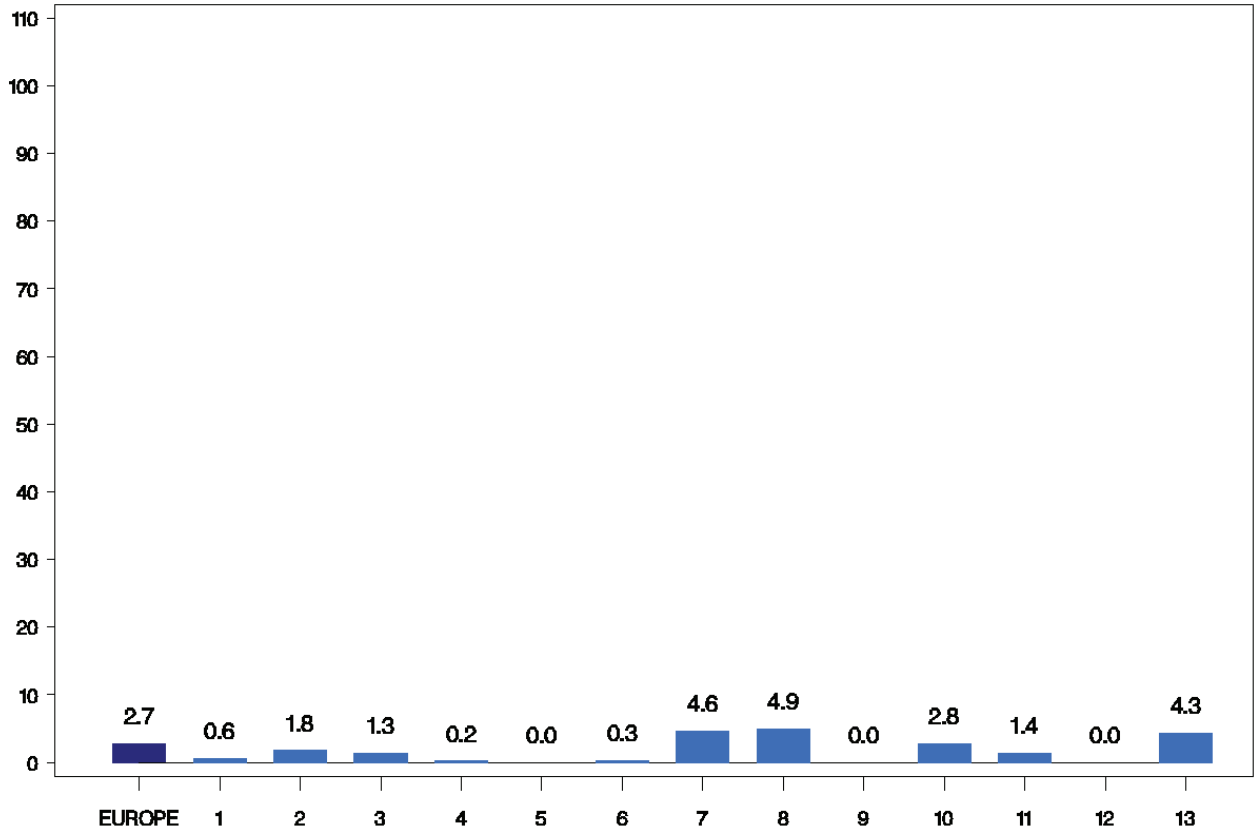


Table 106. Care received in another ward.

	Patients	Number	%
EUROPE	15797	433	2.7
1. Austria	823	5	0.6
2. Belgium	512	9	1.8
3. Croatia	445	6	1.3
4. Greece	1133	2	0.2
5. Malta	112	0	0.0
6. Poland	734	2	0.3
7. Ireland	237	11	4.6
8. Romania	629	31	4.9
9. Slovakia	32	0	0.0
10. Spain	5271	148	2.8
11. Switzerland	295	4	1.4
12. Turkey	612	0	0.0
13. UK	4962	215	4.3



The impact of COPD on an individual patient depends not just on the degree of airflow limitation, but also on the severity of symptoms (especially breathlessness and decreased exercise capacity). Further deterioration of lung function usually requires the progressive introduction of more treatments, both pharmacological and non-pharmacological, to attempt to limit the impact of these changes. Appropriate treatment and measures to prevent further exacerbations should be implemented as quickly as possible (GOLD, 2010).

Arterial blood gas

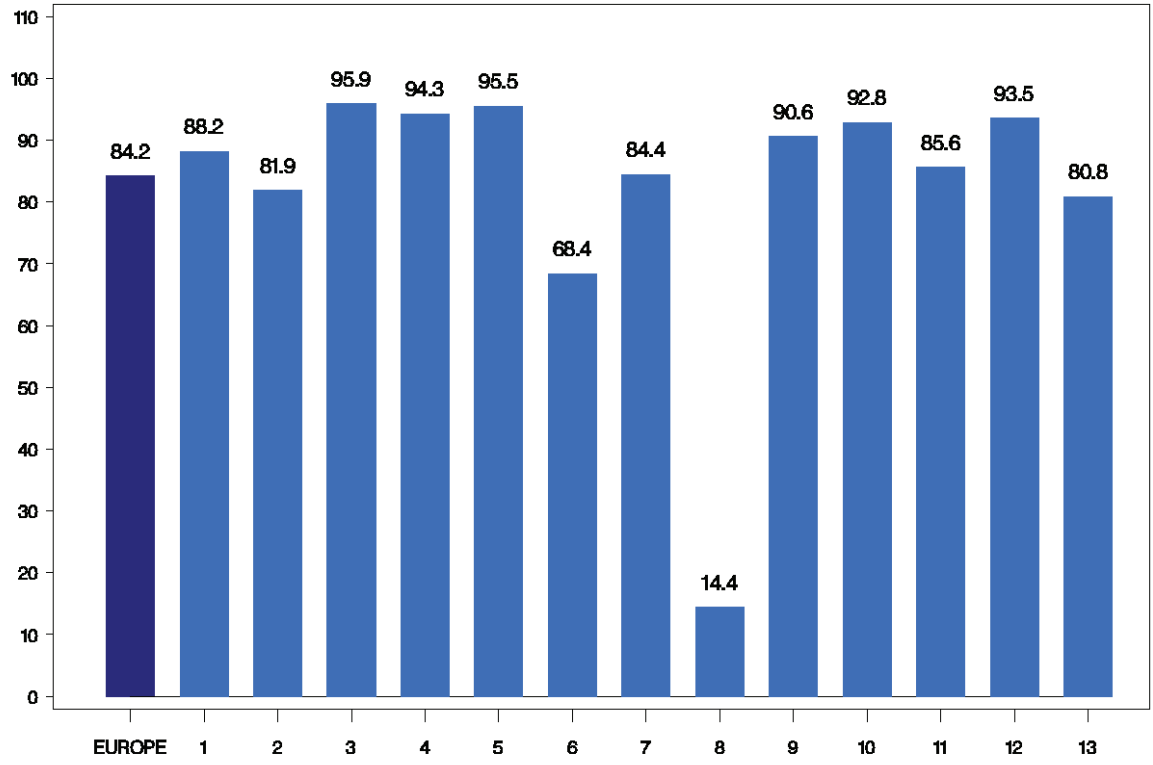
Was arterial blood gas taken on admission?

Although this standard is high in all participating countries, we would expect the number to be 100%. The first actions needed when a patient reaches the emergency department are to provide supplemental oxygen therapy and to determine whether the exacerbation is life threatening. If so, the patients should immediately be admitted to the ICU.

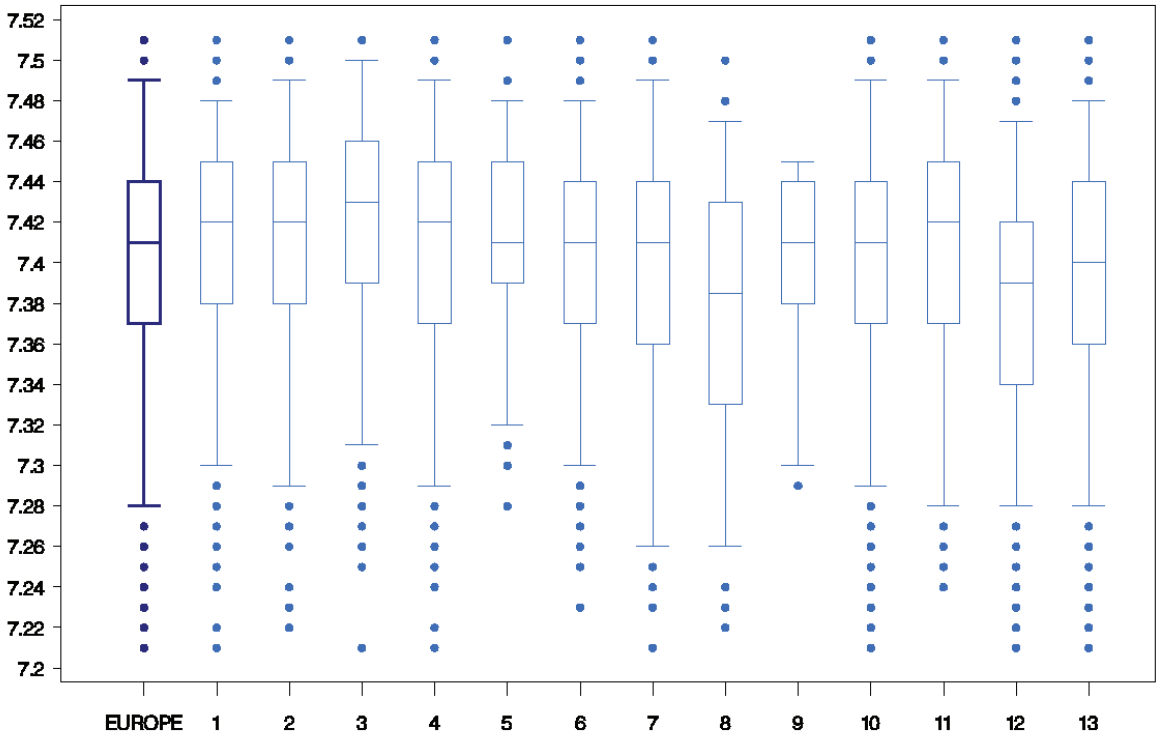
Table 107. Was arterial blood gas taken on admission?

	Arterial blood gas taken on admission			pH		Pa,CO_2			HCO_3 mmol·L^{-1}	
	Patients	N	%	Patients	Median	Patients	Median kPa	Median mmHg	Patients	Median
EUROPE	15488	13041	84.2	12320	7.41	12281	5.85	44.00	11719	27.20
1. Austria	819	722	88.2	694	7.42	687	5.59	42.00	516	26.30
2. Belgium	507	415	81.9	378	7.42	389	5.72	43.00	357	28.00
3. Croatia	441	423	95.9	404	7.43	405	5.59	42.00	396	27.05
4. Greece	1102	1039	94.3	984	7.42	994	5.85	44.00	969	28.00
5. Malta	112	107	95.5	103	7.41	103	5.76	43.30	106	27.40
6. Poland	730	499	68.4	466	7.41	463	5.41	40.70	453	25.30
7. Ireland	231	195	84.4	189	7.41	185	5.89	44.29	182	26.55
8. Romania	611	88	14.4	78	7.39	83	6.24	46.90	69	26.90
9. Slovakia	32	29	90.6	29	7.41	28	5.33	40.04	28	22.95
10. Spain	5182	4810	92.8	4621	7.41	4602	5.99	45.00	4410	28.00
11. Switzerland	278	238	85.6	222	7.42	225	5.40	40.60	215	26.10
12. Turkey	604	565	93.5	542	7.39	545	6.62	49.80	531	28.90
13. UK	4839	3911	80.8	3610	7.40	3572	5.82	43.76	3487	26.80

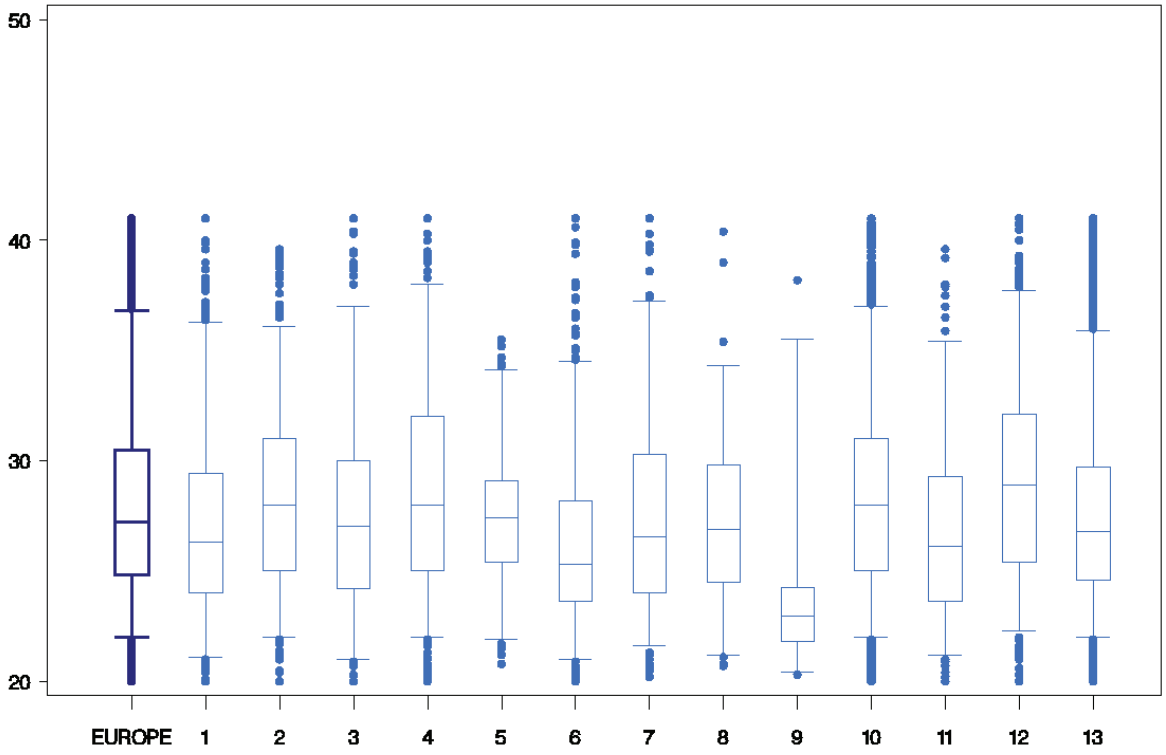
Arterial blood gas taken on admission



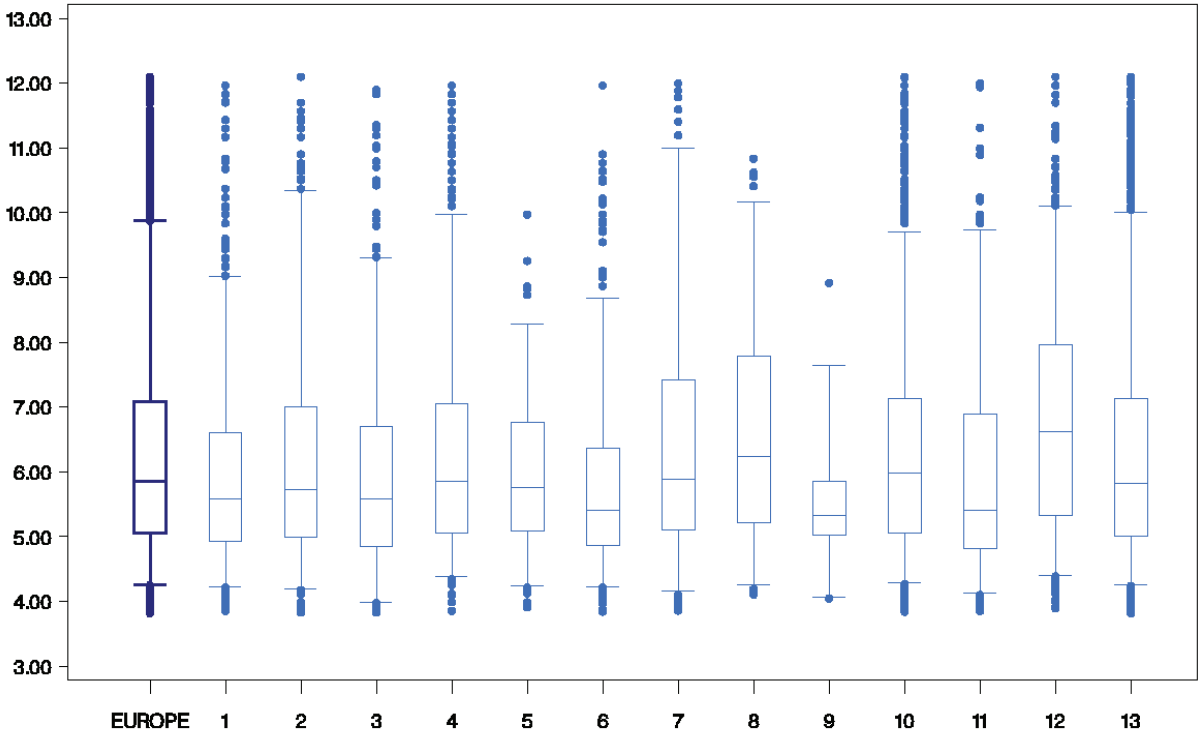
pH

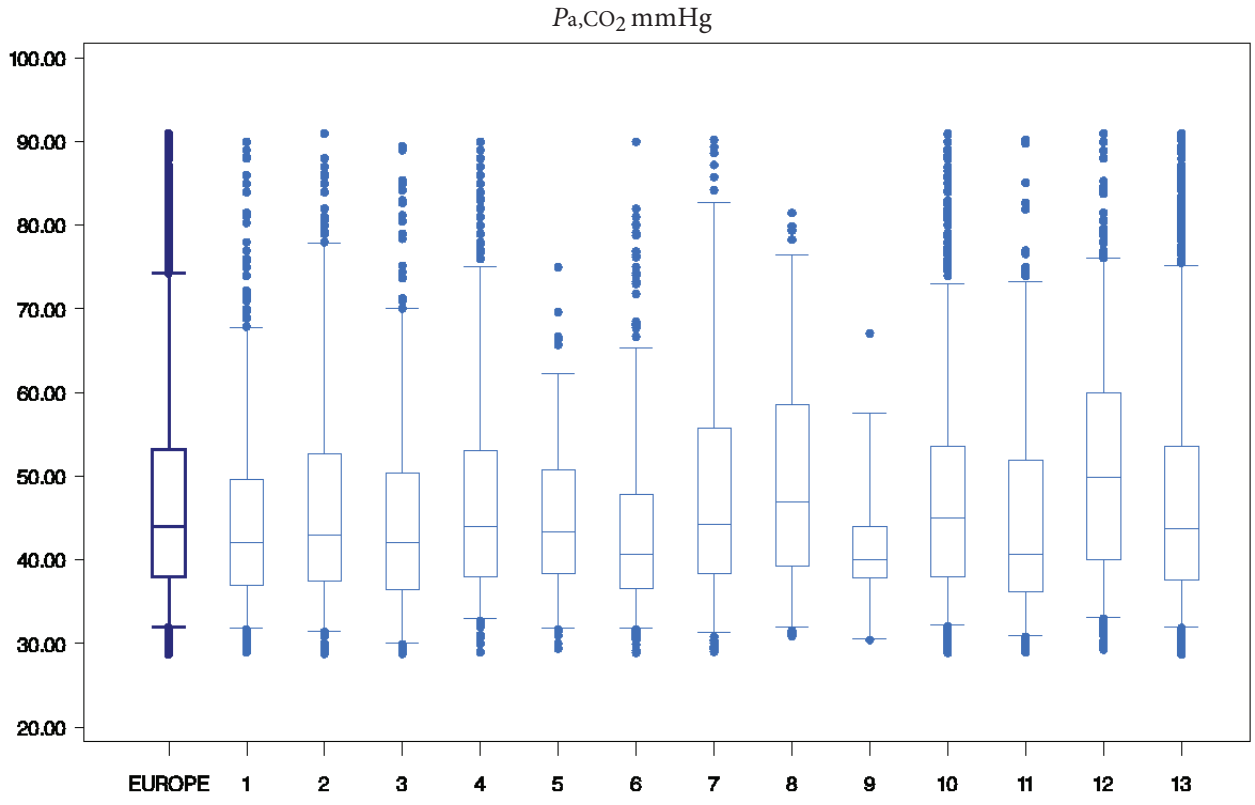


HCO_3 nmol·L^{-1}



P_{a,CO_2} kPa





GOLD 2010: For patients that require hospitalisation, measurement of arterial blood gases is important to assess the severity of an exacerbation. A P_{a,O_2} <8.0 kPa (60 mmHg) and/or S_{a,O_2} <90% with or without P_{a,CO_2} >6.7 kPa (50 mmHg) when breathing room air indicate respiratory failure.

From the *Global Strategy for Diagnosis, Management, and Prevention of COPD updated 2010*, used with permission from the Global Initiative for Chronic Obstructive Lung Disease (GOLD), www.goldcopd.org

Arterial oxygen tension (P_{a,O_2}) values of all patients are a mixture of values taken on room air and/or receiving oxygen on admission. The most severe patients will require supplemental oxygen and cannot be assessed breathing room air.

In 39.9% of the cases the arterial blood gas was taken while patients were on supplemental oxygen.

P_{a,O_2} values

Table 108. P_{a,O_2} (kPa).

	Patients	Median	P25–P75		P5–P95	
EUROPE	12300	7.90	6.92	9.30	5.50	12.50
1. Austria	704	8.53	7.45	9.81	5.99	12.77
2. Belgium	387	8.25	7.18	9.71	5.59	13.07
3. Croatia	396	7.32	6.38	8.67	5.09	10.79
4. Greece	1007	7.71	6.84	8.91	5.45	11.31
5. Malta	97	8.91	7.61	10.27	5.81	12.86
6. Poland	468	7.63	6.73	8.59	5.59	10.08
7. Ireland	183	8.40	7.50	9.99	6.00	12.28
8. Romania	84	7.99	7.03	9.18	5.11	11.20
9. Slovakia	29	7.31	6.38	7.89	5.36	9.36
10. Spain	4586	7.58	6.65	8.66	5.40	11.70
11. Switzerland	217	8.40	7.39	10.19	5.70	14.10
12. Turkey	532	6.96	6.10	8.43	5.01	11.28
13. UK	3610	8.50	7.40	10.10	5.92	14.10

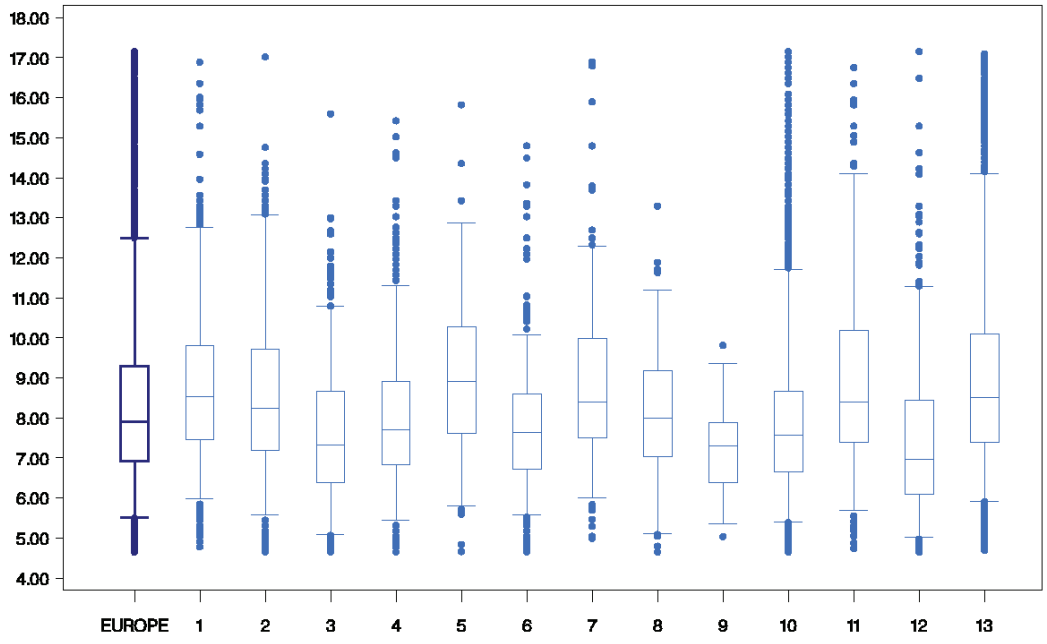
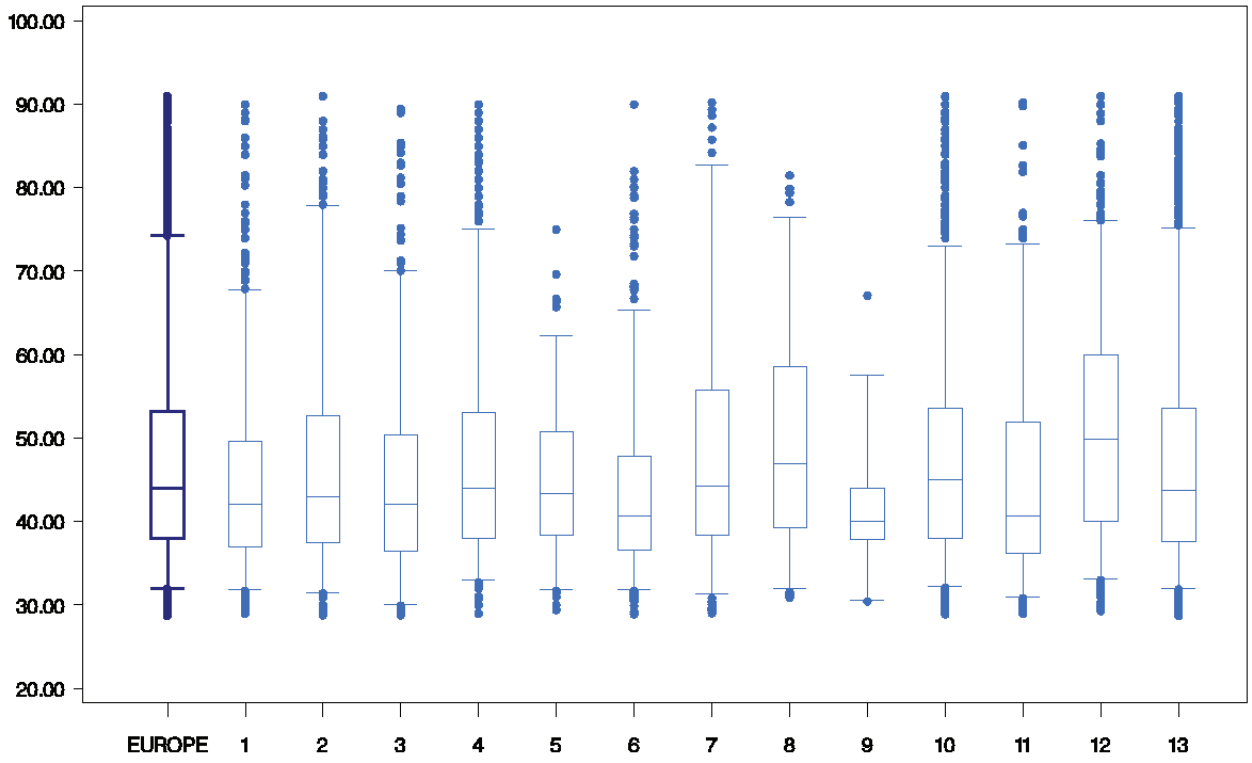


Table 109. Pa,O_2 (mmHg).

	Patients	Median	P25–P75		P5–P95	
EUROPE	12281	44.00	38.00	53.23	32.00	74.29
1. Austria	687	42.00	37.00	49.60	31.80	67.80
2. Belgium	389	43.00	37.50	52.70	31.50	77.80
3. Croatia	405	42.00	36.50	50.38	30.00	70.00
4. Greece	994	44.00	38.00	53.00	33.00	75.00
5. Malta	103	43.30	38.30	50.80	31.90	62.30
6. Poland	463	40.70	36.60	47.80	31.80	65.30
7. Ireland	185	44.29	38.35	55.79	31.28	82.71
8. Romania	83	46.90	39.20	58.50	32.00	76.40
9. Slovakia	28	40.04	37.82	43.98	30.60	57.52
10. Spain	4602	45.00	38.00	53.60	32.20	73.00
11. Switzerland	225	40.60	36.20	51.88	31.00	73.20
12. Turkey	545	49.80	40.00	59.90	33.10	76.00
13. UK	3572	43.76	37.59	53.61	31.95	75.19



Chest radiograph

Any relevant abnormality on chest radiography?

In 98.6% of the cases a chest radiograph was performed on admission.

There is some controversy regarding the diagnosis of exacerbation of COPD in the presence of an abnormal chest radiograph and specifically with radiological consolidation. We have chosen to define an exacerbation as the clinical diagnosis made by the senior clinician admitting the patient. If pneumonia would have been the leading diagnosis, the patient was excluded from the survey. At a later stage we will explore differences in management and in outcomes for patients with an abnormal chest radiograph.

GOLD 2010: Chest radiographs are useful in identifying alternative diagnosis that can mimic the symptoms of an exacerbation. Although the history and physical signs can be confusing, most problems are resolved by chest radiography and/or ECG.

From the *Global Strategy for Diagnosis, Management, and Prevention of COPD updated 2010*, used with permission from the Global Initiative for Chronic Obstructive Lung Disease (GOLD), www.goldcopd.org

Table 110. Chest radiograph performed on admission.

	Patients	Number	%
EUROPE	15821	15593	98.6
1. Austria	823	807	98.1
2. Belgium	512	507	99.0
3. Croatia	445	442	99.3
4. Greece	1133	1115	98.4
5. Malta	112	112	100.0
6. Poland	734	664	90.5
7. Ireland	237	235	99.2
8. Romania	629	612	97.3
9. Slovakia	32	32	100.0
10. Spain	5271	5241	99.4
11. Switzerland	295	287	97.3
12. Turkey	612	610	99.7
13. UK	4986	4929	98.8

Table 111. Chest radiograph normal.

	Patients	Number	%
EUROPE	15821	3507	22.2
1. Austria	823	193	23.5
2. Belgium	512	129	25.2
3. Croatia	445	56	12.6
4. Greece	1133	127	11.2
5. Malta	112	28	25.0
6. Poland	734	145	19.8
7. Ireland	237	39	16.5
8. Romania	629	47	7.5
9. Slovakia	32	5	15.6
10. Spain	5271	1562	29.6
11. Switzerland	295	59	20.0
12. Turkey	612	57	9.3
13. UK	4986	1060	21.3

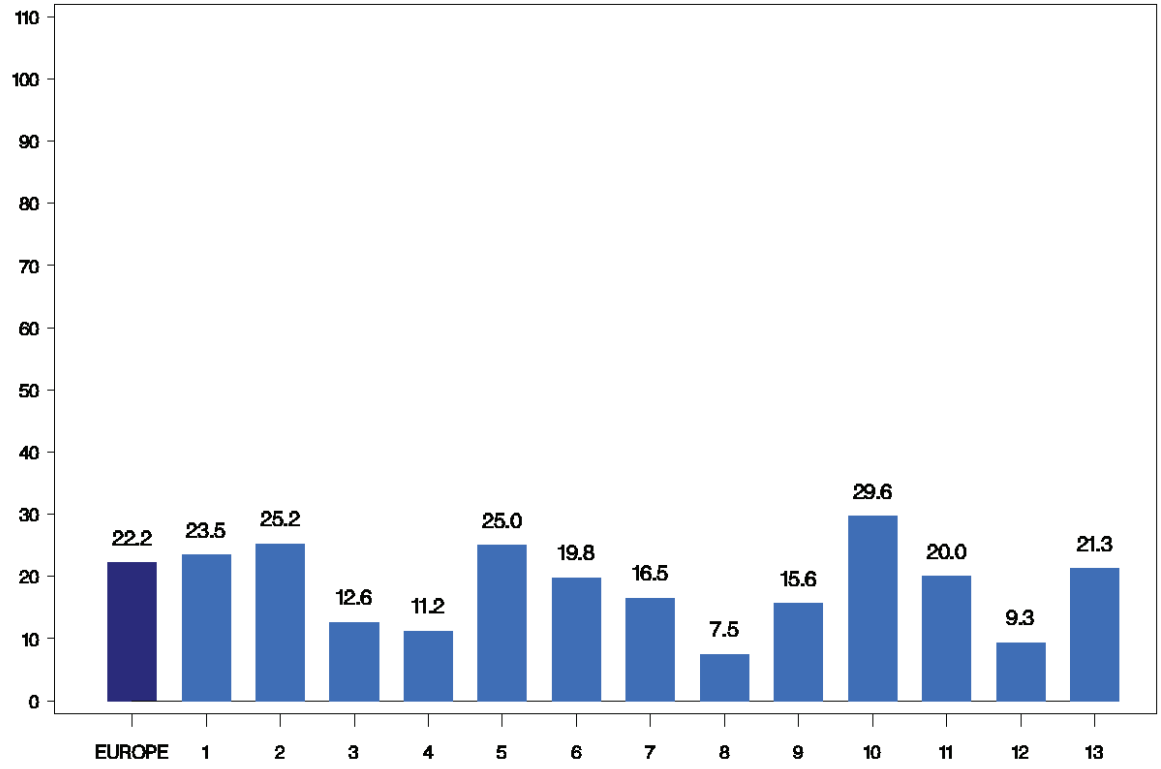


Table 112. Bronchiectasis on chest radiograph.

	Patients	Number	%
EUROPE	15821	868	5.5
1. Austria	823	12	1.5
2. Belgium	512	25	4.9
3. Croatia	445	67	15.1
4. Greece	1133	138	12.2
5. Malta	112	1	0.9
6. Poland	734	34	4.6
7. Ireland	237	7	3.0
8. Romania	629	74	11.8
9. Slovakia	32	2	6.3
10. Spain	5271	359	6.8
11. Switzerland	295	5	1.7
12. Turkey	612	51	8.3
13. UK	4986	93	1.9

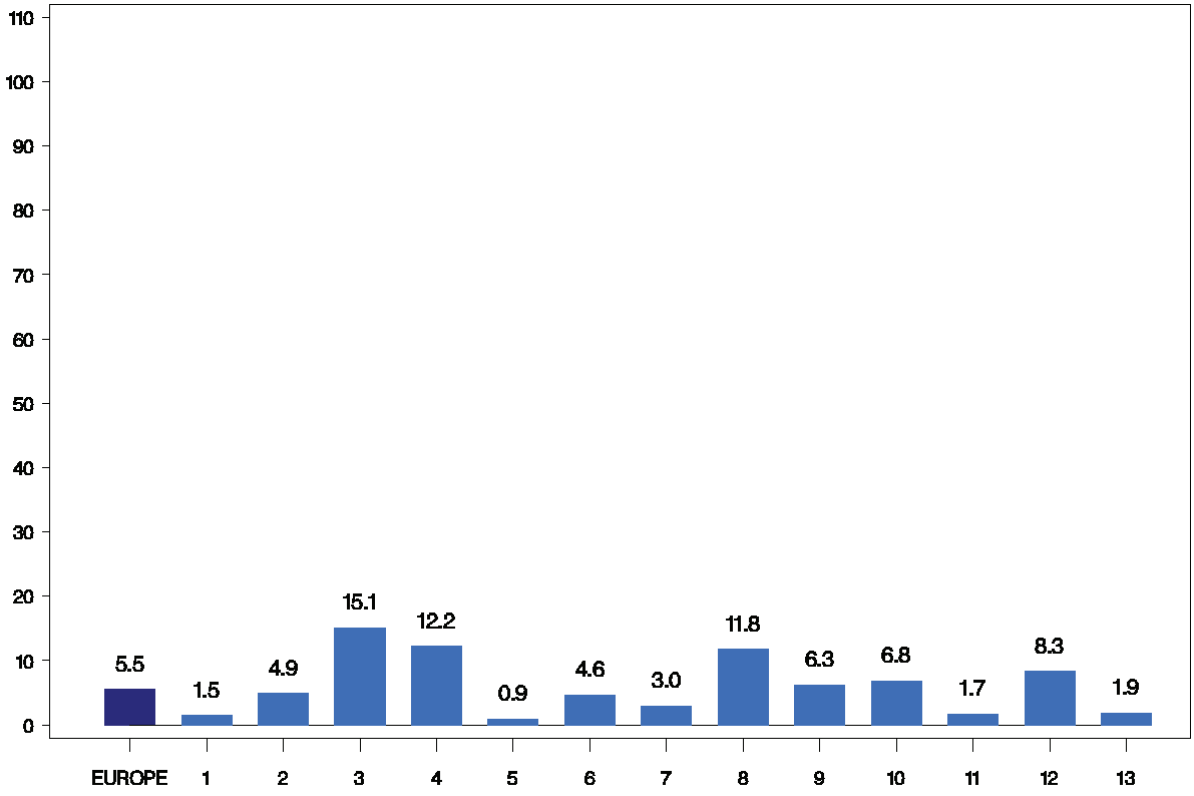


Table 113. Chest radiograph hyperinflation.

	Patients	Number	%
EUROPE	15821	5351	33.8
1. Austria	823	368	44.7
2. Belgium	512	149	29.1
3. Croatia	445	217	48.8
4. Greece	1133	468	41.3
5. Malta	112	25	22.3
6. Poland	734	219	29.8
7. Ireland	237	79	33.3
8. Romania	629	361	57.4
9. Slovakia	32	10	31.3
10. Spain	5271	1423	27.0
11. Switzerland	295	76	25.8
12. Turkey	612	271	44.3
13. UK	4986	1685	33.8

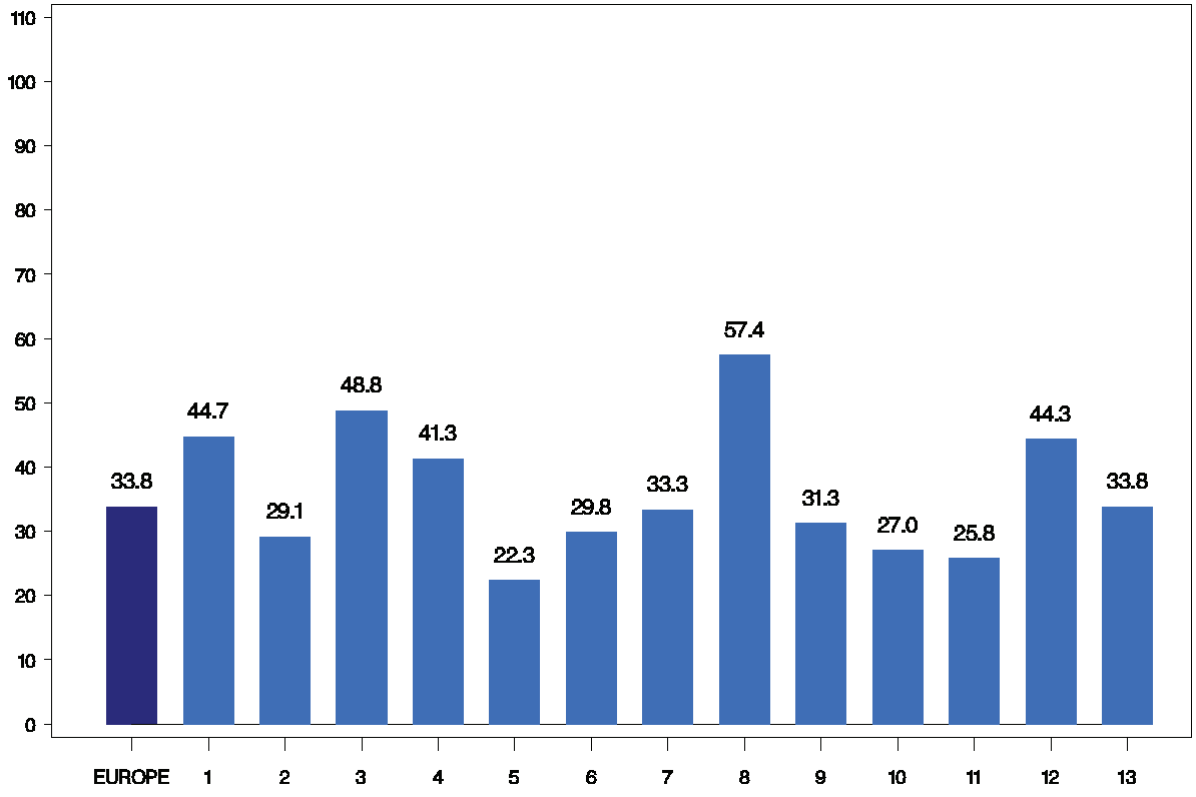


Table 114. Alveolar consolidation on chest radiograph.

	Patients	Number	%
EUROPE	15821	1031	6.5
1. Austria	823	71	8.6
2. Belgium	512	71	13.9
3. Croatia	445	36	8.1
4. Greece	1133	149	13.2
5. Malta	112	1	0.9
6. Poland	734	65	8.9
7. Ireland	237	17	7.2
8. Romania	629	107	17.0
9. Slovakia	32	8	25.0
10. Spain	5271	235	4.5
11. Switzerland	295	38	12.9
12. Turkey	612	56	9.2
13. UK	4986	177	3.5

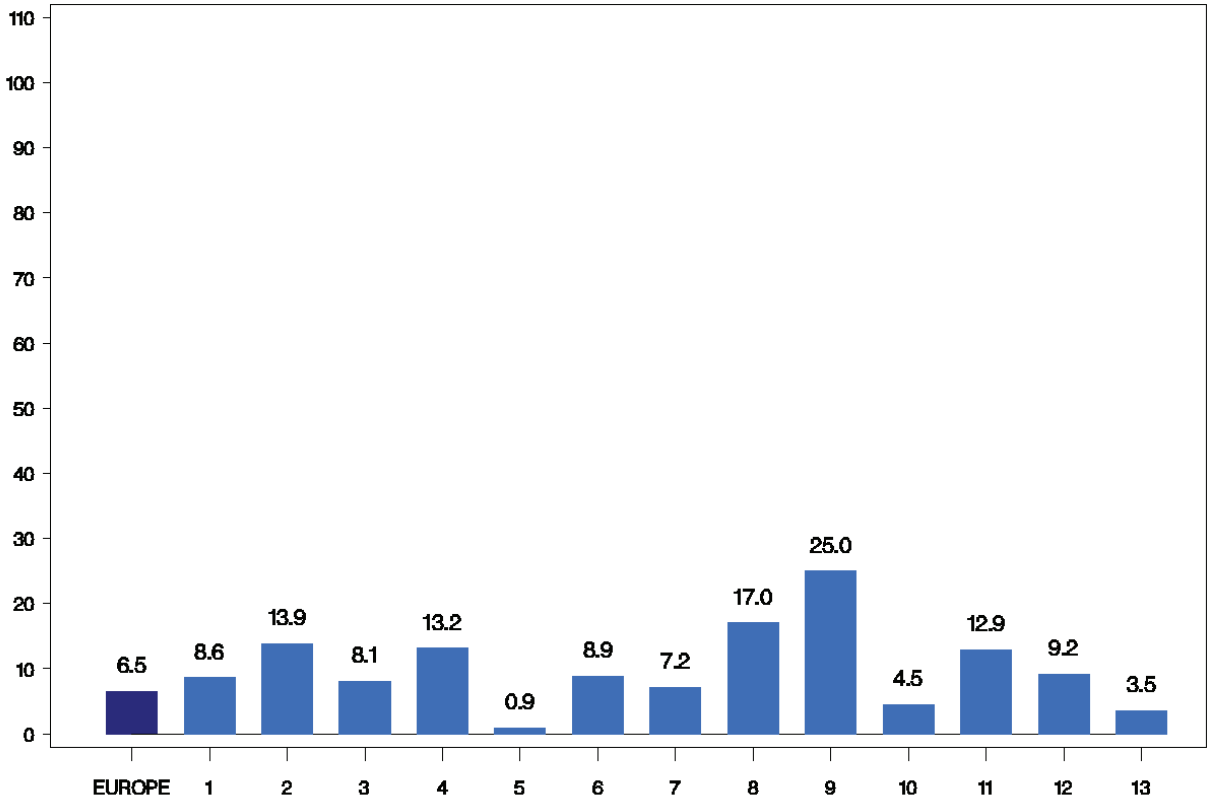


Table 115. Consolidation on chest radiograph.

	Patients	Number	%
EUROPE	15821	2930	18.5
1. Austria	823	147	17.9
2. Belgium	512	99	19.3
3. Croatia	445	75	16.9
4. Greece	1133	260	22.9
5. Malta	112	10	8.9
6. Poland	734	183	24.9
7. Ireland	237	73	30.8
8. Romania	629	205	32.6
9. Slovakia	32	12	37.5
10. Spain	5271	469	8.9
11. Switzerland	295	71	24.1
12. Turkey	612	149	24.3
13. UK	4986	1177	23.6

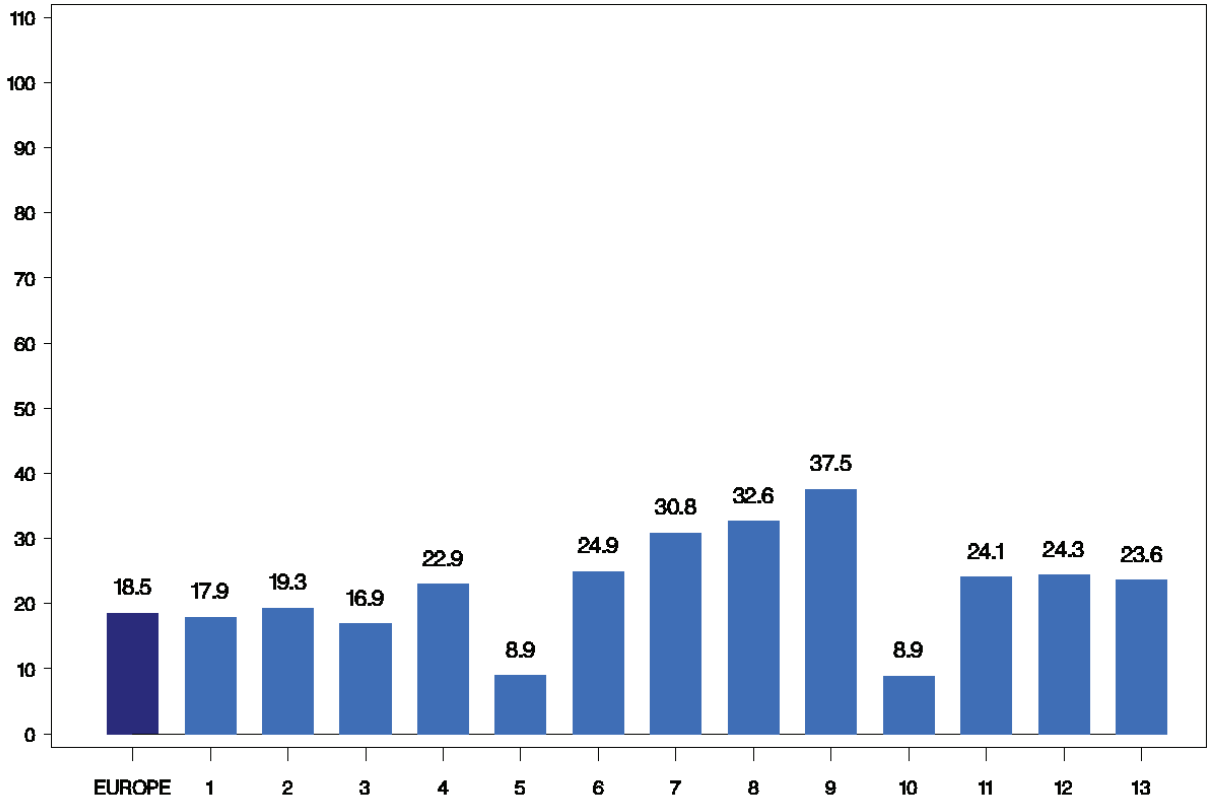


Table 116. Pleural effusion on chest radiograph.

	Patients	Number	%
EUROPE	15821	447	2.8
1. Austria	823	22	2.7
2. Belgium	512	21	4.1
3. Croatia	445	5	1.1
4. Greece	1133	35	3.1
5. Malta	112	3	2.7
6. Poland	734	11	1.5
7. Ireland	237	6	2.5
8. Romania	629	7	1.1
9. Slovakia	32	1	3.1
10. Spain	5271	181	3.4
11. Switzerland	295	29	9.8
12. Turkey	612	21	3.4
13. UK	4986	105	2.1

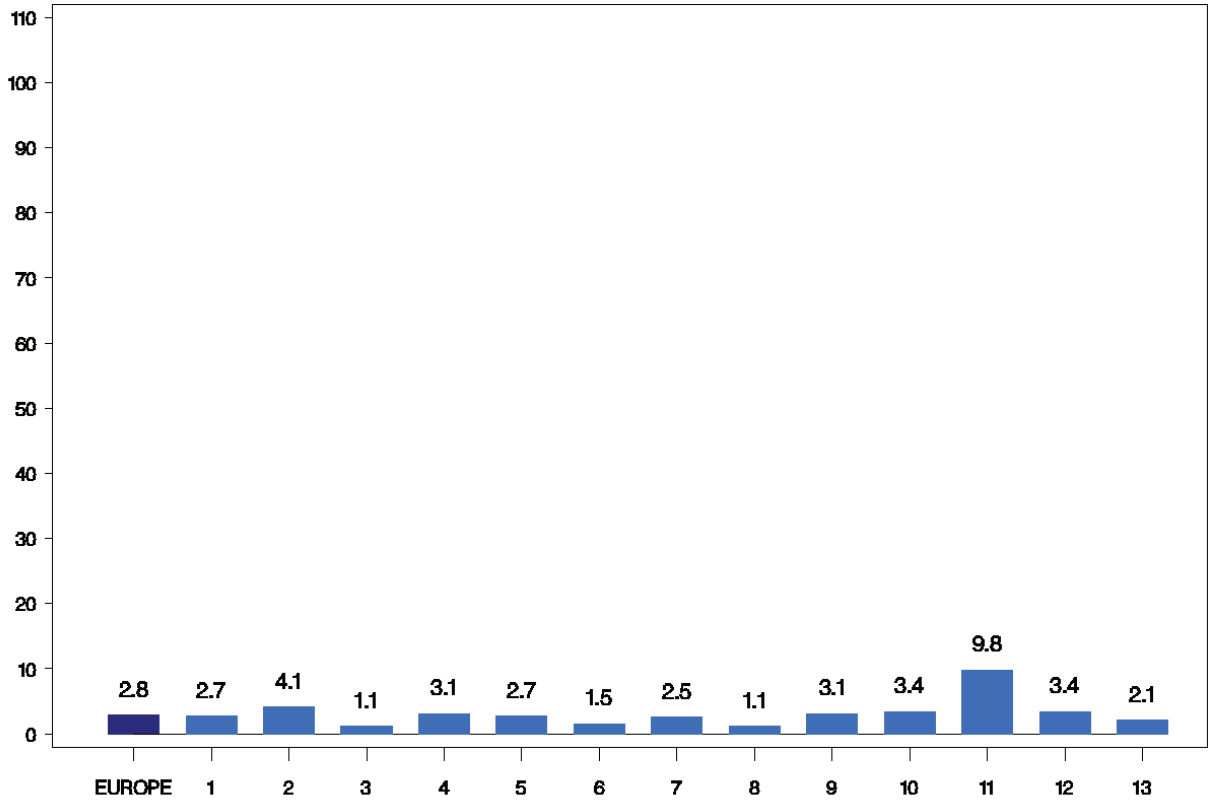


Table 117. Pneumothorax on chest radiograph.

	Patients	Number	%
EUROPE	15821	33	0.2
1. Austria	823	0	0.0
2. Belgium	512	2	0.4
3. Croatia	445	2	0.4
4. Greece	1133	2	0.2
5. Malta	112	0	0.0
6. Poland	734	5	0.7
7. Ireland	237	0	0.0
8. Romania	629	0	0.0
9. Slovakia	32	0	0.0
10. Spain	5271	7	0.1
11. Switzerland	295	0	0.0
12. Turkey	612	0	0.0
13. UK	4986	15	0.3

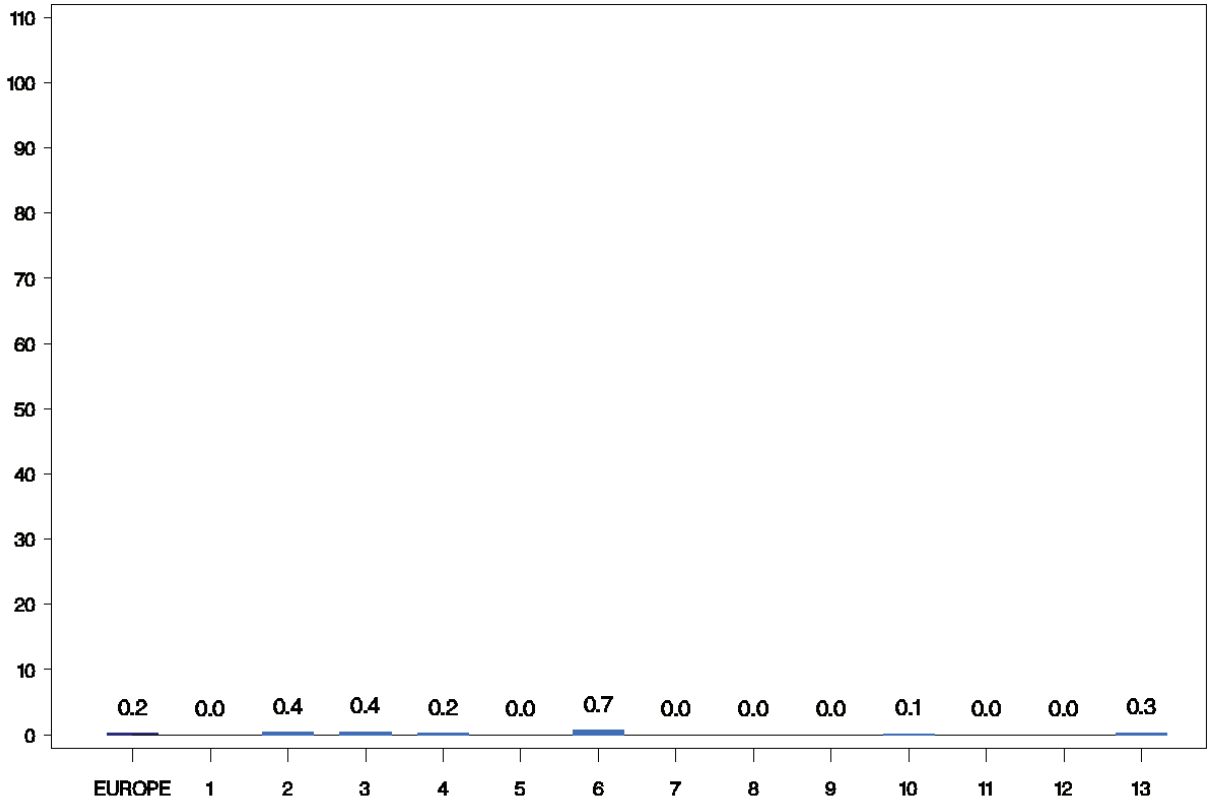


Table 118. Interstitial disease on chest radiograph.

	Patients	Number	%
EUROPE	15821	793	5.0
1. Austria	823	51	6.2
2. Belgium	512	31	6.1
3. Croatia	445	48	10.8
4. Greece	1133	36	3.2
5. Malta	112	27	24.1
6. Poland	734	31	4.2
7. Ireland	237	7	3.0
8. Romania	629	190	30.2
9. Slovakia	32	2	6.3
10. Spain	5271	164	3.1
11. Switzerland	295	27	9.2
12. Turkey	612	36	5.9
13. UK	4986	143	2.9

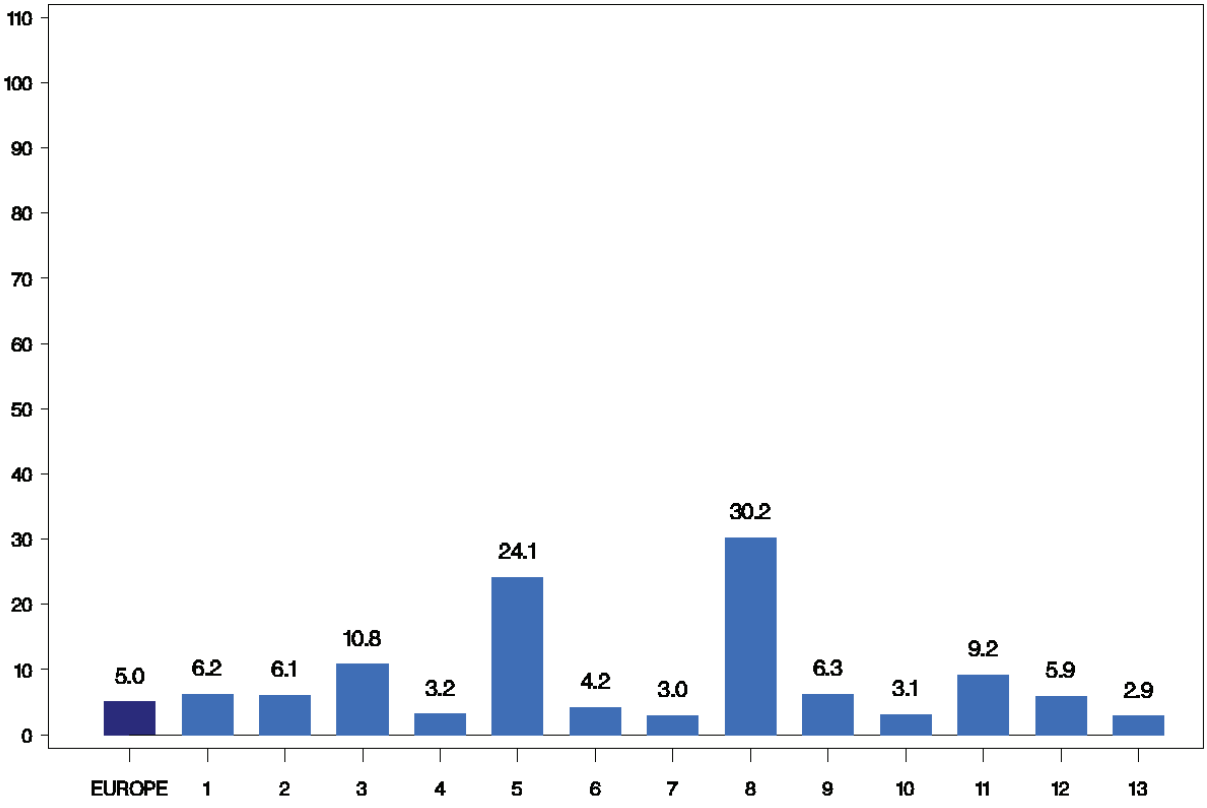


Table 119. Lung cancer on chest radiograph.

	Patients	Number	%
EUROPE	15821	385	2.4
1. Austria	823	16	1.9
2. Belgium	512	10	2.0
3. Croatia	445	20	4.5
4. Greece	1133	57	5.0
5. Malta	112	1	0.9
6. Poland	734	39	5.3
7. Ireland	237	7	3.0
8. Romania	629	11	1.7
9. Slovakia	32	0	0.0
10. Spain	5271	70	1.3
11. Switzerland	295	5	1.7
12. Turkey	612	13	2.1
13. UK	4986	136	2.7

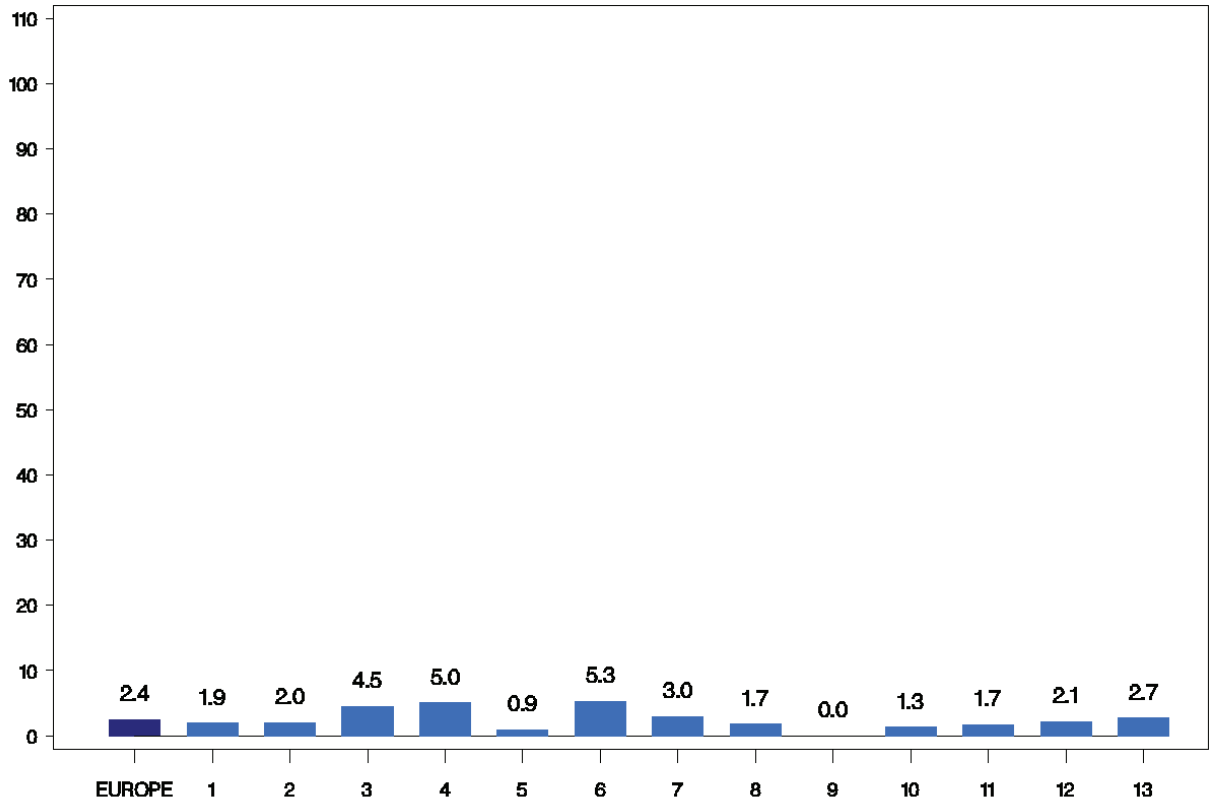
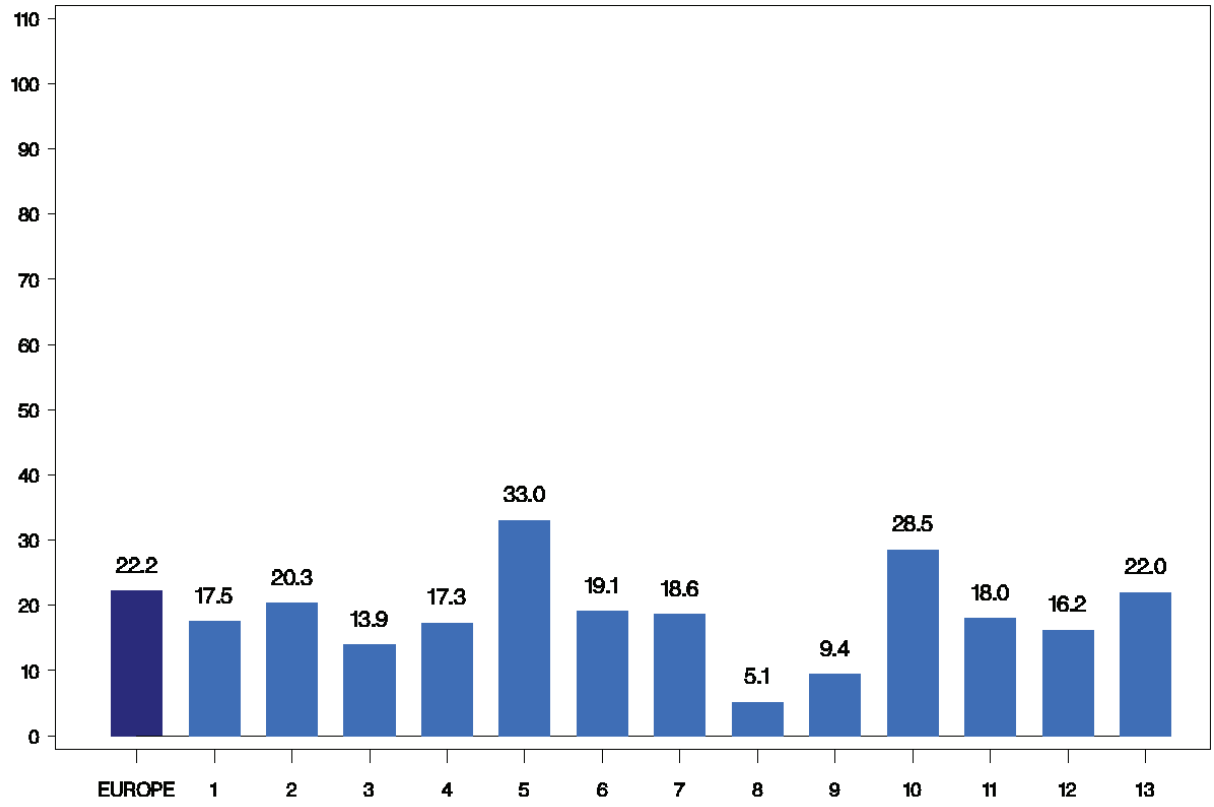


Table 120. Chest radiograph: other result.

	Patients	Number	%
EUROPE	15821	3512	22.2
1. Austria	823	144	17.5
2. Belgium	512	104	20.3
3. Croatia	445	62	13.9
4. Greece	1133	196	17.3
5. Malta	112	37	33.0
6. Poland	734	140	19.1
7. Ireland	237	44	18.6
8. Romania	629	32	5.1
9. Slovakia	32	3	9.4
10. Spain	5271	1502	28.5
11. Switzerland	295	53	18.0
12. Turkey	612	99	16.2
13. UK	4986	1096	22.0



Pharmacological treatment during admission

GOLD 2010

1) Assess the severity of symptoms, blood gases and chest radiograph
2) Administer controlled oxygen therapy and repeat arterial blood gas measurement after 30–60 minutes
3) Bronchodilators:
    a) Increase dosed and/or frequency
    b) Combine β_2-agonists and anticholinergics
    c) Use spacers or air-driven nebulisers
    d) Consider adding intravenous methylxanthines, if needed
4) Add inhaled or systemic corticosteroids (glucocorticosteroids)
5) Consider antibiotics (oral or occasionally intravenous) when signs of bacterial infection (minimum two cardinal symptoms of which one is colour change of sputum)
6) Consider non-invasive mechanical ventilation
7) At all times:
    a) Monitor fluid balance and nutrition
    b) Consider subcutaneous heparin
    c) Identify and treat associated conditions (*e.g.* heart failure and arrhythmias)
    d) Closely monitor condition of the patient

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What was the treatment for exacerbation during admission?

The treatment for the exacerbation during hospital stay in this COPD audit varied widely. Most of the patients received short-acting β2-agonists (84.8%), systemic corticosteroids (82.3%) and short-acting anticholinergics (77.7%).

Table 121. Pharmacological treatment during admission to treat the exacerbation: short-acting β_2-agonists.

	Patients	Number	%
EUROPE	15821	13423	84.8
1. Austria	823	616	74.8
2. Belgium	512	446	87.1
3. Croatia	445	157	35.3
4. Greece	1133	1006	88.8
5. Malta	112	112	100.0
6. Poland	734	477	65.0
7. Ireland	237	214	90.3
8. Romania	629	399	63.4
9. Slovakia	32	12	37.5
10. Spain	5271	4679	88.8
11. Switzerland	295	233	79.0
12. Turkey	612	586	95.8
13. UK	4986	4486	90.0

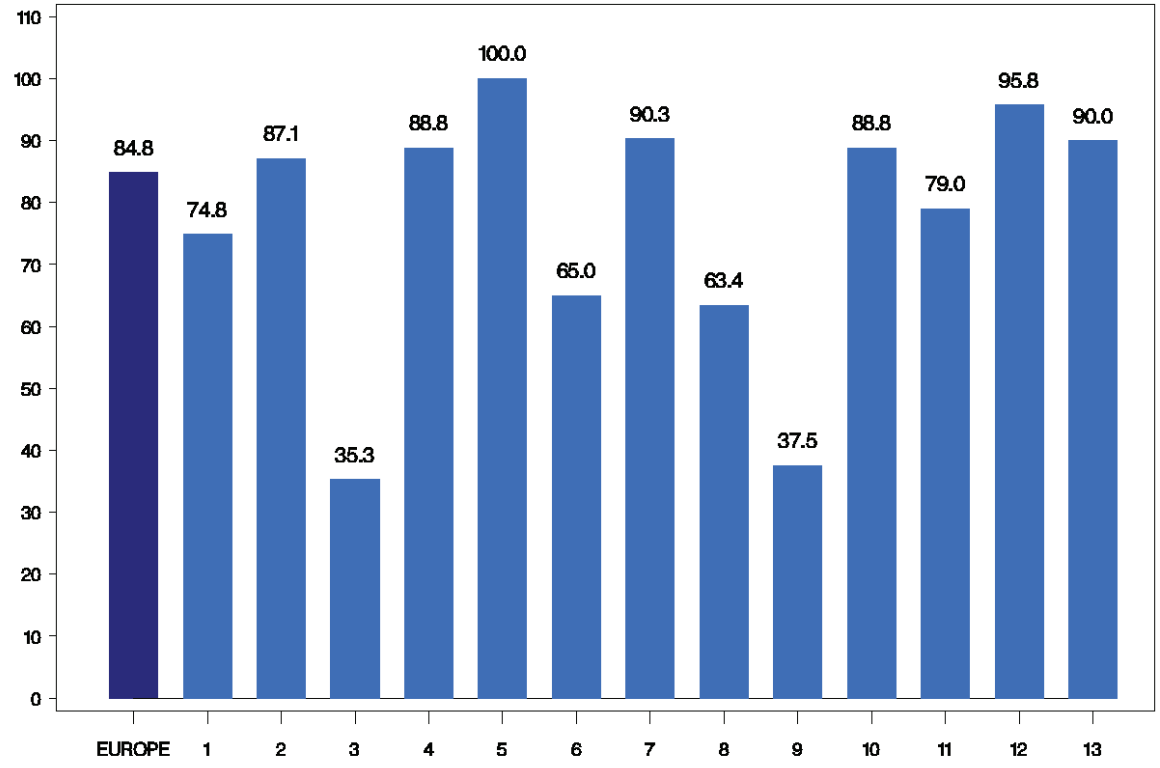


Table 122. Pharmacological treatment during admission to treat the exacerbation: short-acting muscarinic antagonist.

	Patients	Number	%
EUROPE	15821	12294	77.7
1. Austria	823	415	50.4
2. Belgium	512	431	84.2
3. Croatia	445	298	67.0
4. Greece	1133	968	85.4
5. Malta	112	112	100.0
6. Poland	734	514	70.0
7. Ireland	237	196	82.7
8. Romania	629	154	24.5
9. Slovakia	32	17	53.1
10. Spain	5271	4817	91.4
11. Switzerland	295	221	74.9
12. Turkey	612	566	92.5
13. UK	4986	3585	71.9

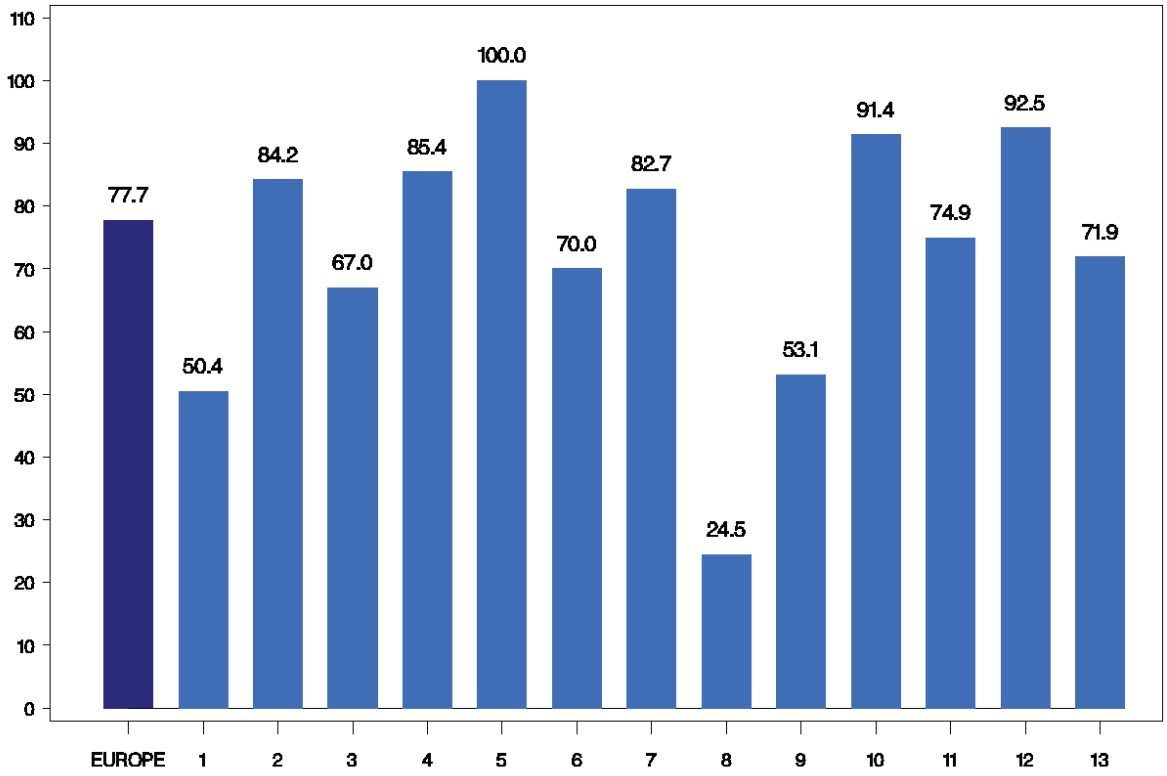


Table 123. Pharmacological treatment during admission to treat the exacerbation: inhaled corticosteroids.

	Patients	Number	%
EUROPE	15821	5396	34.1
1. Austria	823	389	47.3
2. Belgium	512	319	62.3
3. Croatia	445	155	34.8
4. Greece	1133	934	82.4
5. Malta	112	54	48.2
6. Poland	734	394	53.7
7. Ireland	237	95	40.1
8. Romania	629	233	37.0
9. Slovakia	32	18	56.3
10. Spain	5271	985	18.7
11. Switzerland	295	46	15.6
12. Turkey	612	379	61.9
13. UK	4986	1395	28.0

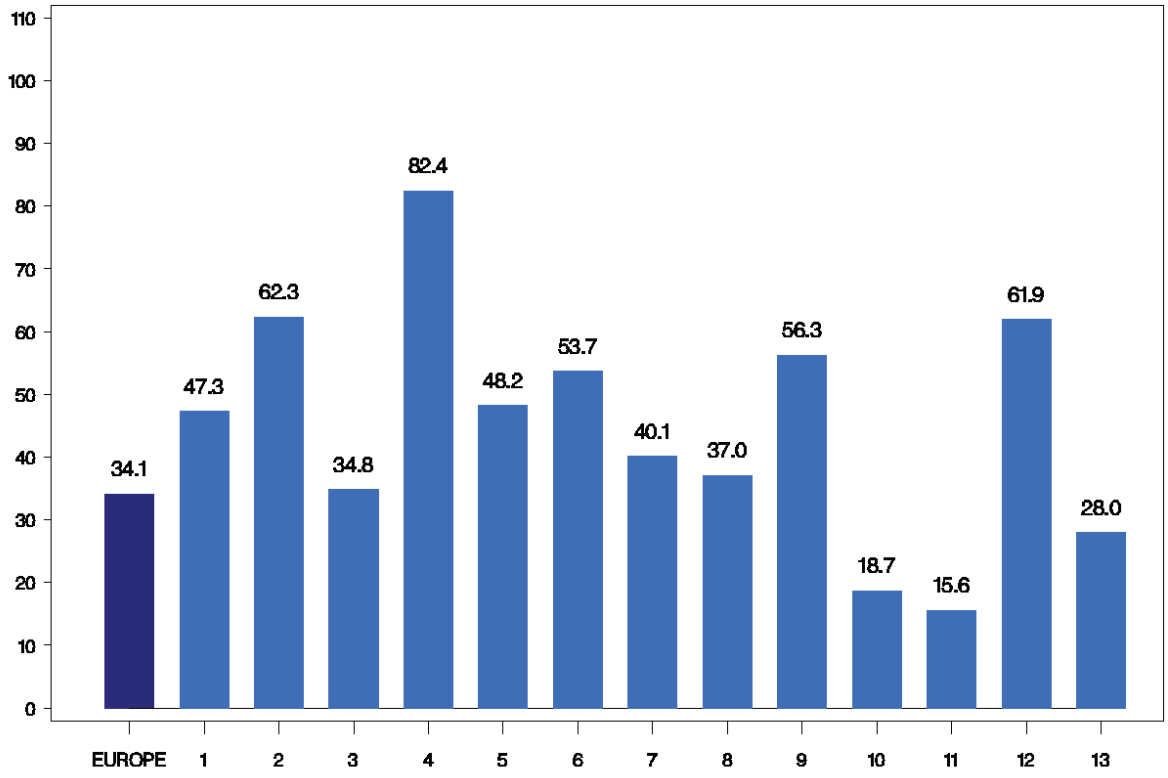
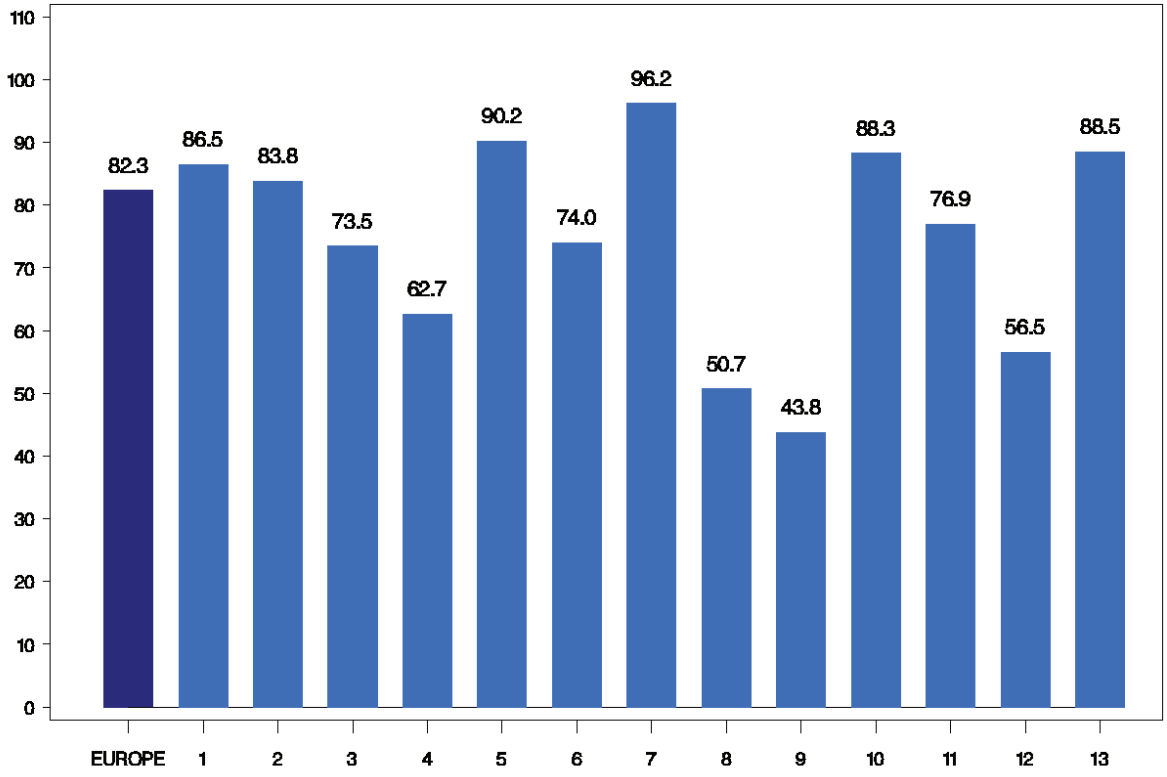


Table 124. Pharmacological treatment during admission to treat the exacerbation: systemic corticosteroids.

	Patients	Number	%
EUROPE	15821	13022	82.3
1. Austria	823	712	86.5
2. Belgium	512	429	83.8
3. Croatia	445	327	73.5
4. Greece	1133	710	62.7
5. Malta	112	101	90.2
6. Poland	734	543	74.0
7. Ireland	237	228	96.2
8. Romania	629	319	50.7
9. Slovakia	32	14	43.8
10. Spain	5271	4653	88.3
11. Switzerland	295	227	76.9
12. Turkey	612	346	56.5
13. UK	4986	4413	88.5



Despite their widespread clinical use, the role of methylxanthines in the treatment of exacerbations of COPD remains controversial. Possible beneficial effects in terms of lung function and clinical end-points are modest and inconsistent, whereas adverse affects are significant (GOLD, 2010).

Table 125. Pharmacological treatment during admission to treat the exacerbation: theophylline.

	Patients	Number	%
EUROPE	15821	2262	14.3
1. Austria	823	337	40.9
2. Belgium	512	29	5.7
3. Croatia	445	382	85.8
4. Greece	1133	227	20.0
5. Malta	112	0	0.0
6. Poland	734	355	48.4
7. Ireland	237	1	0.4
8. Romania	629	214	34.0
9. Slovakia	32	9	28.1
10. Spain	5271	137	2.6
11. Switzerland	295	3	1.0
12. Turkey	612	311	50.8
13. UK	4986	257	5.2

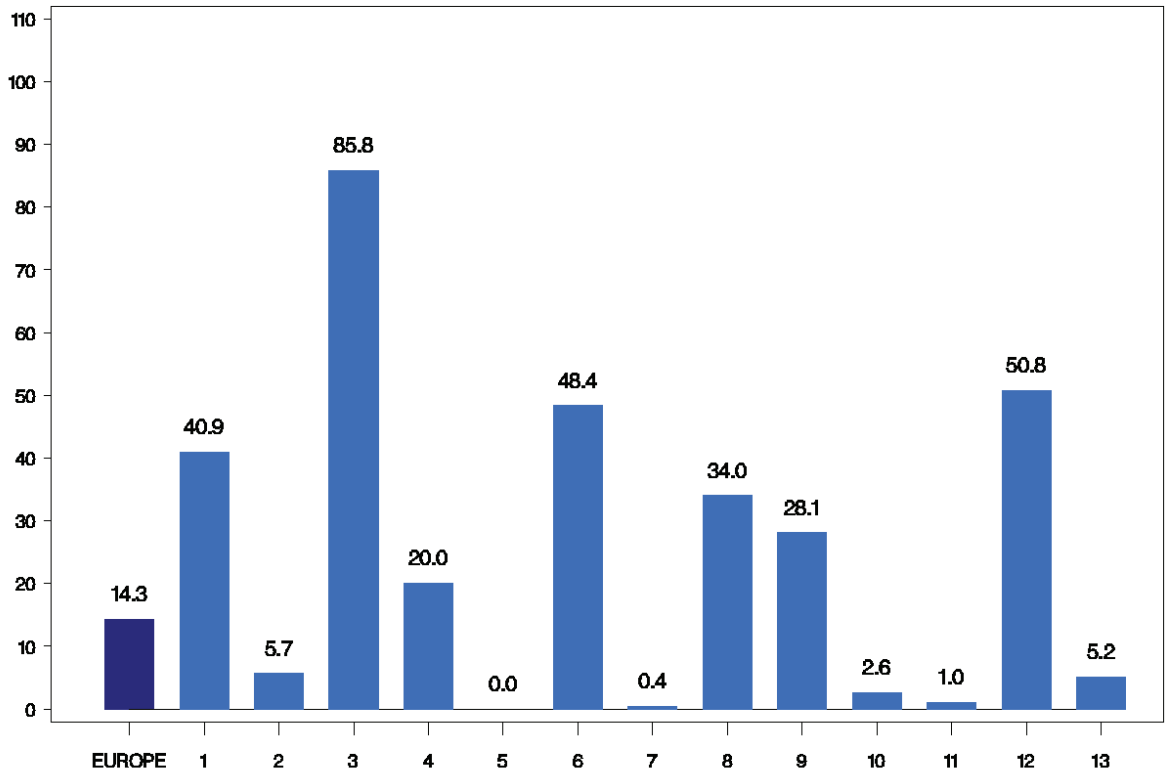
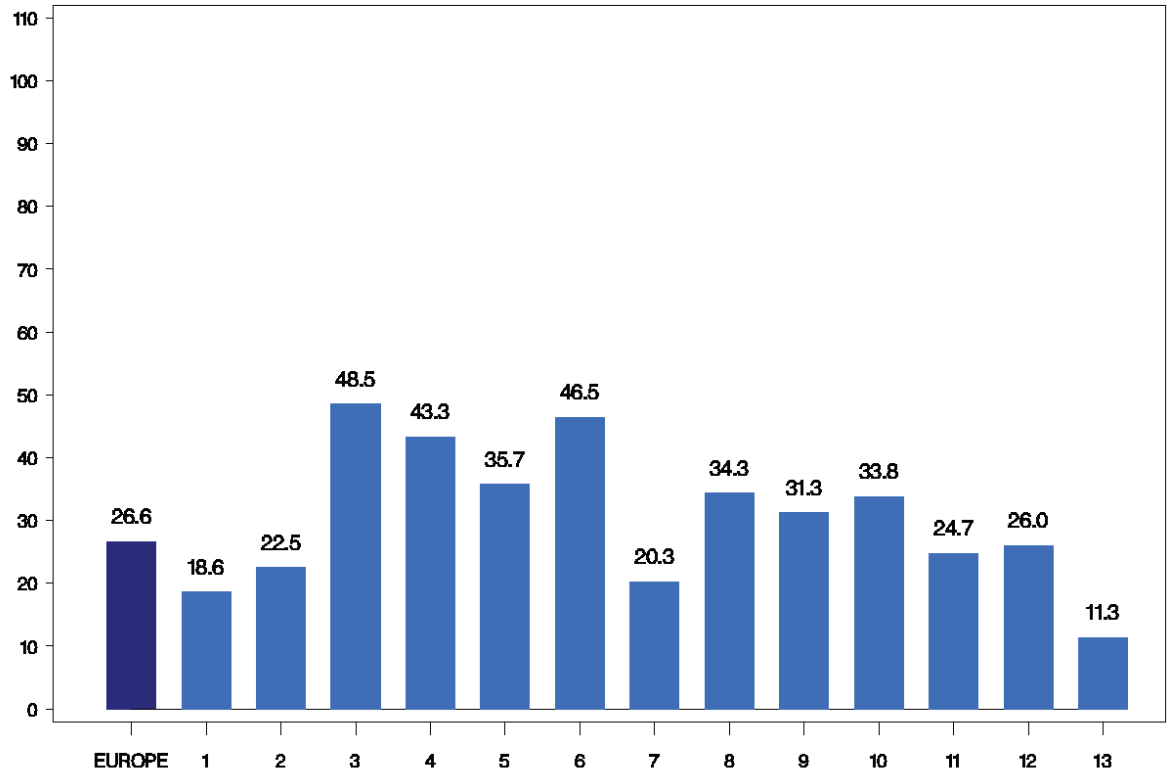


Table 126. Pharmacological treatment during admission to treat the exacerbation: diuretics.

	Patients	Number	%
EUROPE	15821	4208	26.6
1. Austria	823	153	18.6
2. Belgium	512	115	22.5
3. Croatia	445	216	48.5
4. Greece	1133	491	43.3
5. Malta	112	40	35.7
6. Poland	734	341	46.5
7. Ireland	237	48	20.3
8. Romania	629	216	34.3
9. Slovakia	32	10	31.3
10. Spain	5271	1781	33.8
11. Switzerland	295	73	24.7
12. Turkey	612	159	26.0
13. UK	4986	565	11.3



GOLD 2010: Antibiotics should be given to:

- Patients with exacerbations of COPD with the following three cardinal symptoms: increased dyspnoea, increased sputum volume and increased sputum colour change
- Patients with exacerbations of COPD with two of the cardinal symptoms, if increased colour change of sputum is one of the two symptoms
- Patients with a severe exacerbation of COPD that requires mechanical ventilation (invasive or non-invasive)

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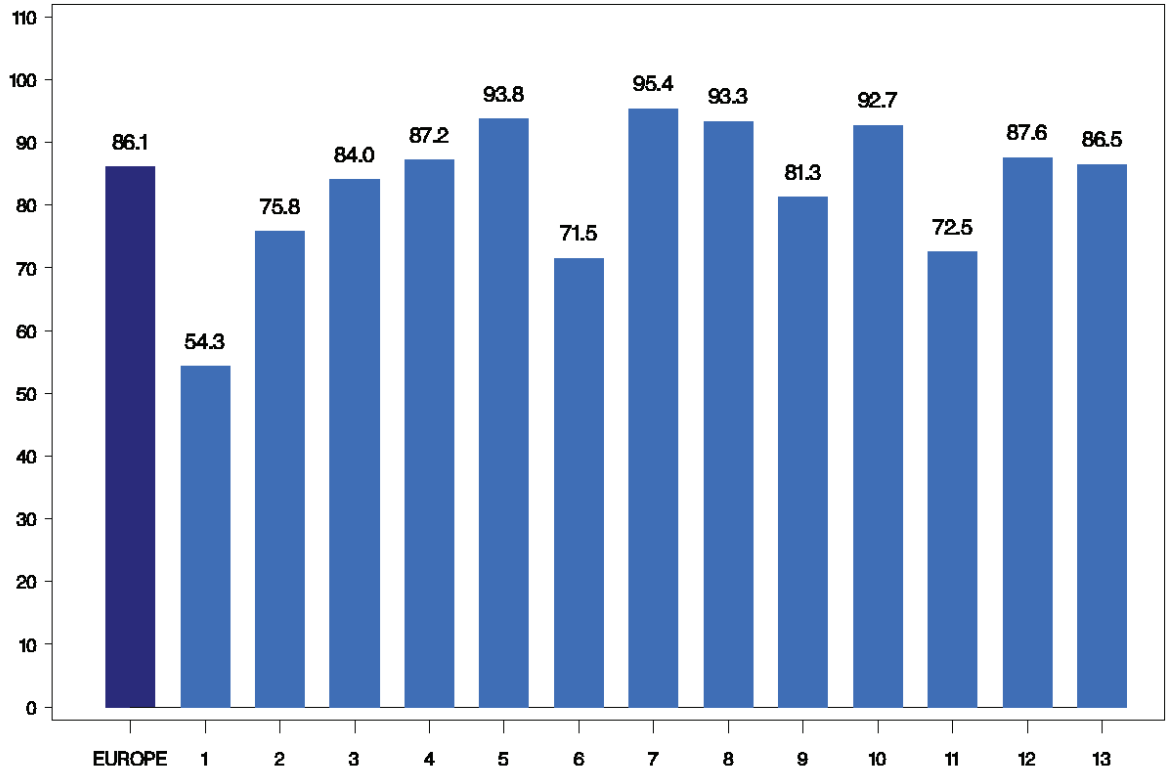
Table 127. Antibiotic treatment for exacerbations.

	Patients	Number	%
EUROPE	15821	13616	86.1
1. Austria	823	447	54.3
2. Belgium	512	388	75.8
3. Croatia	445	374	84.0
4. Greece	1133	988	87.2
5. Malta	112	105	93.8
6. Poland	734	525	71.5
7. Ireland	237	226	95.4
8. Romania	629	587	93.3
9. Slovakia	32	26	81.3
10. Spain	5271	4888	92.7
11. Switzerland	295	214	72.5
12. Turkey	612	536	87.6
13. UK	4986	4312	86.5



Oxygen during admission

GOLD 2010: Oxygen is the cornerstone of hospital treatment of COPD exacerbations.

Short-acting inhaled β_2-agonists are usually the preferred bronchodilators for treatment of exacerbations of COPD. If a prompt response to these drugs does not occur, the addition of an anticholinergic is recommended. Inhaled or systemic corticosteroids are recommended as an addition to other therapies in the hospital management of exacerbations of COPD.

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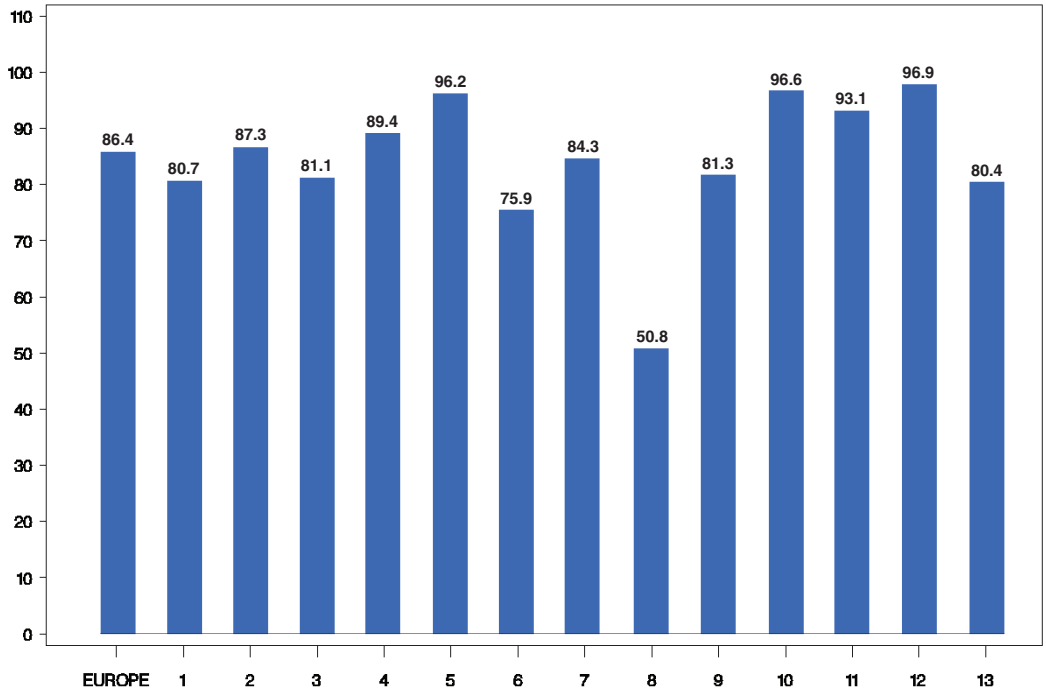
Was oxygen provided during admission?

Oxygen therapy is a standard treatment for hypoxaemic patients. While high flow oxygen may be indicated for severely ill patients as part of intensive management, it may also precipitate type II respiratory failure in patients predisposed and is not advised as standard management, which should consist of controlled oxygen therapy defined in the audit as less than 35% fraction of inspired oxygen (F_{i,O_2}) or less than 4 L·min^{-1} by cannulae. For severe exacerbations it is recommended to receive oxygen on admission. The fraction of 35% F_{i,O_2} is defined as high flow oxygen expressing a serious condition of the patient.

Table 128. Oxygen for exacerbation during admission.

	Patients	Number	%
EUROPE	15572	13450	86.4
1. Austria	814	657	80.7
2. Belgium	504	440	87.3
3. Croatia	445	361	81.1
4. Greece	1122	1003	89.4
5. Malta	105	101	96.2
6. Poland	730	554	75.9
7. Ireland	229	193	84.3
8. Romania	622	316	50.8
9. Slovakia	32	26	81.3
10. Spain	5186	5009	96.6
11. Switzerland	277	258	93.1
12. Turkey	612	593	96.9
13. UK	4894	3939	80.4



What was the amount of oxygen provided during admission?

Table 129. Oxygen less than 35% or 4 L·min^{-1} provided during admission.

	Patients	Number	%
EUROPE	15572	12138	77.9
1. Austria	814	607	74.6
2. Belgium	504	399	79.2
3. Croatia	445	340	76.4
4. Greece	1122	804	71.7
5. Malta	105	89	84.8
6. Poland	730	473	64.8
7. Ireland	229	178	77.7
8. Romania	622	300	48.2
9. Slovakia	32	24	75.0
10. Spain	5186	4551	87.8
11. Switzerland	277	239	86.3
12. Turkey	612	537	87.7
13. UK	4894	3597	73.5

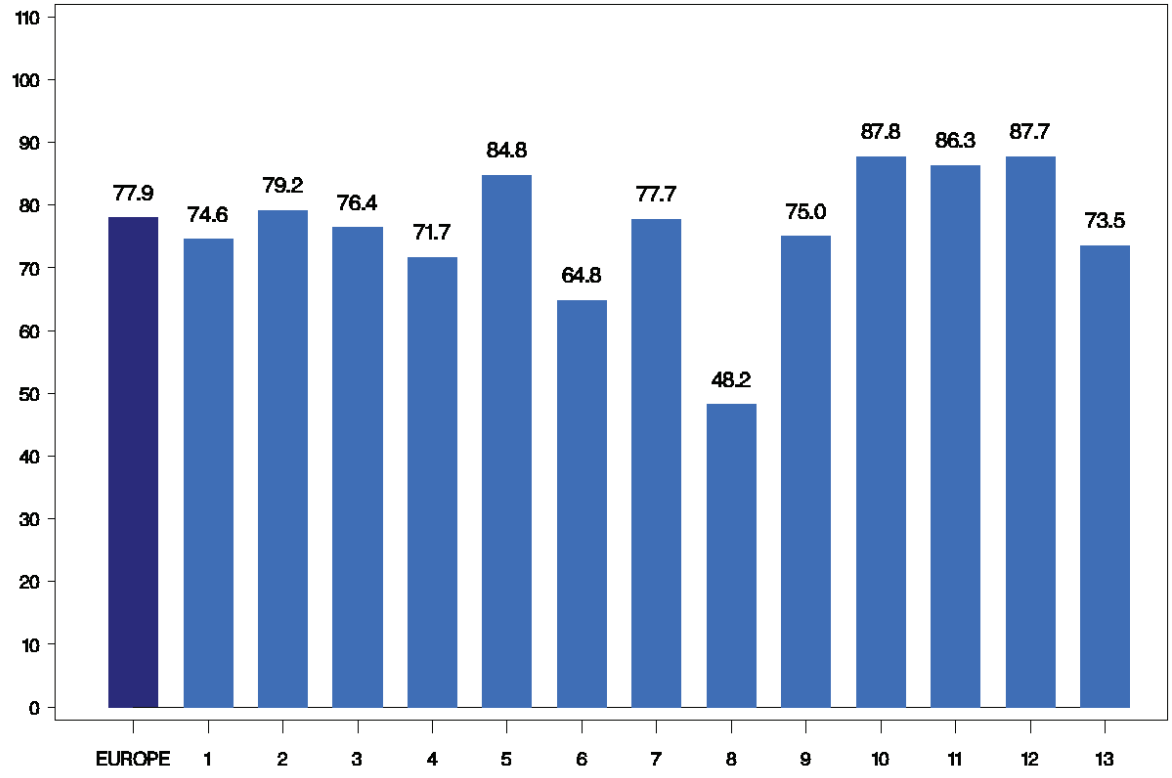
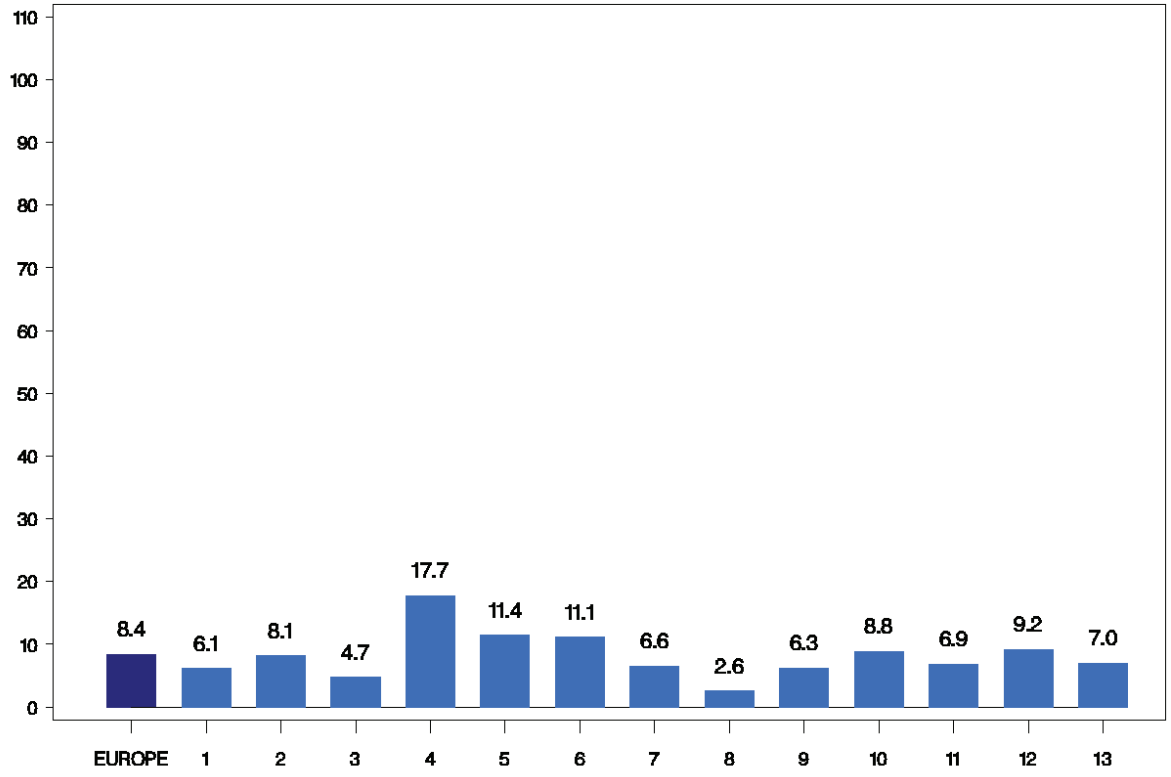


Table 130. Oxygen more than 35% or 4 L·min^{-1} provided during admission.

	Patients	Number	%
EUROPE	15572	1312	8.4
1. Austria	814	50	6.1
2. Belgium	504	41	8.1
3. Croatia	445	21	4.7
4. Greece	1122	199	17.7
5. Malta	105	12	11.4
6. Poland	730	81	11.1
7. Ireland	229	15	6.6
8. Romania	622	16	2.6
9. Slovakia	32	2	6.3
10. Spain	5186	458	8.8
11. Switzerland	277	19	6.9
12. Turkey	612	56	9.2
13. UK	4894	342	7.0



Ventilatory support during admission

Was ventilatory support provided during admission?

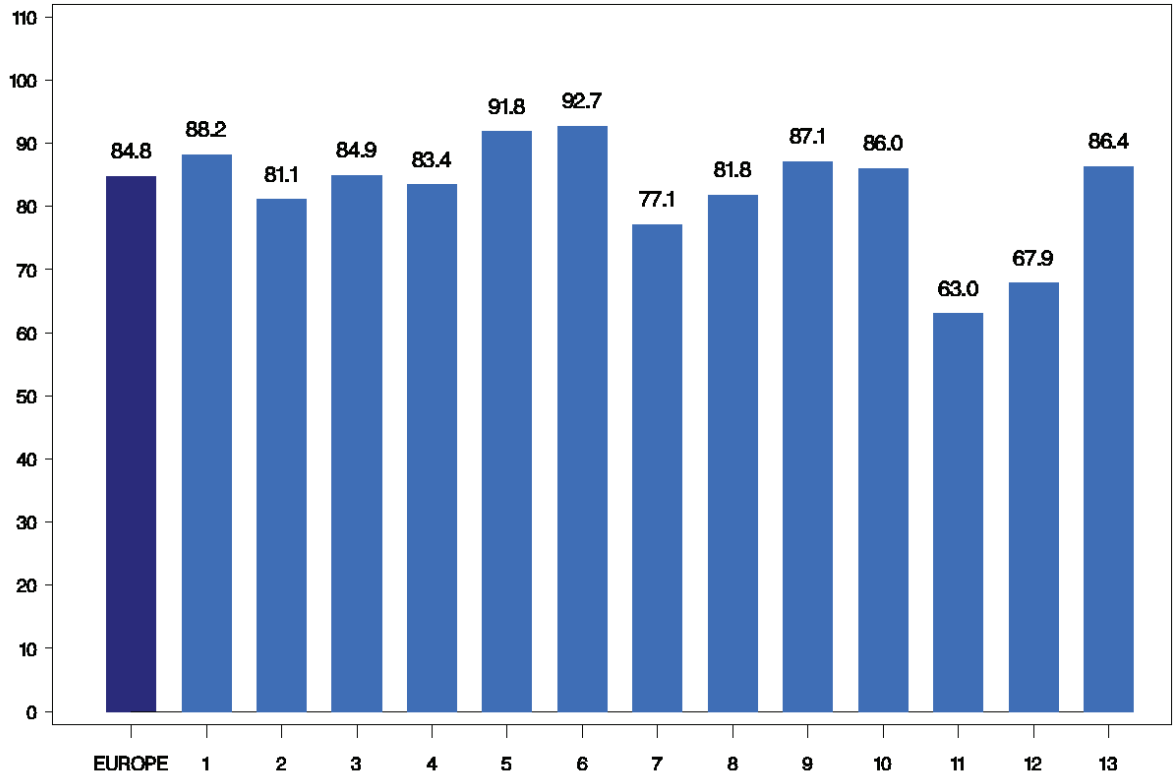
Doxapram, a non-specific but relatively safe respiratory stimulant (available in some countries as an intravenous formulation), should be used only when non-invasive intermittent ventilation is not available or not recommended (GOLD, 2010).

Of the patients who did receive ventilatory support during admission, 1.4% of them received invasive mechanical ventilation, 13.4 % non-invasive ventilation and 0.4% both. 63.16% of the patients who received ventilatory support were acidotic on admission.

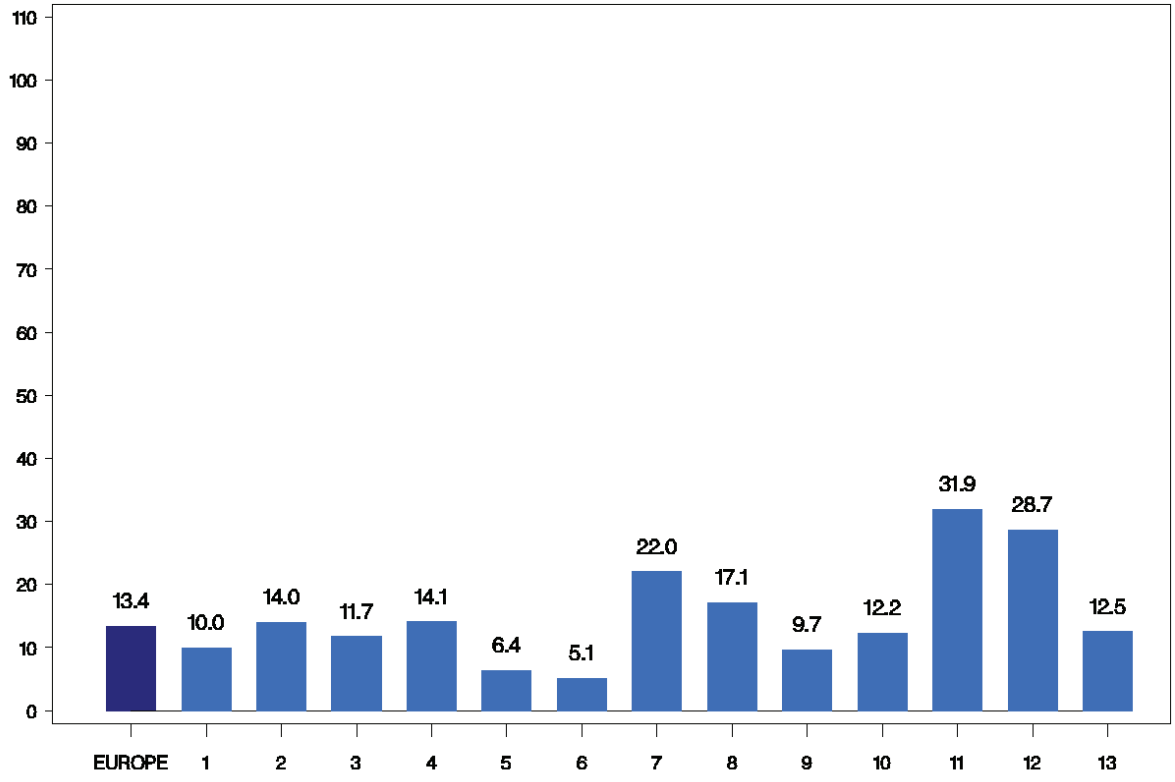
Table 131. Ventilatory support during admission.

	Patients	No ventilatory support		Non-invasive ventilatory support		Invasive ventilatory support		Both	
		N	%	N	%	N	%	N	%
EUROPE	15300	12970	84.8	2045	13.4	218	1.4	67	0.4
1. Austria	821	724	88.2	82	10.0	15	1.8	0	0.0
2. Belgium	507	411	81.1	71	14.0	21	4.1	4	0.8
3. Croatia	443	376	84.9	52	11.7	15	3.4	0	0.0
4. Greece	1121	935	83.4	158	14.1	20	1.8	8	0.7
5. Malta	110	101	91.8	7	6.4	1	0.9	1	0.9
6. Poland	631	585	92.7	32	5.1	14	2.2	0	0.0
7. Ireland	236	182	77.1	52	22.0	2	0.8	0	0.0
8. Romania	490	401	81.8	84	17.1	4	0.8	1	0.2
9. Slovakia	31	27	87.1	3	9.7	1	3.2	0	0.0
10. Spain	5089	4378	86.0	623	12.2	68	1.3	20	0.4
11. Switzerland	276	174	63.0	88	31.9	10	3.6	4	1.4
12. Turkey	607	412	67.9	174	28.7	10	1.6	11	1.8
13. UK	4938	4264	86.4	519	12.4	33	0.8	18	0.4

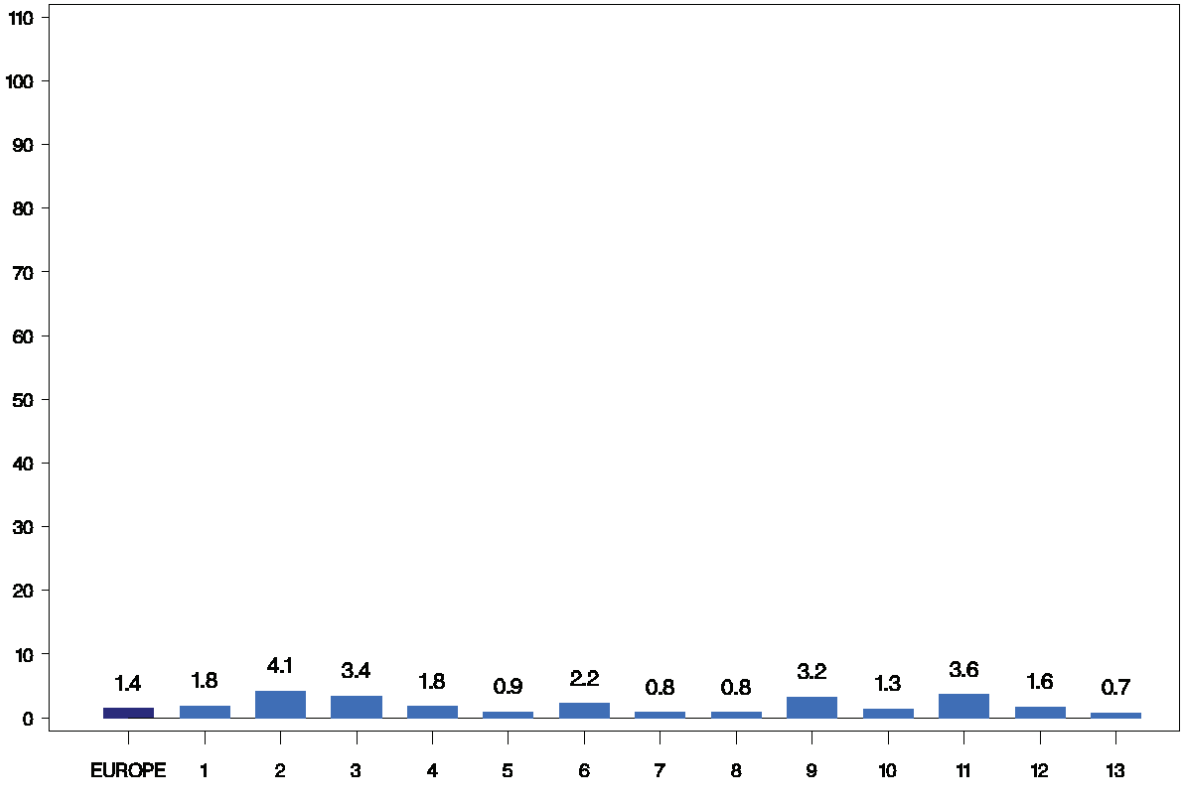
No ventilatory support



Non-invasive ventilatory support



Invasive ventilatory support



Invasive and non-invasive ventilatory support

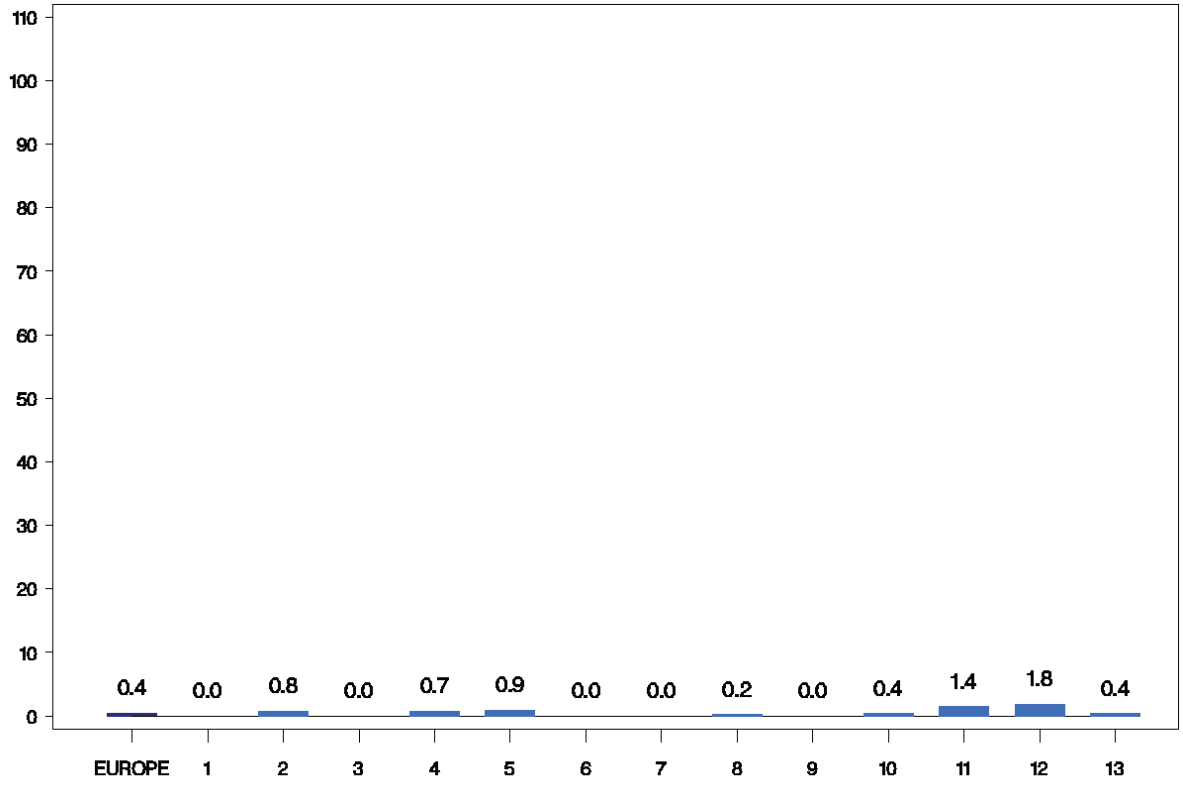


Table 132. pH level in patients treated with mechanical ventilation.

	Total		Acidotic		Normal		Alkalotic	
	N	%	N	%	N	%	N	%
EUROPE	2139	100.0	1351	63.16	627	29.31	161	7.53
1. Austria	95	4.44	49	51.58	36	37.89	10	10.53
2. Belgium	85	3.97	46	54.12	31	36.47	8	9.41
3. Croatia	64	2.99	19	29.69	25	39.06	20	31.25
4. Greece	184	8.60	119	64.67	47	25.54	18	9.78
5. Malta	9	0.42	2	22.22	6	66.67	1	11.11
6. Poland	32	1.50	21	65.63	9	28.13	2	6.25
7. Ireland	51	2.38	40	78.43	11	21.57	0	
8. Romania	24	1.12	14	58.33	7	29.17	3	12.50
9. Slovakia	4	0.19	1	25.00	3	75.00	0	
10. Spain	678	31.70	409	60.32	228	33.63	41	6.05
11. Switzerland	92	4.30	32	34.78	36	39.13	24	26.09
12. Turkey	190	8.88	127	66.84	56	29.47	7	3.68
13. UK	631	29.50	472	74.80	132	20.92	27	4.28

However, non-invasive ventilation is not appropriate for all COPD patients with exacerbation. Inclusion and exclusion criteria are as follows.

GOLD 2010: Indications for non-invasive mechanical ventilation:

- Moderate to severe acidosis (pH ≤7.35) and/or hypercapnia P_{a,CO_2} >6.0 kPa (45 mmHg)
- Moderate to severe dyspnoea with use of accessory muscles and paradoxical abdominal motion
- Respiratory frequency >25 breaths per minute

Contra-indications for non-invasive mechanical ventilation:

- Respiratory arrest
- Cardiovascular instability (hypotension, arrhythmias, myocardial infarction)
- Change in mental status; uncooperative patient
- High aspiration risk
- Viscous or copious secretions
- Recent facial or gastro-oesophageal surgery
- Craniofacial trauma
- Fixed nasopharyngeal abnormalities
- Burns
- Extreme obesity

From the *Global Strategy for Diagnosis, Management, and Prevention of COPD updated 2010*, used with permission from the Global Initiative for Chronic Obstructive Lung Disease (GOLD), www.goldcopd.org

Invasive mechanical ventilation is the gold standard of ventilation for all patients who did meet the criteria for non-invasive ventilation. Therefore, invasive mechanical ventilation can only be indicated as follows.

GOLD 2010: Indications for invasive mechanical ventilation:

- Unable to tolerate non-invasive ventilation, or non-invasive ventilation failure
- Severe dyspnoea with use of accessory muscles and paradoxical abdominal motion
- Respiratory frequency >35 breaths per minute
- Life-threatening hypoxaemia
- Severe acidosis (pH <7.25) and/or hypercapnia ($PaCO_2$ >8.0 kPa, 60 mmHg)
- Respiratory arrest
- Somnolence, impaired mental status
- Cardiovascular complications (hypotension and shock)
- Other complications (metabolic abnormalities, sepsis, pneumonia, pulmonary embolism, barotrauma and massive pleural effusion)

From the *Global Strategy for Diagnosis, Management, and Prevention of COPD updated 2010*, used with permission from the Global Initiative for Chronic Obstructive Lung Disease (GOLD), www.goldcopd.org

Table 133. Mechanical ventilation in patients with pH <7.35.

	Total		None		Non-invasive ventilation		Mechanical invasive ventilation		Both	
	N	%	N	%	N	%	N	%	N	%
EUROPE	2773	100.0	117	4.22	1190	42.91	44	1.59	1422	51.28
1. Austria	114	4.11	8	7.02	41	35.96	0		65	57.02
2. Belgium	78	2.81	11	14.10	34	43.59	1	1.28	32	41.03
3. Croatia	54	1.95	14	25.93	5	9.26	0		35	64.81
4. Greece	199	7.18	15	7.54	97	48.74	7	3.52	80	40.20
5. Malta	13	0.47	0		2	15.38	0		11	84.62
6. Poland	81	2.92	7	8.64	14	17.28	0		60	74.07
7. Ireland	49	1.77	1	2.04	39	79.59	0		9	18.37
8. Romania	29	1.05	3	10.34	11	37.93	0		15	51.72
9. Slovakia	4	0.14	0		1	25.00	0		3	75.00
10. Spain	967	34.87	35	3.62	359	37.13	15	1.55	558	57.70
11. Switzerland	45	1.62	4	8.89	26	57.78	2	4.44	13	28.89
12. Turkey	186	6.71	5	2.69	115	61.83	7	3.76	59	31.72
13. UK	954	34.40	14	1.47	446	46.75	12	1.26	482	50.52

Table 134. Mechanical ventilation in patients with pH ≤7.26.

	Total		None		Non-invasive ventilation		Mechanical invasive ventilation		Both	
	N	%	N	%	N	%	N	%	N	%
EUROPE	695	100.0	69	9.93	418	60.14	26	3.74	182	26.19
1.Austria	23	3.31	4	17.39	13	56.52	0		6	26.09
2.Belgium	23	3.31	8	34.78	11	47.83	1	4.35	3	13.04
3.Croatia	16	2.30	7	43.75	1	6.25	0		8	50.00
4.Greece	43	6.19	8	18.60	21	48.84	4	9.30	10	23.26
5.Malta	1	0.14	0		1	100.0	0		0	
6.Poland	12	1.73	6	50.00	2	16.67	0		4	33.33
7.Ireland	13	1.87	1	7.69	11	84.62	0		1	7.69
8.Romania	10	1.44	3	30.00	4	40.00	0		3	30.00
9.Slovakia	0		0		0		0		0	
10.Spain	231	33.24	19	8.23	129	55.84	8	3.46	75	32.47
11.Switzerland	14	2.01	2	14.29	7	50.00	1	7.14	4	28.57
12.Turkey	32	4.60	3	9.38	20	62.50	5	15.63	4	12.50
13. UK	277	39.86	8	2.89	198	71.48	7	2.53	64	23.10

Why did the patient not receive ventilation support?

Where a patient met the pH indication for ventilatory support but where this support was not given the auditor was asked to submit the reason recorded in the medical notes for this decision.

Table 135. Ventilatory support declined by patient.

	Patients	Number	%
EUROPE	12371	113	0.9
1. Austria	708	4	0.6
2. Belgium	389	5	1.3
3. Croatia	365	0	0.0
4. Greece	917	18	2.0
5. Malta	101	3	3.0
6. Poland	528	1	0.2
7. Ireland	181	0	0.0
8. Romania	205	1	0.5
9. Slovakia	26	2	7.7
10. Spain	4198	42	1.0
11. Switzerland	173	4	2.3
12. Turkey	410	1	0.2
13. UK	4170	32	0.8

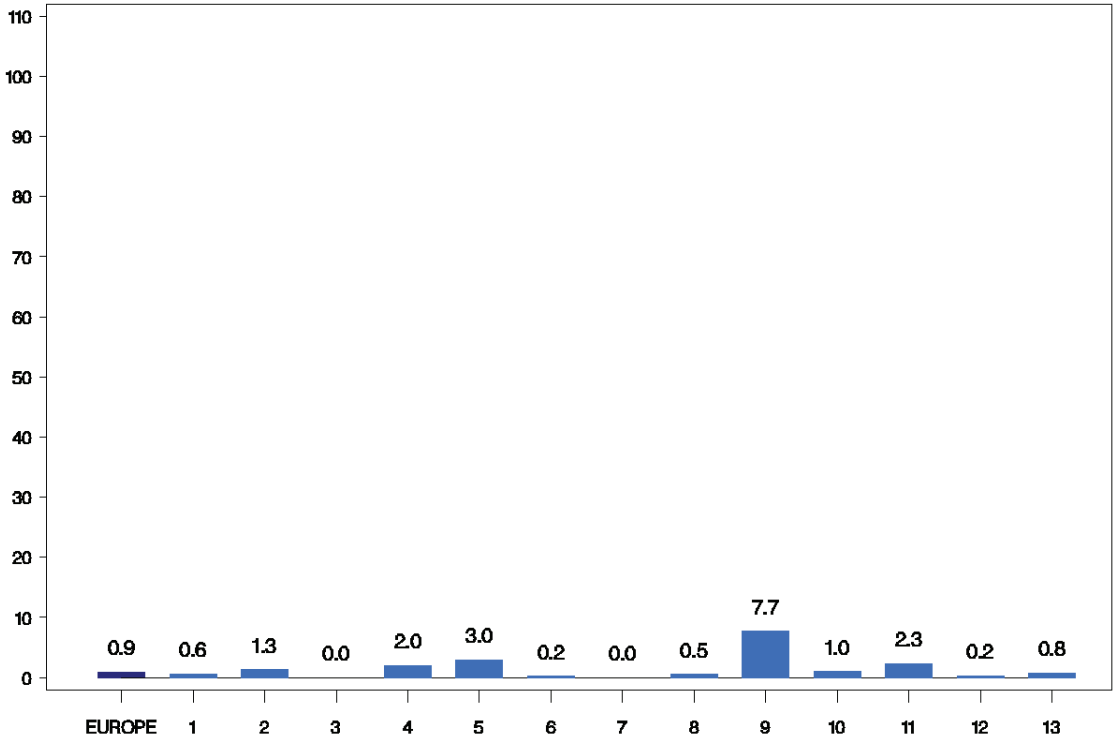


Table 136. Ventilatory support not given: medical staff decided inappropriate.

	Patients	Number	%
EUROPE	12371	5224	42.2
1. Austria	708	457	64.5
2. Belgium	389	312	80.2
3. Croatia	365	236	64.7
4. Greece	917	566	61.7
5. Malta	101	4	4.0
6. Poland	528	364	68.9
7. Ireland	181	119	65.7
8. Romania	205	160	78.0
9. Slovakia	26	15	57.7
10. Spain	4198	1022	24.3
11. Switzerland	173	163	94.2
12. Turkey	410	135	32.9
13. UK	4170	1671	40.1

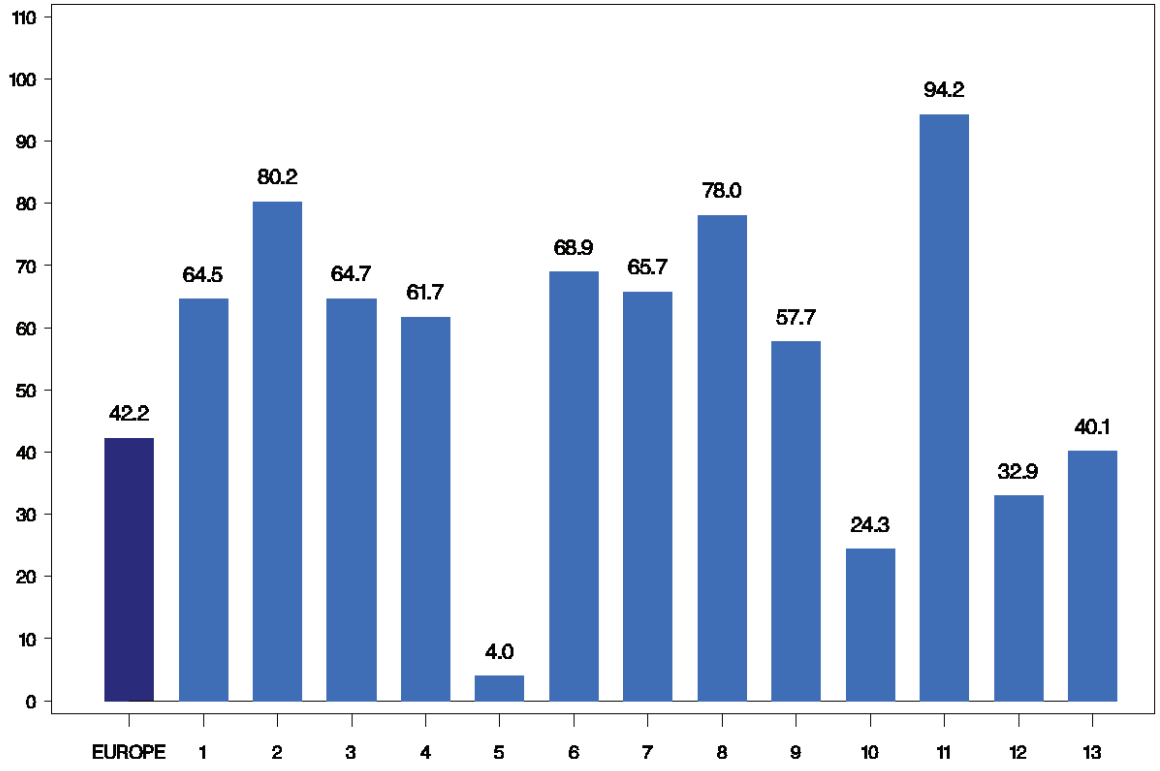


Table 137. Ventilatory support not given: patient improved before non-invasive ventilation was needed.

	Patients	Number	%
EUROPE	12371	4949	40.0
1. Austria	708	237	33.5
2. Belgium	389	63	16.2
3. Croatia	365	123	33.7
4. Greece	917	303	33.0
5. Malta	101	92	91.1
6. Poland	528	159	30.1
7. Ireland	181	60	33.1
8. Romania	205	43	21.0
9. Slovakia	26	5	19.2
10. Spain	4198	1627	38.8
11. Switzerland	173	6	3.5
12. Turkey	410	271	66.1
13. UK	4170	1960	47.0

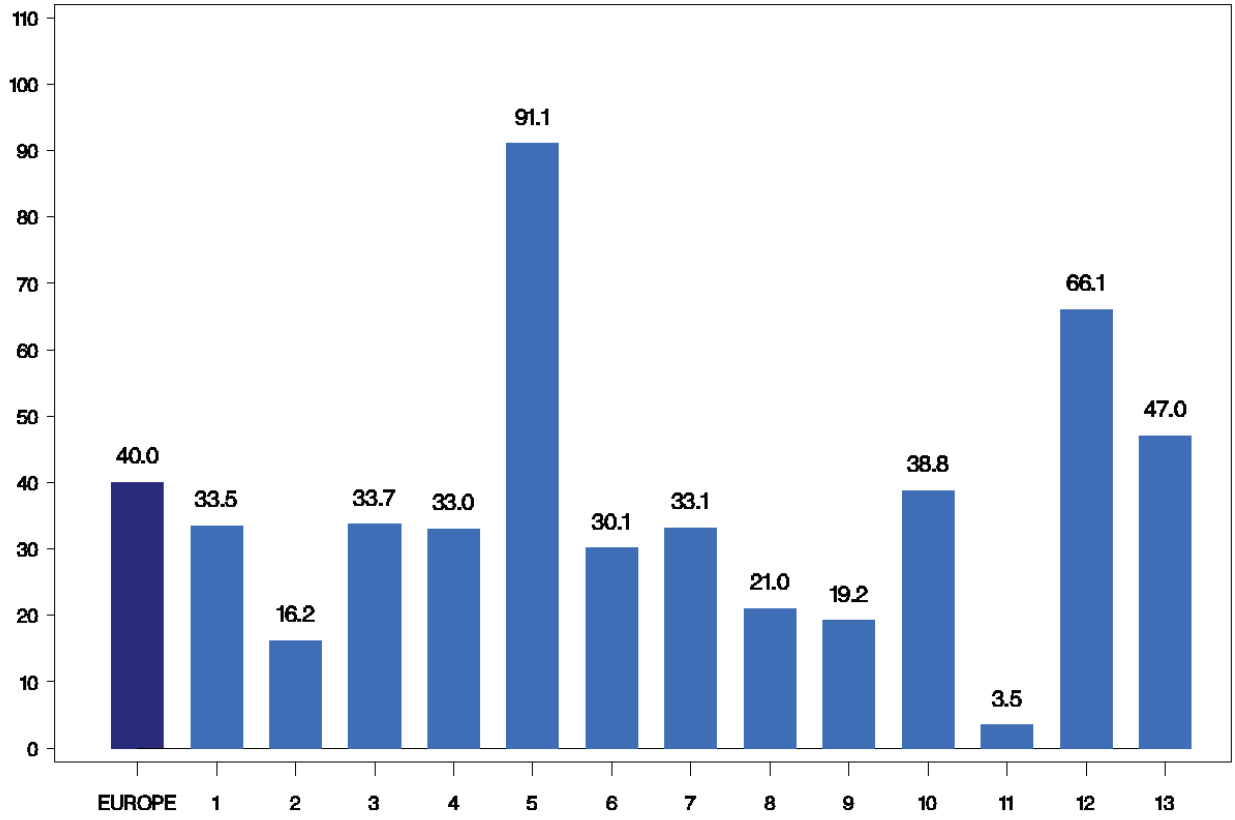
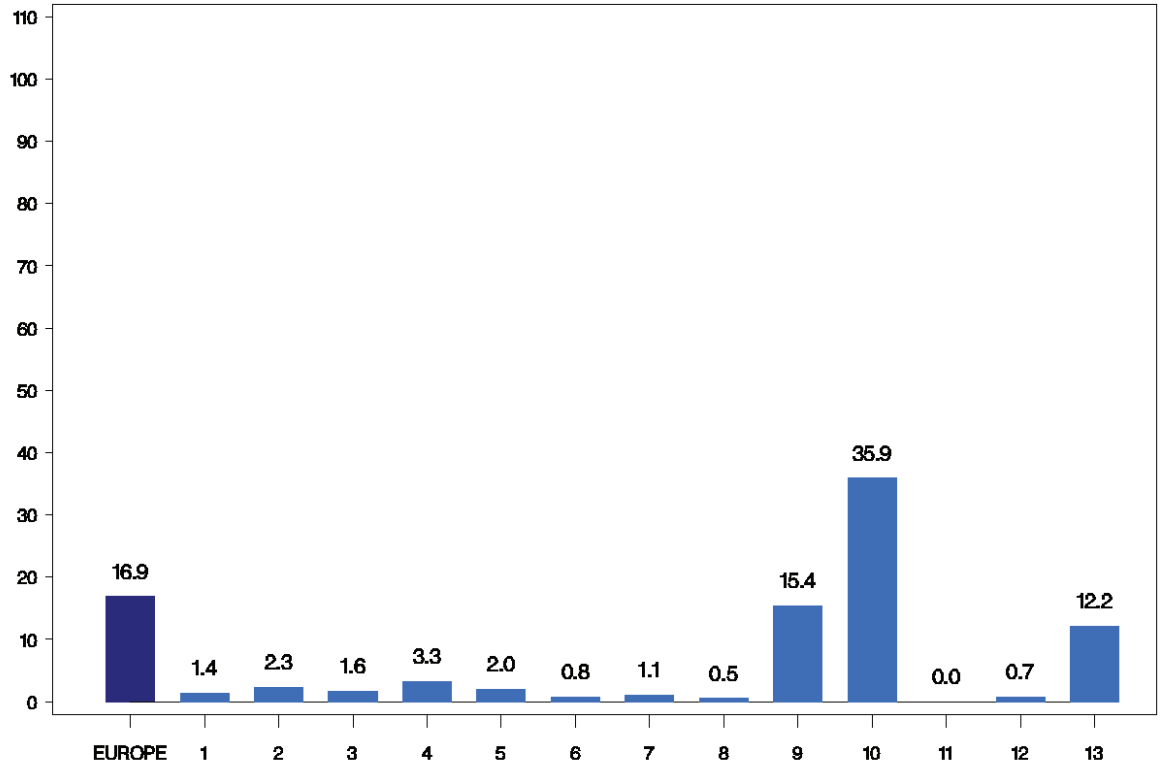


Table 138. Ventilatory support not given: other reason.

	Patients	Number	%
EUROPE	12371	2085	16.9
1. Austria	708	10	1.4
2. Belgium	389	9	2.3
3. Croatia	365	6	1.6
4. Greece	917	30	3.3
5. Malta	101	2	2.0
6. Poland	528	4	0.8
7. Ireland	181	2	1.1
8. Romania	205	1	0.5
9. Slovakia	26	4	15.4
10. Spain	4198	1507	35.9
11. Switzerland	173	0	0.0
12. Turkey	410	3	0.7
13. UK	4170	507	12.2



Discharge

GOLD 2010: Discharge criteria for patients with exacerbations of COPD.

- Inhaled β_2-agonist therapy is required no more frequently than every 4 hours
- Patient, if previously ambulatory, is able to walk across the room
- Patient is able to eat and sleep without frequent awaking by dyspnoea
- Patient has been clinically stable for 12–24 hours
- Arterial blood gases have been stable for 12–24 hours
- Patient (or home caregiver) fully understands correct use of medications
- Follow-up and home care arrangements have been completed (*e.g.* visiting nurse, oxygen delivery and meal provisions)
- Patient, family and physician are confident patient can manage successfully at home

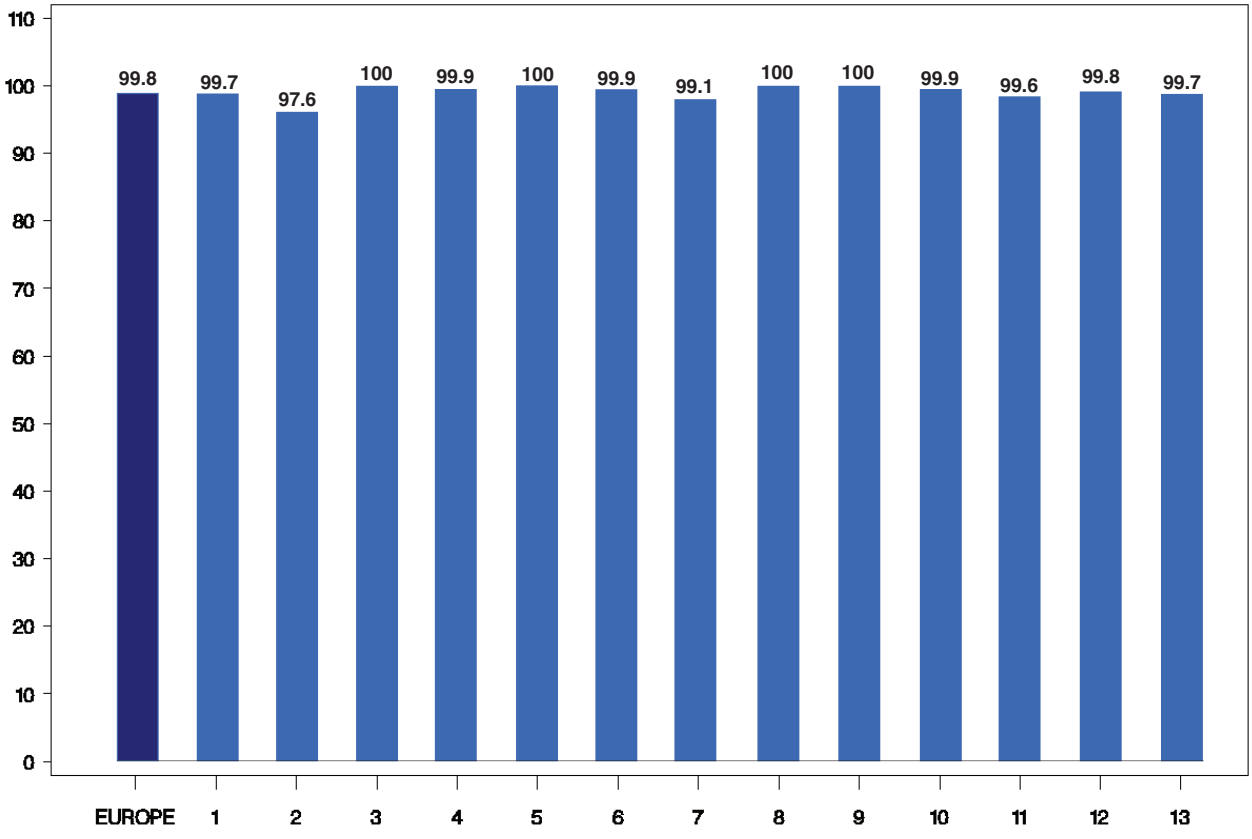
From the *Global Strategy for Diagnosis, Management, and Prevention of COPD updated 2010*, used with permission from the Global Initiative for Chronic Obstructive Lung Disease (GOLD), www.goldcopd.org

What is the percentage of survived patients that have been discharged?

Of those patients who were still alive at the end of the audit period, 99.8% had been discharged from hospital.

Table 139. Percentage of survived discharged patients.

	Patients	Number	%
EUROPE	15039	15004	99.8
1. Austria	789	787	99.7
2. Belgium	498	486	97.6
3. Croatia	405	405	100.0
4. Greece	1088	1087	99.9
5. Malta	105	105	100.0
6. Poland	708	707	99.9
7. Ireland	230	228	99.1
8. Romania	626	626	100.0
9. Slovakia	31	31	100.0
10. Spain	5045	5041	99.9
11. Switzerland	279	278	99.6
12. Turkey	592	591	99.8
13. UK	4643	4632	99.7



Why has the patient not been discharged?

The main reasons for not being discharged (remaining inpatients at 90 days) were prolonged weaning (20%) and relapses (14.3%), while in 65.7% of cases the patient was not discharged because of non-COPD-related complications.

Table 140. Reasons for not discharging: not COPD related.

	Patients	Number	%
EUROPE	35	23	65.7
1. Austria	2	1	50.0
2. Belgium	12	9	75.0
3. Croatia	0	0	0.0
4. Greece	1	0	0.0
5. Malta	0	0	0.0
6. Poland	1	0	0.0
7. Ireland	2	1	50.0
8. Romania	0	0	0.0
9. Slovakia	0	0	0.0
10. Spain	4	3	75.0
11.Switzerland	1	1	100.0
12. Turkey	1	1	100.0
13. UK	11	7	63.6

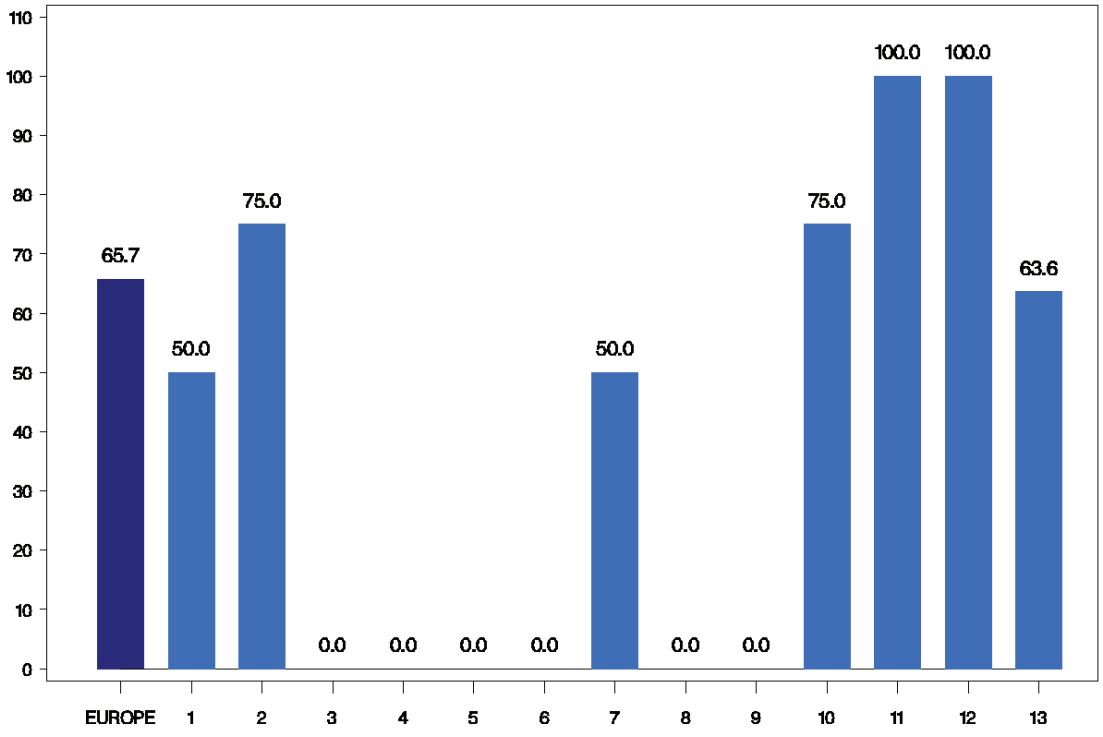


Table 141. Reason for not discharging: prolonged weaning.

	Patients	Number	%
EUROPE	12	7	58.3
1. Austria	1	1	100.0
2. Belgium	3	2	66.7
3. Croatia	0	0	0.0
4. Greece	1	0	0.0
5. Malta	0	0	0.0
6. Poland	1	1	100.0
7. Ireland	1	1	100.0
8. Romania	0	0	0.0
9. Slovakia	0	0	0.0
10. Spain	1	0	0.0
11. Switzerland	0	0	0.0
12. Turkey	0	0	0.0
13. UK	4	2	50.0

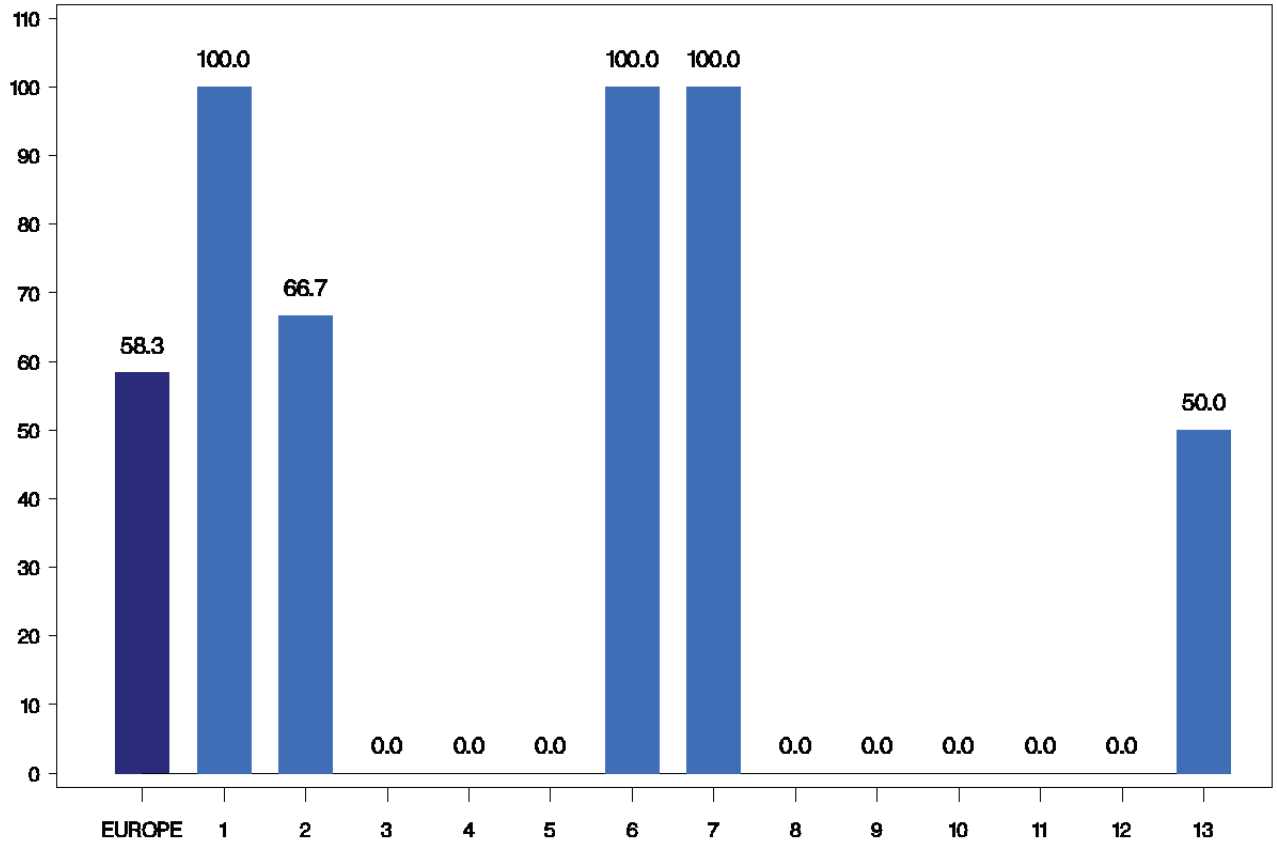
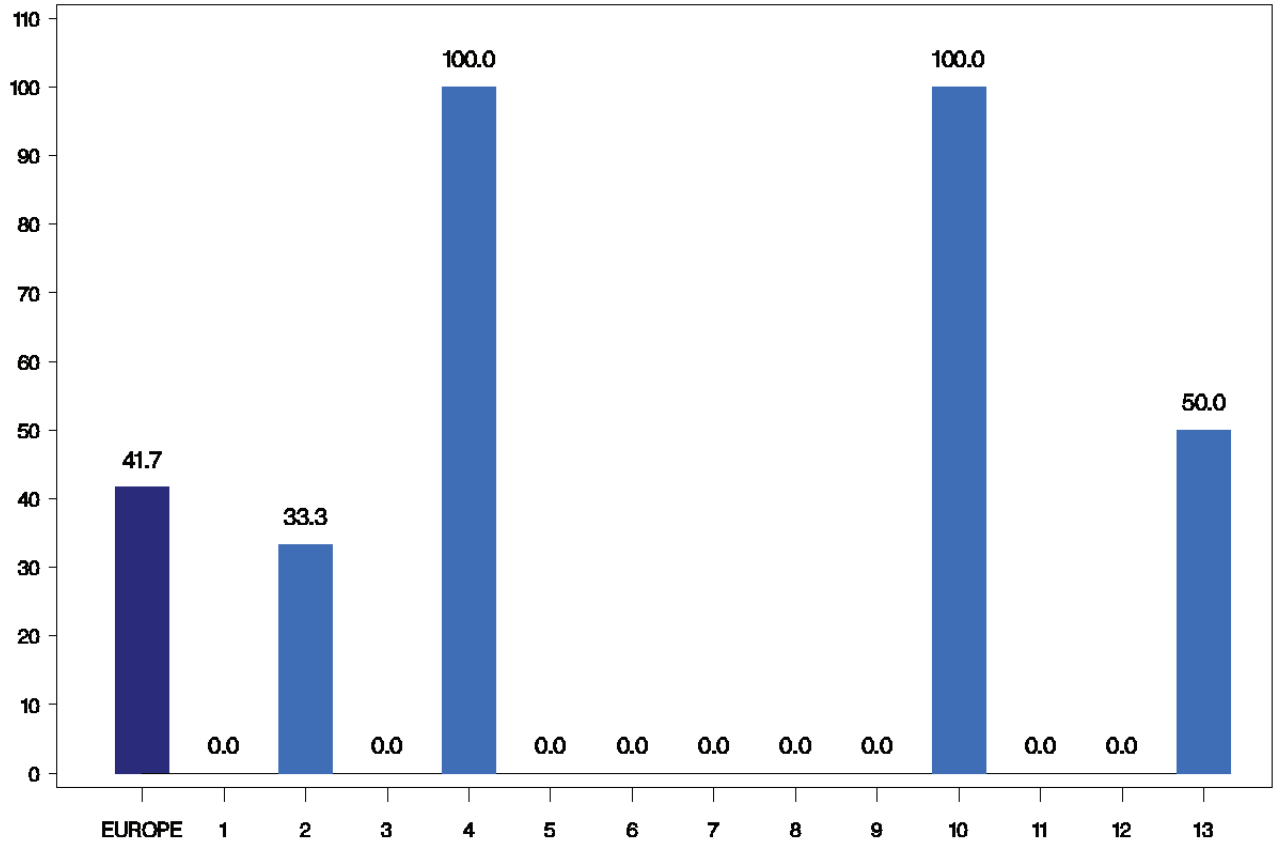


Table 142. Reason for not discharging: relapses.

	Patients	Number	%
EUROPE	12	5	41.7
1. Austria	1	0	0.0
2. Belgium	3	1	33.3
3. Croatia	0	0	0.0
4. Greece	1	1	100.0
5. Malta	0	0	0.0
6. Poland	1	0	0.0
7. Ireland	1	0	0.0
8. Romania	0	0	0.0
9. Slovakia	0	0	0.0
10. Spain	1	1	100.0
11. Switzerland	0	0	0.0
12. Turkey	0	0	0.0
13. UK	4	2	50.0

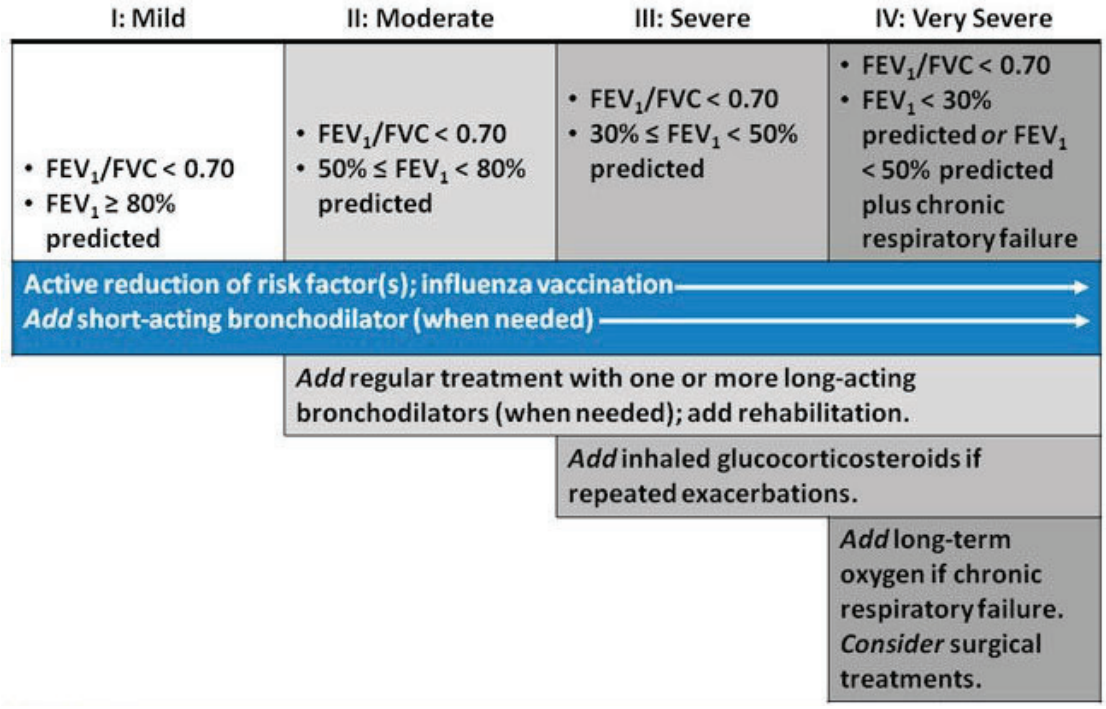


Pharmacological treatment at discharge

Pharmacotherapy known to reduce the number of exacerbations and hospitalisations and delay the time of first/next hospitalisation, such as β_2-agonists, anticholinergics, oral and systemic corticosteroids and combined treatment (long-acting β_2-agonists and inhaled corticosteroids), should be specifically considered when discharging a patient (GOLD, 2010).

The treatment at discharge in this COPD audit varied a lot. Most of the patients (69.5%) received combined treatment (long-acting β_2-agonists and inhaled corticosteroids), long-acting anticholinergics (59.8%), short-acting β_2-agonists (56.3%) and systemic corticosteroids (51.3%).

Figure 6. Therapy at each stage of COPD. From the *Global Strategy for Diagnosis, Management, and Prevention of COPD updated 2010*, used with permission from the Global Initiative for Chronic Obstructive Lung Disease (GOLD), www.goldcopd.org



What was the treatment at discharge?

Table 143. Pharmacological treatment at discharge: short-acting β_2-agonist.

	Patients	Number	%
EUROPE	15821	8900	56.3
1. Austria	823	600	72.9
2. Belgium	512	339	66.2
3. Croatia	445	92	20.7
4. Greece	1133	404	35.7
5. Malta	112	98	87.5
6. Poland	734	305	41.6
7. Ireland	237	161	67.9
8. Romania	629	270	42.9
9. Slovakia	32	2	6.3
10. Spain	5271	2204	41.8
11. Switzerland	295	115	39.0
12. Turkey	612	245	40.0
13. UK	4986	4065	81.5

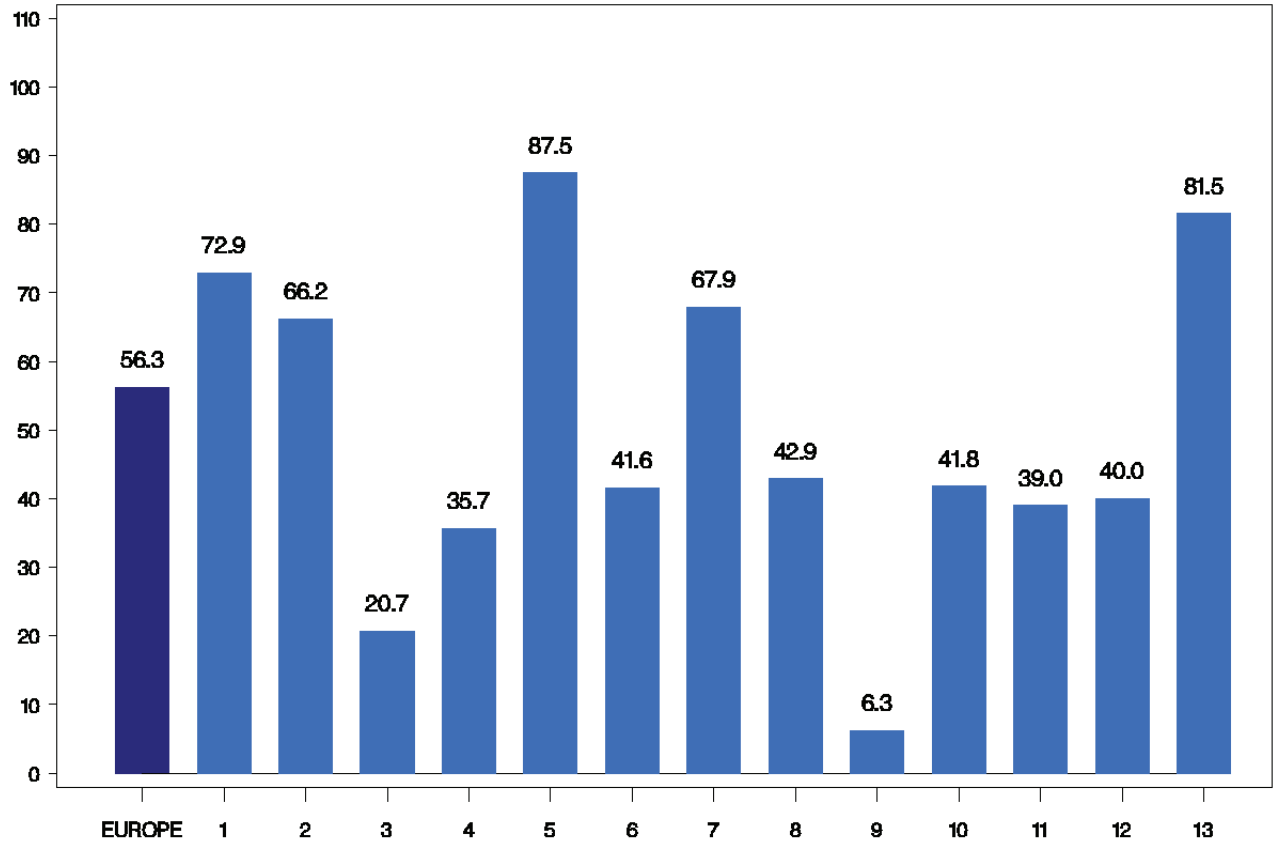


Table 144. Treatment at discharge: short-acting muscarinic antagonist.

	Patients	Number	%
EUROPE	15821	3926	24.8
1. Austria	823	342	41.6
2. Belgium	512	304	59.4
3. Croatia	445	153	34.4
4. Greece	1133	306	27.0
5. Malta	112	87	77.7
6. Poland	734	415	56.5
7. Ireland	237	101	42.6
8. Romania	629	45	7.2
9. Slovakia	32	8	25.0
10. Spain	5271	952	18.1
11. Switzerland	295	95	32.2
12. Turkey	612	184	30.1
13. UK	4986	934	18.7

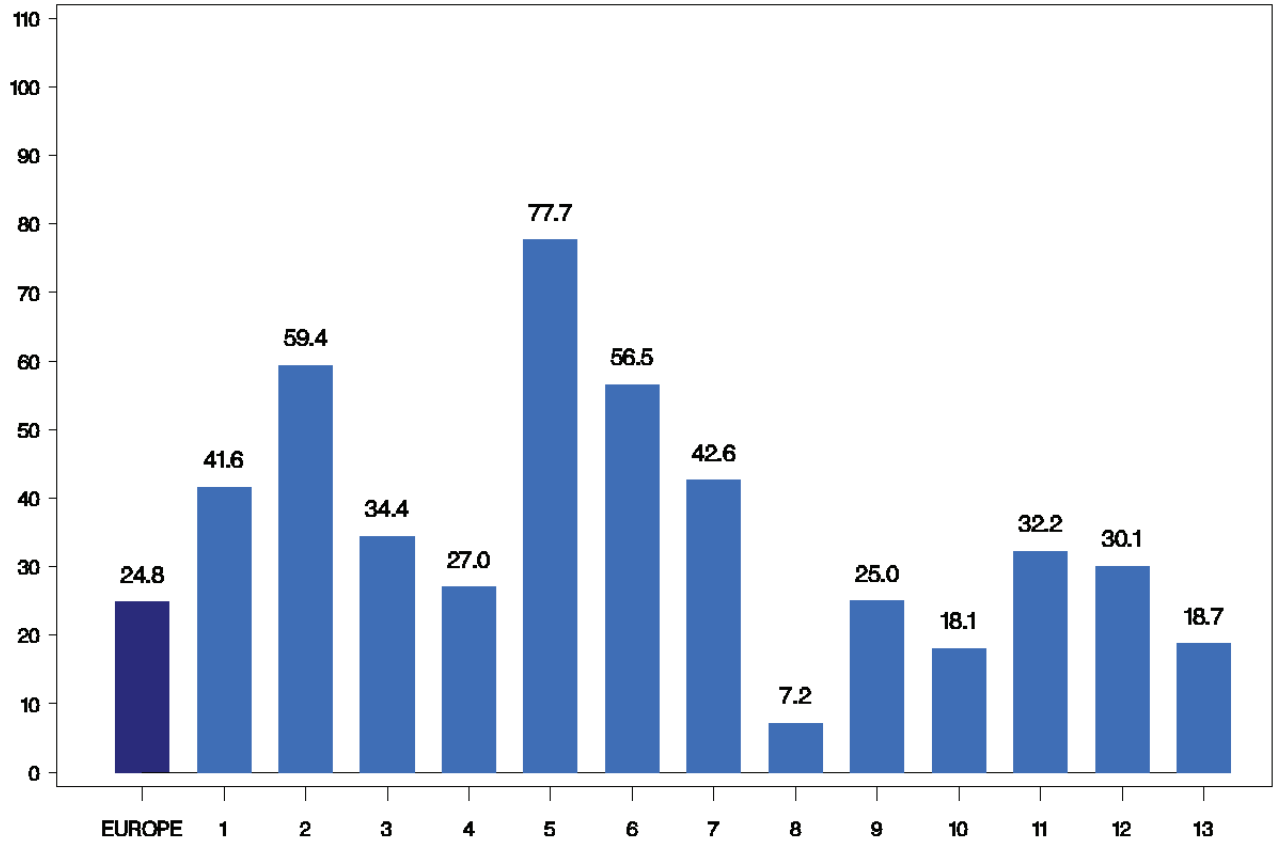


Table 145. Treatment at discharge: long-acting β_2-agonist.

	Patients	Number	%
EUROPE	15821	1555	9.8
1. Austria	823	108	13.1
2. Belgium	512	76	14.8
3. Croatia	445	8	1.8
4. Greece	1133	139	12.3
5. Malta	112	18	16.1
6. Poland	734	310	42.2
7. Ireland	237	44	18.6
8. Romania	629	12	1.9
9. Slovakia	32	1	3.1
10. Spain	5271	385	7.3
11. Switzerland	295	29	9.8
12. Turkey	612	95	15.5
13. UK	4986	330	6.6

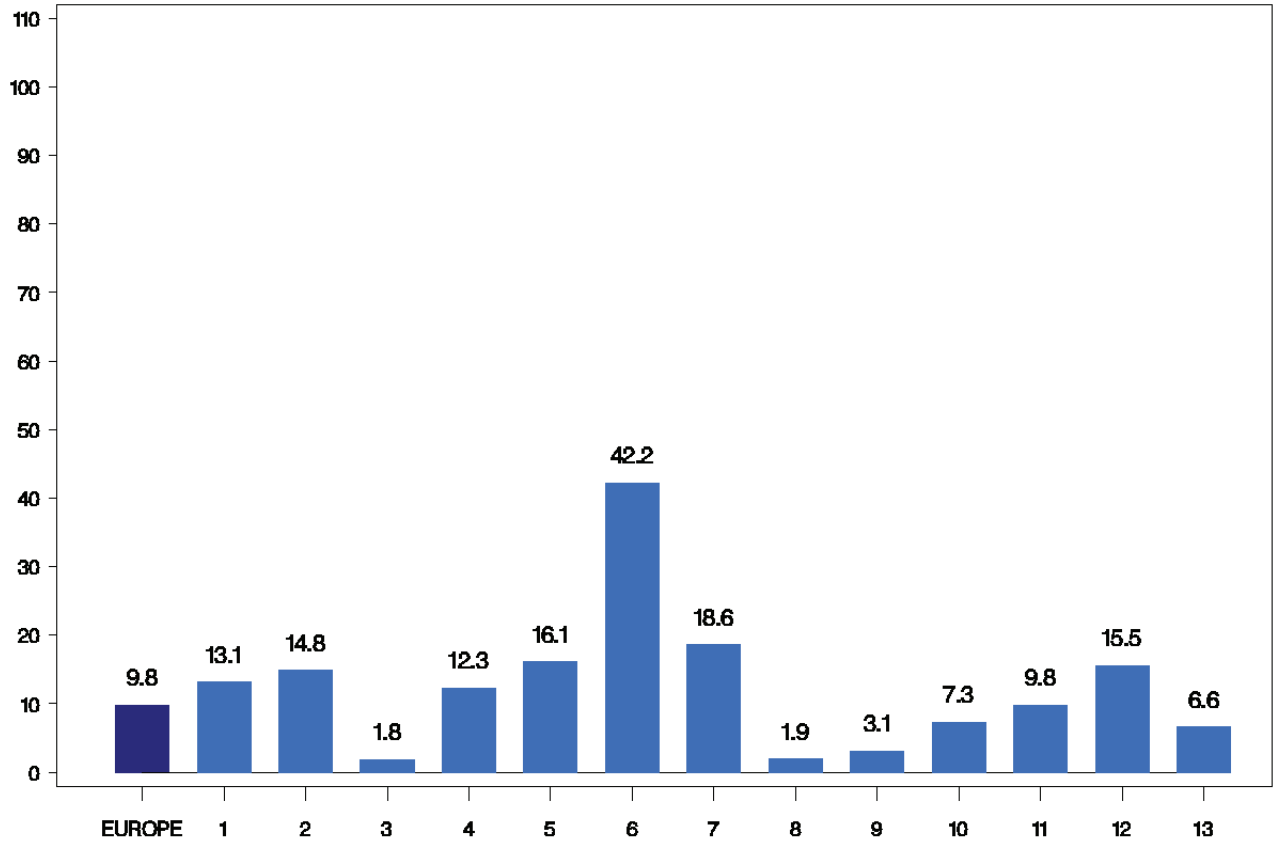


Table 146. Treatment at discharge: long-acting muscarinic antagonist.

	Patients	Number	%
EUROPE	15821	9467	59.8
1. Austria	823	666	80.9
2. Belgium	512	396	77.3
3. Croatia	445	195	43.8
4. Greece	1133	531	46.9
5. Malta	112	2	1.8
6. Poland	734	331	45.1
7. Ireland	237	150	63.3
8. Romania	629	295	46.9
9. Slovakia	32	15	46.9
10. Spain	5271	3406	64.6
11. Switzerland	295	166	56.3
12. Turkey	612	414	67.6
13. UK	4986	2900	58.2

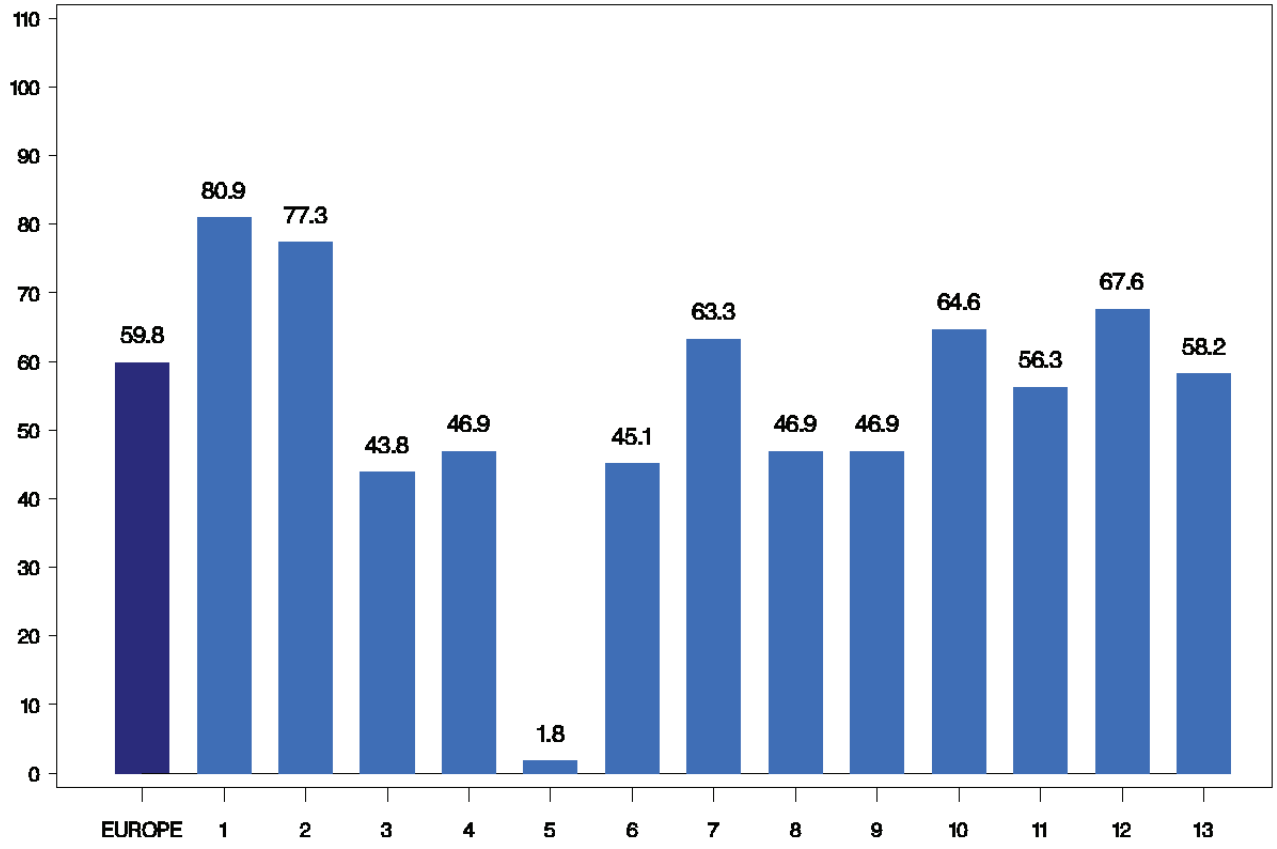


Table 147. Treatment at discharge: combined (inhaled corticosteroids and long-acting β_2-agonists).

	Patients	Number	%
EUROPE	15821	11003	69.5
1. Austria	823	602	73.1
2. Belgium	512	394	77.0
3. Croatia	445	367	82.5
4. Greece	1133	643	56.8
5. Malta	112	1	0.9
6. Poland	734	190	25.9
7. Ireland	237	198	83.5
8. Romania	629	438	69.6
9. Slovakia	32	26	81.3
10. Spain	5271	3959	75.1
11. Switzerland	295	169	57.3
12. Turkey	612	390	63.7
13. UK	4986	3626	72.7

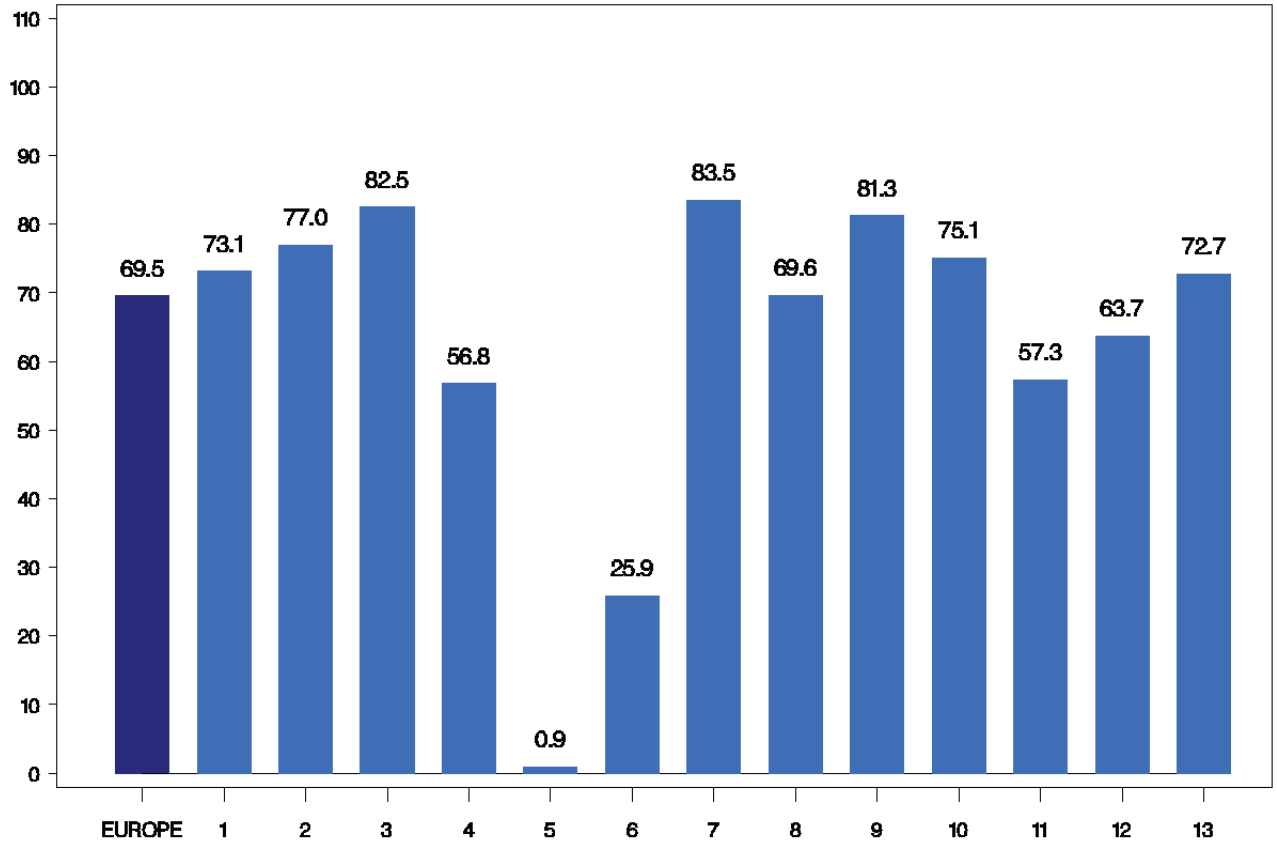


Table 148. Treatment at discharge: systemic corticosteroids.

	Patients	Number	%
EUROPE	15821	8122	51.3
1. Austria	823	456	55.4
2. Belgium	512	328	64.1
3. Croatia	445	70	15.7
4. Greece	1133	416	36.7
5. Malta	112	66	58.9
6. Poland	734	251	34.2
7. Ireland	237	142	59.9
8. Romania	629	19	3.0
9. Slovakia	32	3	9.4
10. Spain	5271	3316	62.9
11. Switzerland	295	129	43.7
12. Turkey	612	59	9.6
13. UK	4986	2867	57.5

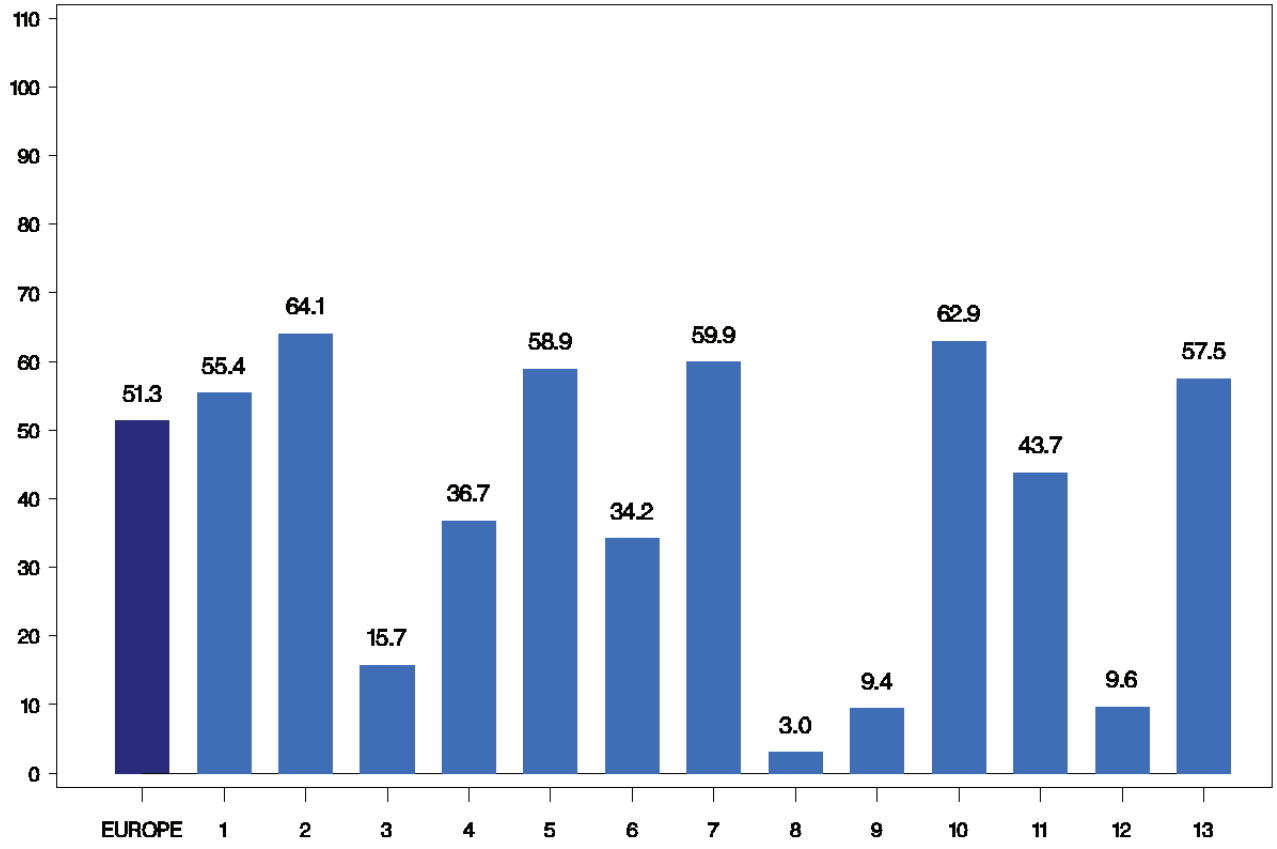


Table 149. Treatment at discharge: theophylline.

	Patients	Number	%
EUROPE	15821	3156	19.9
1. Austria	823	292	35.5
2. Belgium	512	96	18.8
3. Croatia	445	304	68.3
4. Greece	1133	203	17.9
5. Malta	112	9	8.0
6. Poland	734	422	57.5
7. Ireland	237	41	17.3
8. Romania	629	272	43.2
9. Slovakia	32	8	25.0
10. Spain	5271	462	8.8
11. Switzerland	295	9	3.1
12. Turkey	612	260	42.5
13. UK	4986	778	15.6

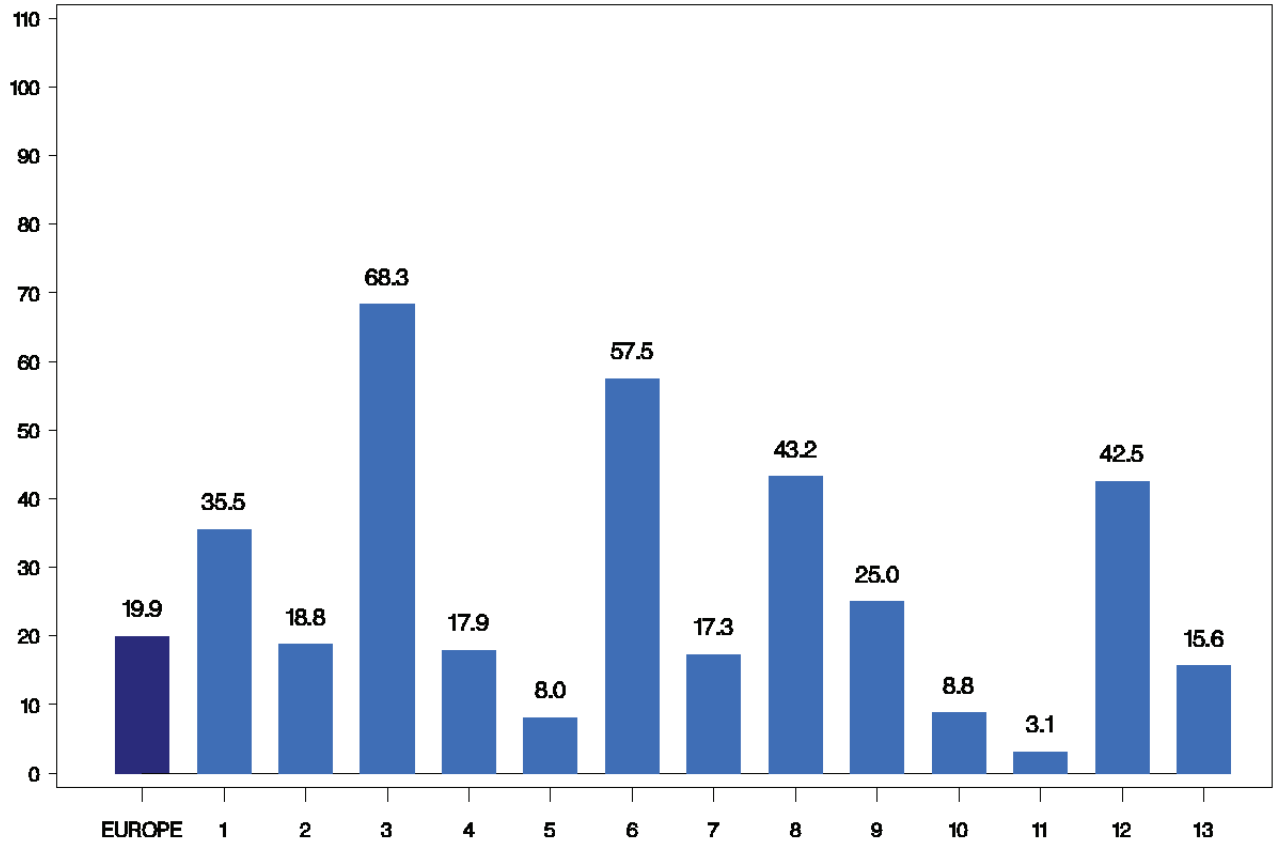


Table 150. Treatment at discharge: other.

	Patients	Number	%
EUROPE	15821	871	5.5
1. Austria	823	7	0.9
2. Belgium	512	20	3.9
3. Croatia	445	4	0.9
4. Greece	1133	30	2.6
5. Malta	112	12	10.7
6. Poland	734	63	8.6
7. Ireland	237	3	1.3
8. Romania	629	17	2.7
9. Slovakia	32	0	0.0
10. Spain	5271	440	8.3
11. Switzerland	295	43	14.6
12. Turkey	612	5	0.8
13. UK	4986	227	4.6

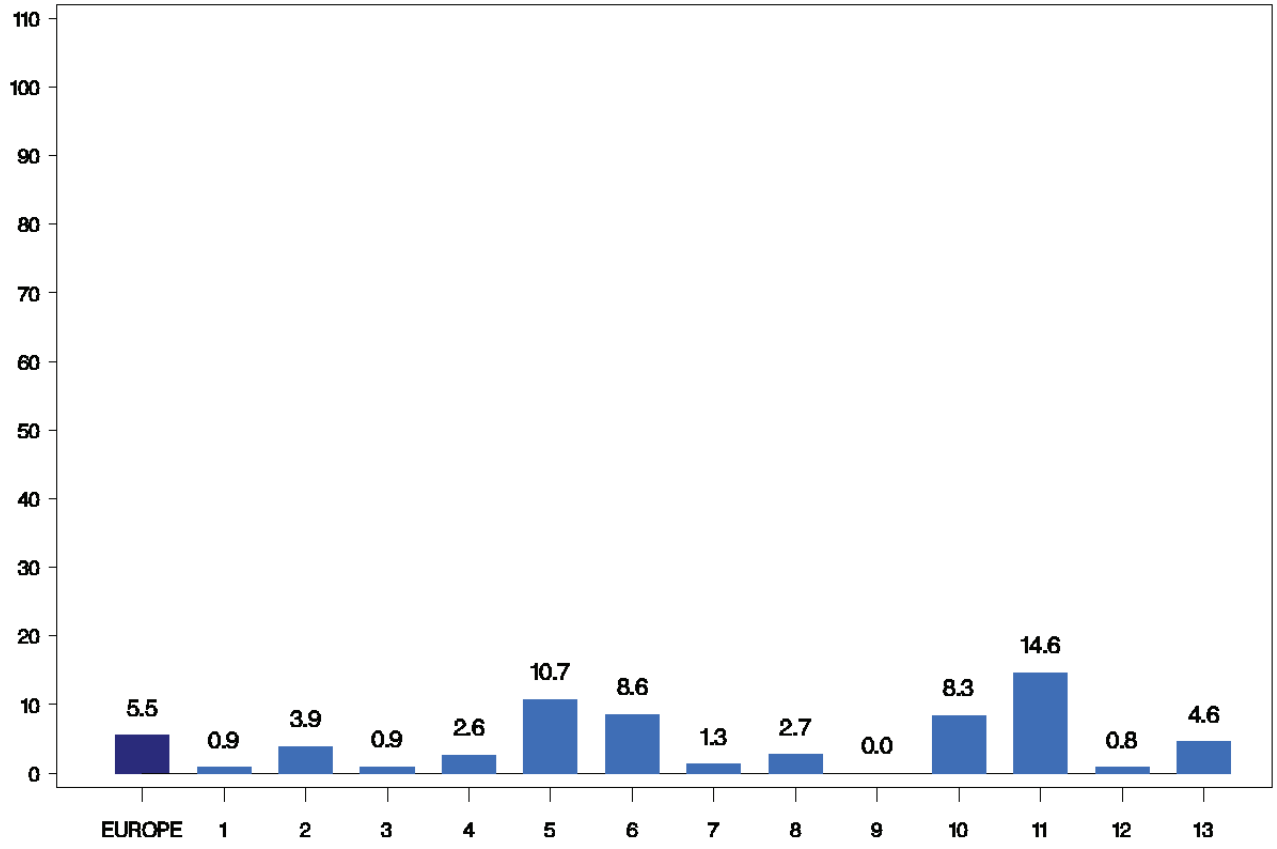
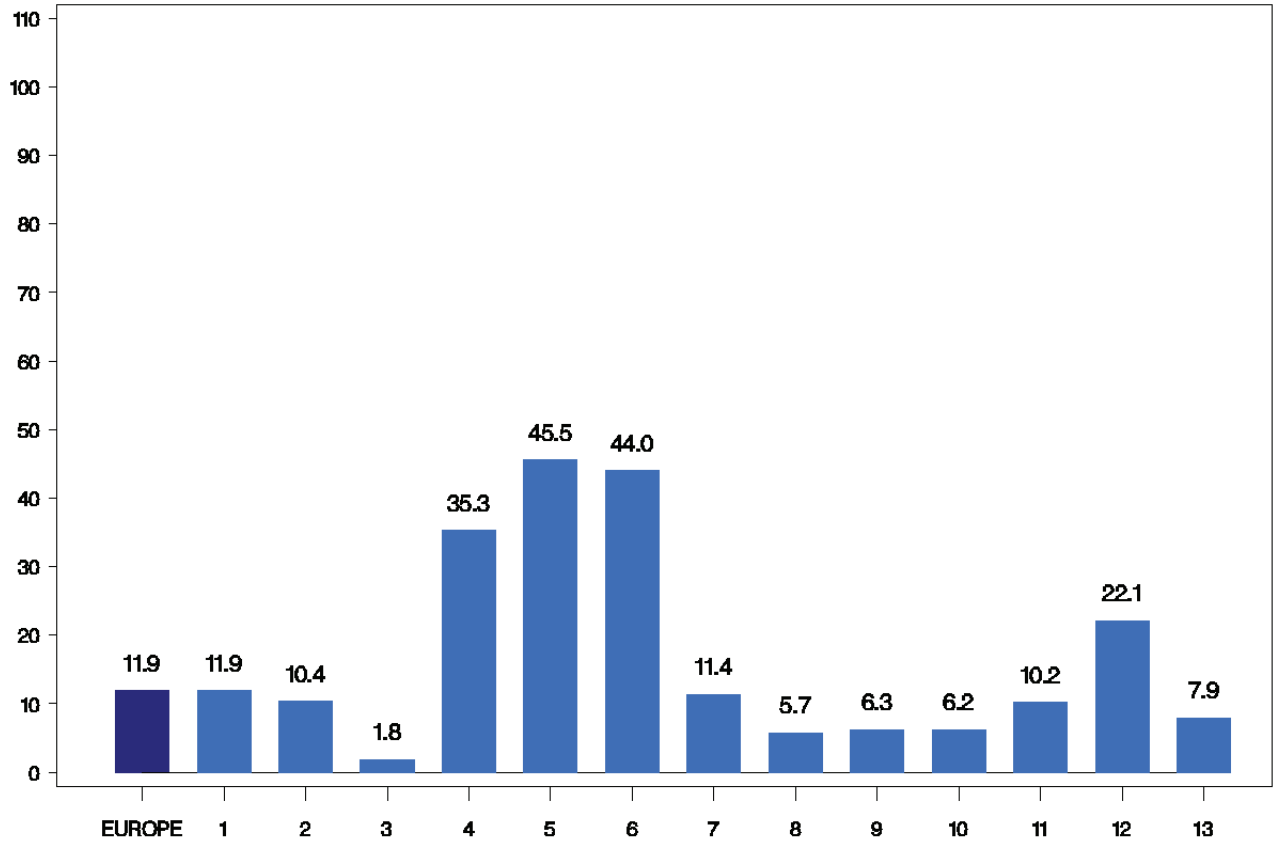


Table 151. Antibiotics at discharge.

	Patients	Number	%
EUROPE	15821	1882	11.9
1. Austria	823	98	11.9
2. Belgium	512	53	10.4
3. Croatia	445	8	1.8
4. Greece	1133	400	35.3
5. Malta	112	51	45.5
6. Poland	734	323	44.0
7. Ireland	237	27	11.4
8. Romania	629	36	5.7
9. Slovakia	32	2	6.3
10. Spain	5271	325	6.2
11. Switzerland	295	30	10.2
12. Turkey	612	135	22.1
13. UK	4986	394	7.9



Oxygen at discharge

33.9% of all patients discharged received oxygen of some form. Of these, 30.4% were discharged to use long-term oxygen therapy, 1.3% ambulatory oxygen and 2.3% short burst oxygen therapy.

Was oxygen provided at discharge?

Table 152. Oxygen at discharge.

	No		Long-term oxygen therapy		Ambulatory therapy		Short burst therapy		Total	
	N	%	N	%	N	%	N	%	N	%
EUROPE	10139	66.1	4660	30.4	195	1.3	352	2.3	15346	100.0
1. Austria	466	58.8	310	39.1	10	1.3	6	0.8	792	5.16
2. Belgium	336	66.5	125	24.8	22	4.4	22	4.4	505	3.29
3. Croatia	327	76.4	94	22.0	6	1.4	1	0.2	428	2.79
4. Greece	517	46.6	554	50.0	3	0.3	35	3.2	1109	7.23
5. Malta	80	80.8	15	15.2	0	0.0	4	4.0	99	0.65
6. Poland	578	82.1	119	16.9	6	0.9	1	0.1	704	4.59
7. Ireland	182	77.8	44	18.8	5	2.1	3	1.3	234	1.52
8. Romania	514	81.8	89	14.2	20	3.2	5	0.8	628	4.09
9. Slovakia	18	58.1	8	25.8	2	6.5	3	9.7	31	0.20
10. Spain	2979	57.8	2040	39.6	76	1.5	60	1.2	5155	33.59
11. Switzerland	173	67.1	81	31.4	3	1.2	1	0.4	258	1.68
12. Turkey	281	46.3	321	52.9	1	0.2	4	0.7	607	3.96
13. UK	3688	76.9	860	17.9	41	0.9	207	4.3	4066	26.50

Ventilatory support at discharge

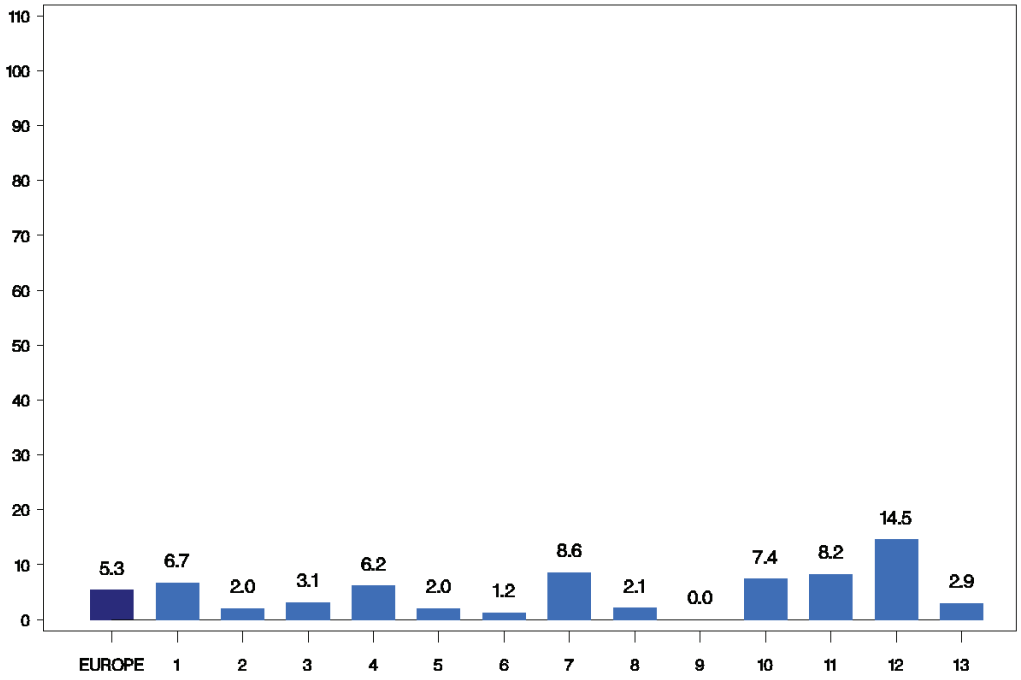
What is the percentage of discharged patients who received non-invasive ventilation at discharge?

Of all discharged patients, 5.3% received non-invasive ventilation for long term domiciliary use.

Although non-invasive ventilation is now widely used to treat acute exacerbations of COPD, it has been demonstrated to have no effect on shortness of breath, exercise tolerance, arterial blood gases, respiratory muscle strength, or quality of life in COPD patients with chronic respiratory failure (GOLD, 2010).

Table 153. Percentage discharged patients with non-invasive ventilation for long-term domiciliary use.

	Patients	Number	%
EUROPE	15226	811	5.3
1. Austria	795	53	6.7
2. Belgium	502	10	2.0
3. Croatia	423	13	3.1
4. Greece	1105	68	6.2
5. Malta	102	2	2.0
6. Poland	678	8	1.2
7. Ireland	233	20	8.6
8. Romania	622	13	2.1
9. Slovakia	31	0	0.0
10. Spain	5134	378	7.4
11. Switzerland	255	21	8.2
12. Turkey	606	88	14.5
13. UK	4740	137	2.9



Outcomes

Length of stay

What is the length of stay of COPD patients?

The median length of stay was 8 days. The comparative figures for males and females were 8 days for males and 7 for females.

Table 154. Length of stay of COPD patients.

	Patients	Median	P25–P75		P5–P95	
EUROPE	14302	8.00	5.00	11.00	2.00	20.00
1. Austria	759	9.00	7.00	12.00	4.00	20.00
2. Belgium	451	10.00	7.00	14.00	4.00	22.00
3. Croatia	380	11.00	9.00	16.00	4.00	25.00
4. Greece	998	7.00	5.00	10.00	2.00	16.00
5. Malta	104	5.00	4.00	8.00	3.00	13.00
6. Poland	688	9.00	7.00	13.00	4.00	21.00
7. Ireland	215	7.00	5.00	11.00	2.00	21.00
8. Romania	614	10.00	8.00	14.00	5.00	21.00
9. Slovakia	27	14.00	10.00	20.00	7.00	23.00
10. Spain	4934	8.00	5.00	11.00	3.00	19.00
11. Switzerland	265	10.00	7.00	14.00	4.00	22.00
12. Turkey	580	9.00	7.00	12.00	3.00	20.00
13. UK	4287	6.00	3.00	9.00	2.00	18.00

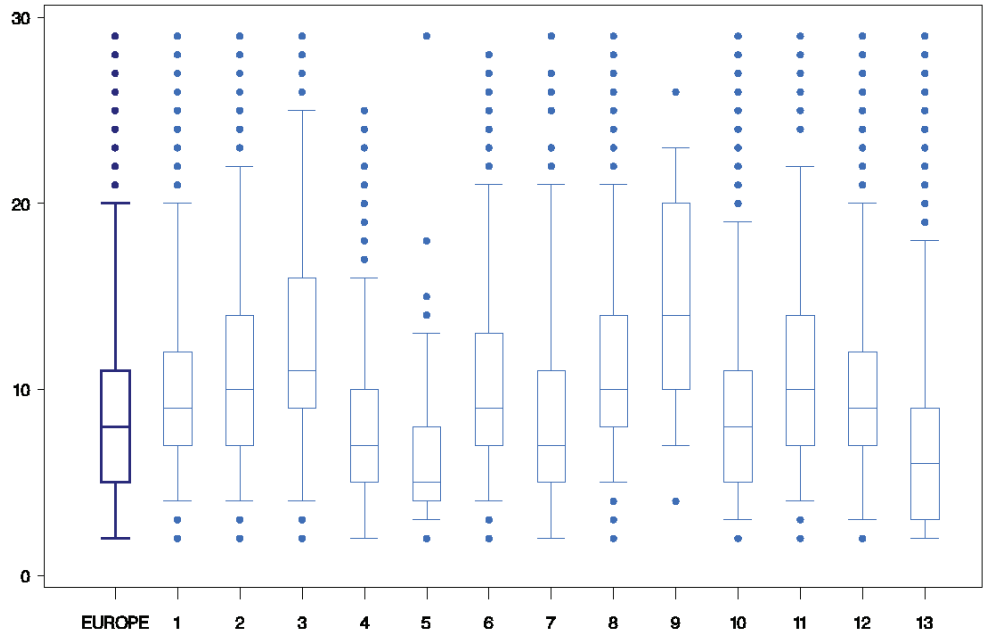


Table 155. Length of stay of COPD patients by sex.

	Patients	Median	P25–P75		P5–P95	
All	14302	8.00	5.00	11.00	2.00	20.00
Male	9810	8.00	5.00	11.00	2.00	20.00
Female	4492	7.00	5.00	11.00	2.00	20.00

Table 156. Length of stay of male COPD patients.

	Patients	Median	P25–P75		P5–P95	
EUROPE	9810	8.0	5.0	11.0	2.0	20.0
1. Austria	455	9.0	6.0	12.0	4.0	21.0
2. Belgium	286	10.0	7.0	15.0	4.0	22.0
3. Croatia	249	11.0	9.0	15.0	4.0	25.0
4. Greece	767	7.0	5.0	10.0	2.0	15.0
5. Malta	76	6.0	4.0	9.0	2.0	14.0
6. Poland	473	9.0	7.0	14.0	4.0	22.0
7. Ireland	112	7.0	5.0	9.0	2.0	18.0
8. Romania	497	11.0	8.0	15.0	5.0	21.0
9. Slovakia	17	15.0	10.0	20.0	7.0	26.0
10. Spain	4244	8.0	5.0	11.0	3.0	19.0
11. Switzerland	148	10.5	6.5	14.0	4.0	22.0
12. Turkey	459	9.0	7.0	12.0	3.0	20.0
13. UK	2027	6.0	3.0	9.0	2.0	18.0

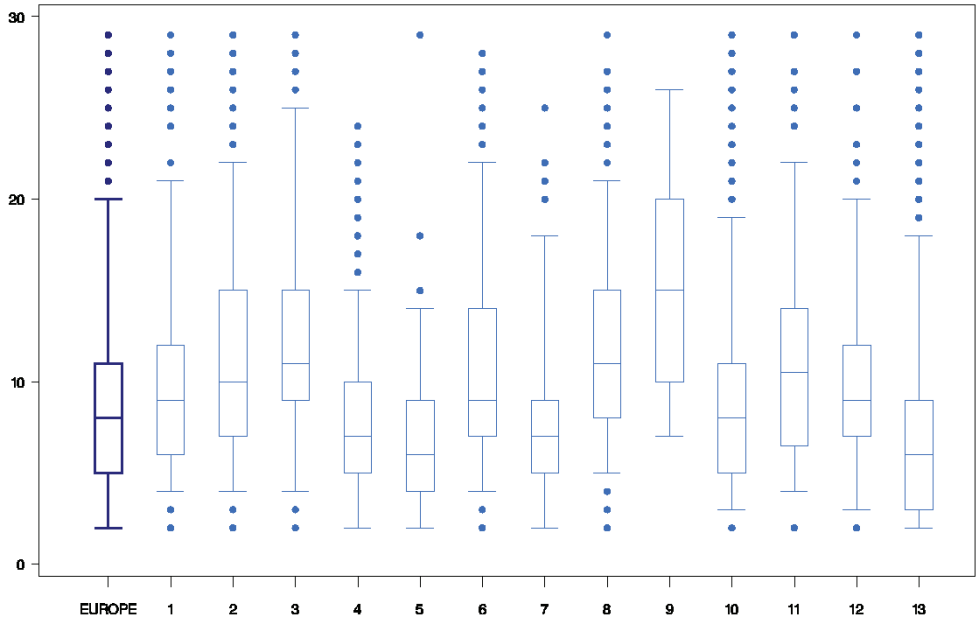
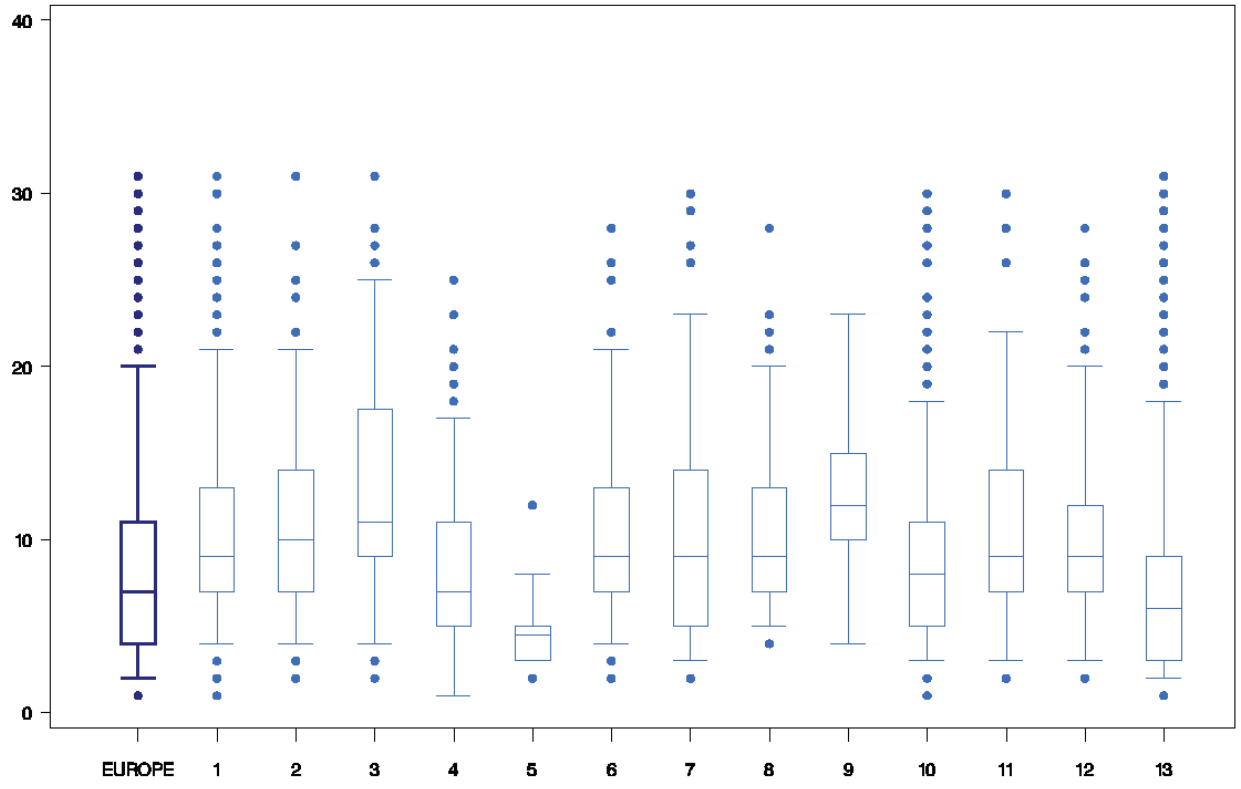


Table 157. Length of stay of female COPD patients.

	Patients	Median	P25–P75		P5–P95	
EUROPE	4645	7.0	4.0	11.0	2.0	20.0
1. Austria	310	9.0	7.0	13.0	4.0	21.0
2. Belgium	167	10.0	7.0	14.0	4.0	21.0
3. Croatia	132	11.0	9.0	17.5	4.0	25.0
4. Greece	248	7.0	5.0	11.0	1.0	17.0
5. Malta	28	4.5	3.0	5.0	3.0	8.0
6. Poland	215	9.0	7.0	13.0	4.0	21.0
7. Ireland	104	9.0	5.0	14.0	3.0	23.0
8. Romania	117	9.0	7.0	13.0	5.0	20.0
9. Slovakia	10	12.0	10.0	15.0	4.0	23.0
10. Spain	695	8.0	5.0	11.0	3.0	18.0
11. Switzerland	118	9.0	7.0	14.0	3.0	22.0
12. Turkey	121	9.0	7.0	12.0	3.0	20.0
13. UK	2380	6.0	3.0	9.0	2.0	18.0



Readmission

What is the readmission percentage within 90 days?

In the 90 days after admission, 35.1% of the patients were readmitted to hospital.

Table 158. Readmission within 90 days.

	Patients	Number	%
EUROPE	15041	5276	35.1
1. Austria	789	313	39.7
2. Belgium	498	161	32.3
3. Croatia	405	103	25.4
4. Greece	1088	290	26.7
5. Malta	105	50	47.6
6. Poland	708	159	22.5
7. Ireland	230	95	41.3
8. Romania	626	119	19.0
9. Slovakia	31	5	16.1
10. Spain	5045	1810	35.9
11. Switzerland	279	71	25.4
12. Turkey	592	214	36.1
13. UK	4645	1886	40.6

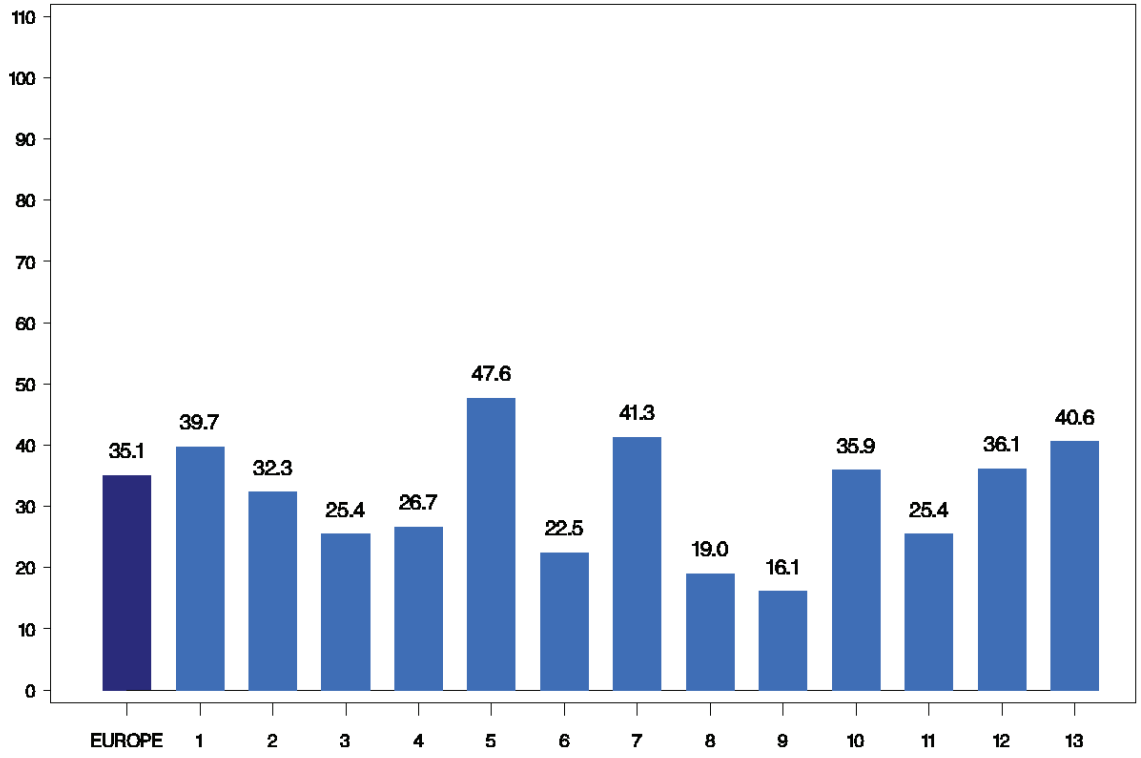


Table 159. Readmission within 90 days by sex.

	Patients	Number	%
All	15041	5276	35.1
Male	10266	3672	35.8
Female	4775	1604	33.6

Table 160. Readmission within 90 days for male patients.

	Patients	Number	%
EUROPE	10266	3672	35.8
1. Austria	468	187	40.0
2. Belgium	313	108	34.5
3. Croatia	268	67	25.0
4. Greece	840	226	26.9
5. Malta	77	36	46.8
6. Poland	487	111	22.8
7. Ireland	119	49	41.2
8. Romania	509	104	20.4
9. Slovakia	19	3	15.8
10. Spain	4340	1632	37.6
11. Switzerland	155	38	24.5
12. Turkey	470	179	38.1
13. UK	2201	932	42.3

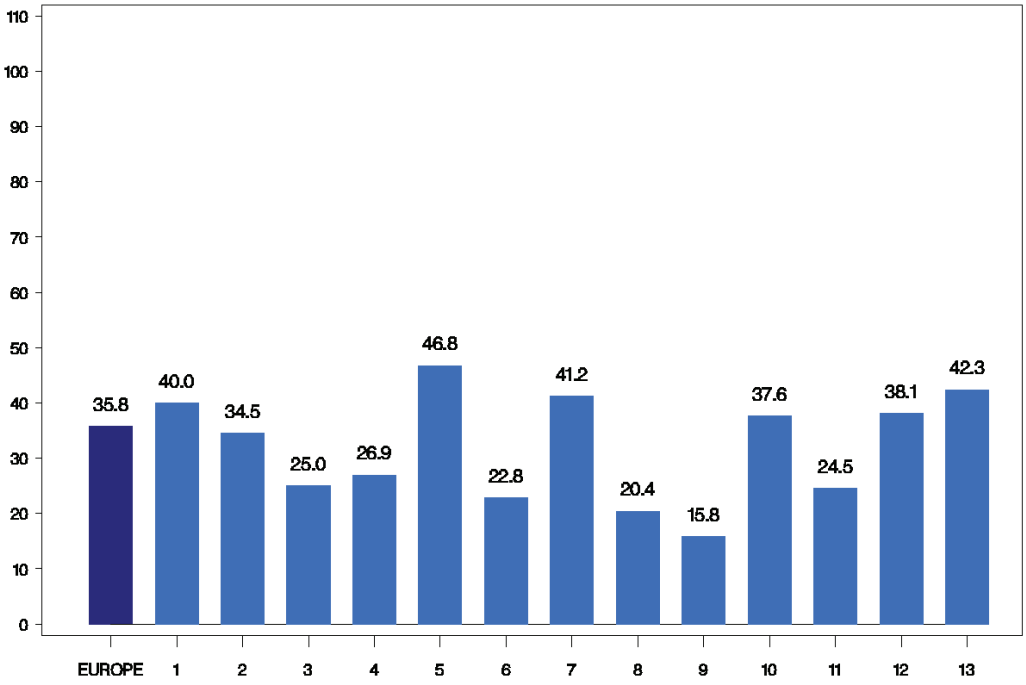
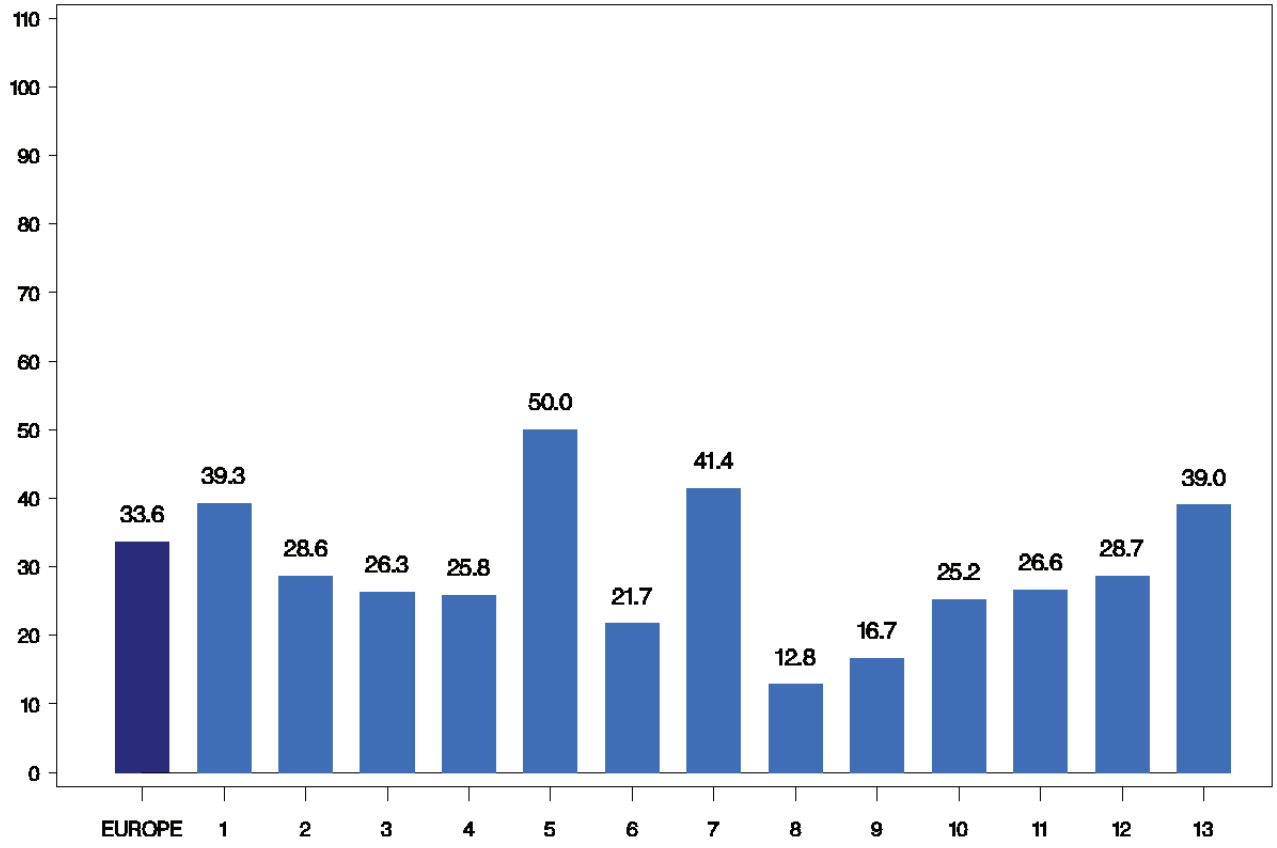


Table 161. Readmission within 90 days for female patients.

	Patients	Number	%
EUROPE	4775	1604	33.6
1. Austria	321	126	39.3
2. Belgium	185	53	28.6
3. Croatia	137	36	26.3
4. Greece	248	64	25.8
5. Malta	28	14	50.0
6. Poland	221	48	21.7
7. Ireland	111	46	41.4
8. Romania	117	15	12.8
9. Slovakia	12	2	16.7
10. Spain	705	178	25.2
11. Switzerland	124	33	26.6
12. Turkey	122	35	28.7
13. UK	2444	954	39.0

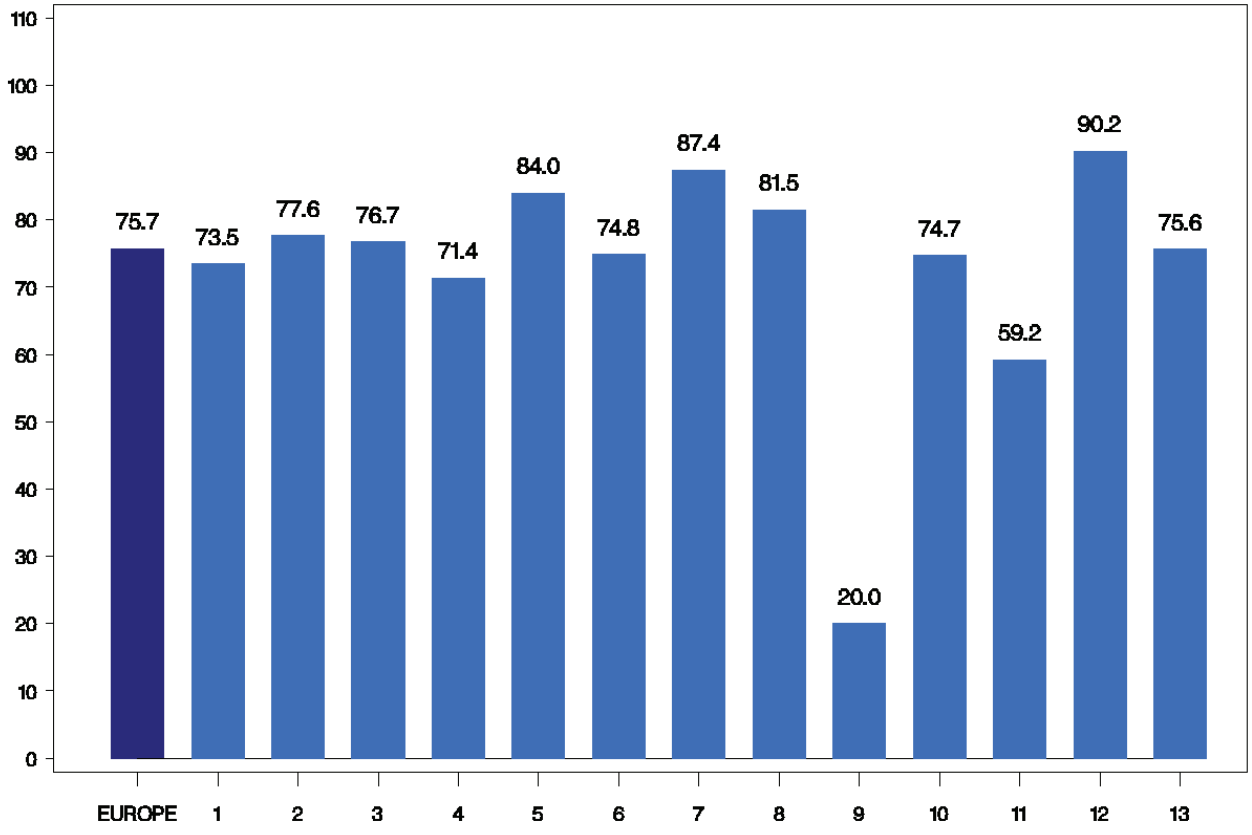


What is the COPD related readmission percentage?

The reason for readmission was recorded in 75.7% of the cases as COPD related.

Table 162. Readmission COPD related.

	Patients	Number	%
EUROPE	5276	3996	75.7
1. Austria	313	230	73.5
2. Belgium	161	125	77.6
3. Croatia	103	79	76.7
4. Greece	290	207	71.4
5. Malta	50	42	84.0
6. Poland	159	119	74.8
7. Ireland	95	83	87.4
8. Romania	119	97	81.5
9. Slovakia	5	1	20.0
10. Spain	1810	1352	74.7
11. Switzerland	71	42	59.2
12. Turkey	214	193	90.2
13. UK	1886	1426	75.6



Mortality in hospital

What is the mortality rate among COPD patients during admission?

The in-hospital mortality was 4.9%; 4.7% for males and 8.5% for females.

Table 163. Mortality of COPD patients during admission by sex.

	Patients	Number	%
All	15819	780	4.9
Male	10770	504	4.7
Female	5049	276	5.5

Table 164. Mortality of male COPD patients during admission.

	Patients	Number	%
EUROPE	10770	504	4.7
1. Austria	486	18	3.7
2. Belgium	323	10	3.1
3. Croatia	299	31	10.4
4. Greece	874	34	3.9
5. Malta	82	5	6.1
6. Poland	506	19	3.8
7. Ireland	123	4	3.3
8. Romania	511	2	0.4
9. Slovakia	19	0	0.0
10. Spain	4533	193	4.3
11. Switzerland	165	10	6.1
12. Turkey	488	18	3.7
13. UK	2361	160	6.8

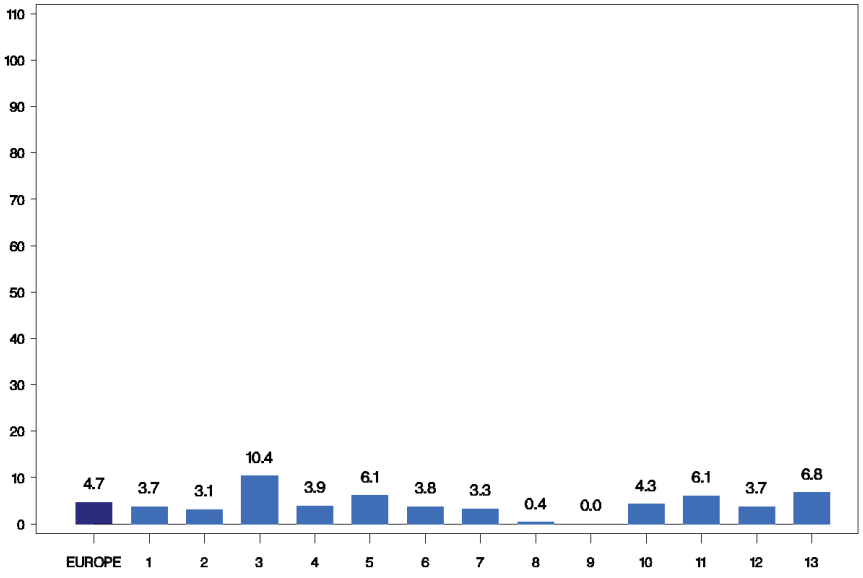
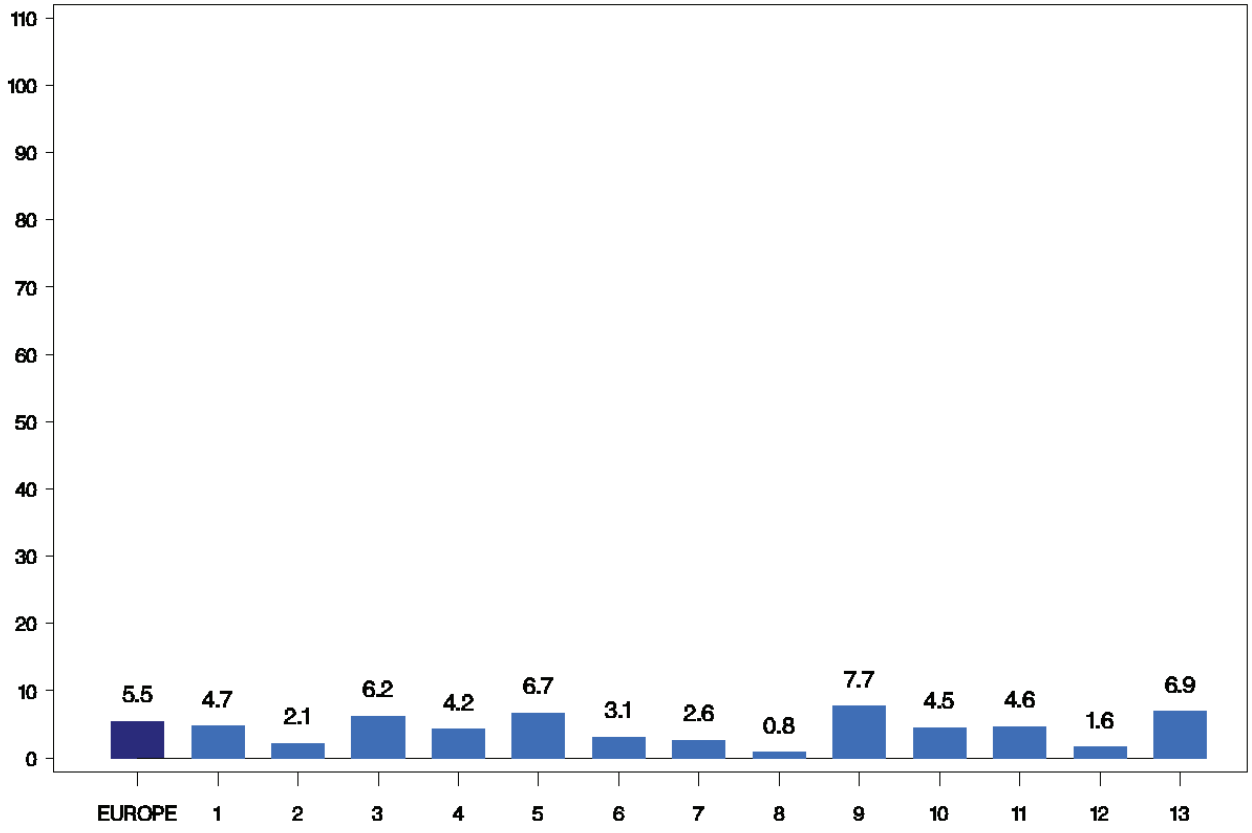


Table 165. Mortality of female COPD patients during admission.

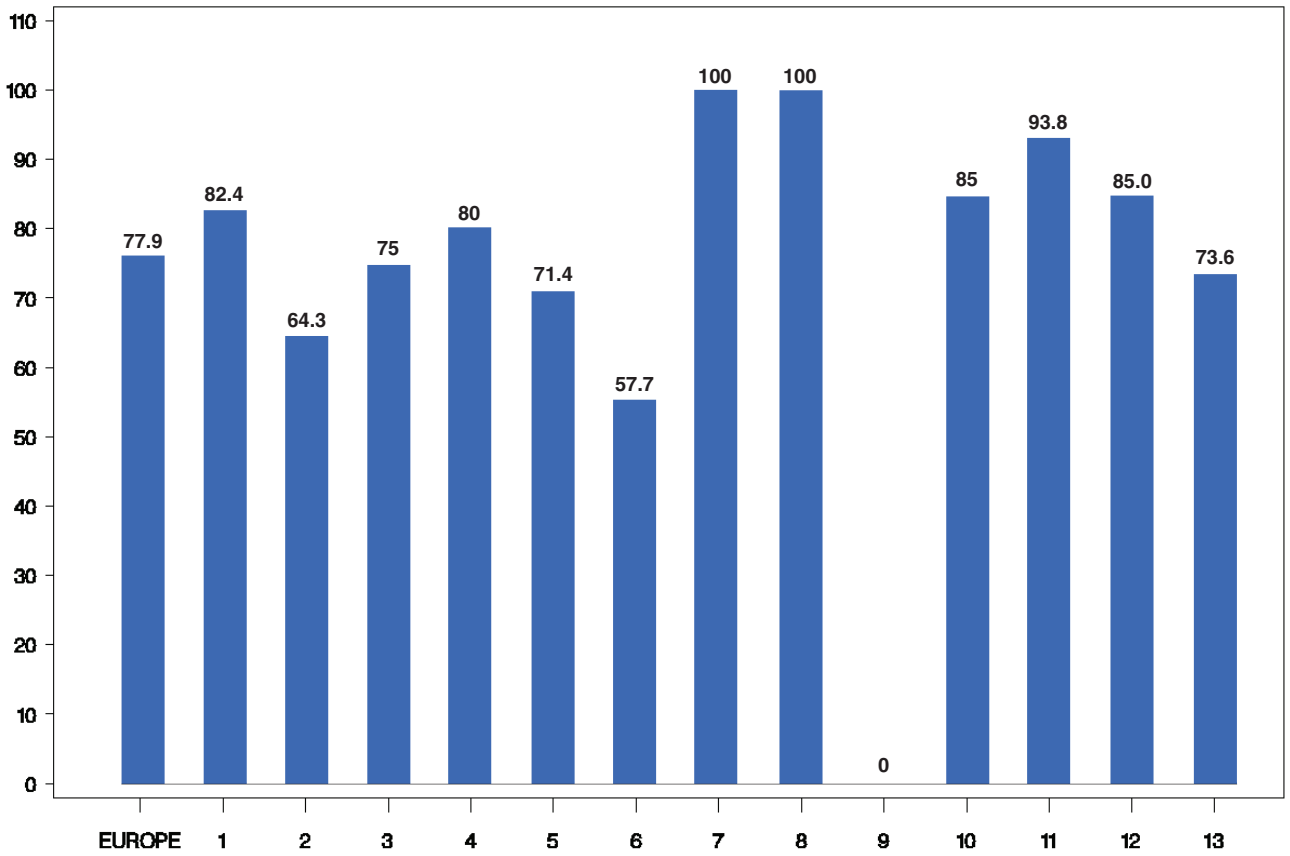
	Patients	Number	%
EUROPE	5049	276	5.5
1. Austria	337	16	4.7
2. Belgium	189	4	2.1
3. Croatia	146	9	6.2
4. Greece	259	11	4.2
5. Malta	30	2	6.7
6. Poland	228	7	3.1
7. Ireland	114	3	2.6
8. Romania	118	1	0.8
9. Slovakia	13	1	7.7
10. Spain	738	33	4.5
11. Switzerland	130	6	4.6
12. Turkey	124	2	1.6
13. UK	2623	181	6.9



What is the mortality rate due to COPD among COPD patients during admission?

Table 166. Death of COPD patients during admission caused by COPD.

	Patients	Number	%
EUROPE	780	608	77.9
1. Austria	34	28	82.4
2. Belgium	14	9	64.3
3. Croatia	40	30	75.0
4. Greece	45	36	80.0
5. Malta	7	5	71.4
6. Poland	26	15	57.7
7. Ireland	7	7	100.0
8. Romania	3	3	100.0
9. Slovakia	1	0	0.0
10. Spain	226	192	85.0
11. Switzerland	16	15	93.8
12. Turkey	20	17	85.0
13. UK	341	251	73.6



Mortality during follow-up period

What is the mortality rate among COPD patients within 90 days of admission?

The reasons for the variation in mortality during the follow-up period are not known at this stage, but further analysis of potential contributing factors, such as comorbidities, rehabilitation, home support and discharge medication, will be made shortly. From these data it is hoped to define a collection of measures that, taken together, will reduce mortality if implemented.

Mortality among patients discharged from hospital and within 90 days of the initial admission date was 6.1% (5.8% in males and 6.8% in females).

Table 167. Mortality of COPD patients during follow-up period.

	Patients	Number	%
EUROPE	15041	925	6.1
1. Austria	789	48	6.1
2. Belgium	498	28	5.6
3. Croatia	405	22	5.4
4. Greece	1088	32	2.9
5. Malta	105	8	7.6
6. Poland	708	34	4.8
7. Ireland	230	19	8.3
8. Romania	626	11	1.8
9. Slovakia	31	0	0.0
10. Spain	5045	235	4.7
11. Switzerland	279	8	2.9
12. Turkey	592	42	7.1
13. UK	4645	438	9.4

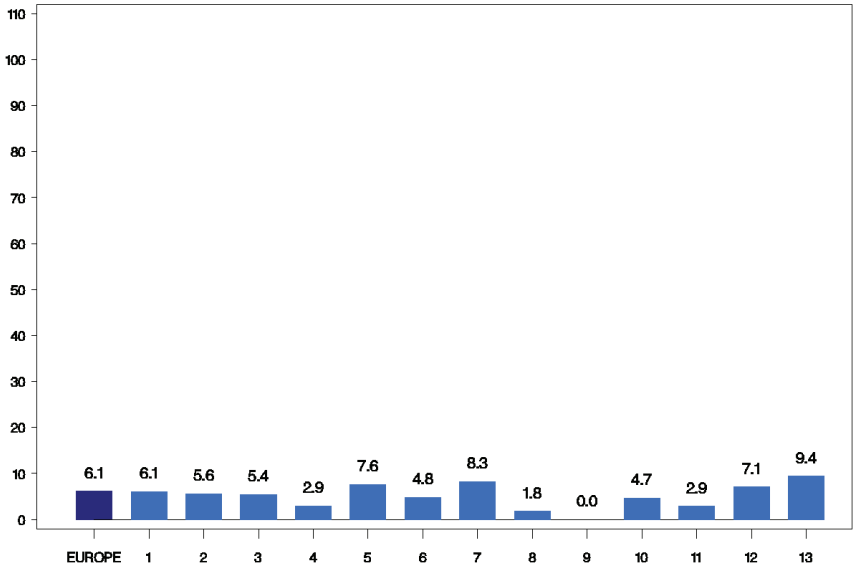


Table 168. Mortality of COPD patients during follow-up period by sex.

	Patients	Number	%
All	15041	925	6.1
Male	10266	600	5.8
Female	4775	325	6.8

Table 169. Mortality of male COPD patients.

	Patients	Number	%
EUROPE	10266	600	5.8
1. Austria	468	29	6.2
2. Belgium	313	19	6.1
3. Croatia	268	20	7.5
4. Greece	840	27	3.2
5. Malta	77	8	10.4
6. Poland	487	26	5.3
7. Ireland	119	9	7.6
8. Romania	509	7	1.4
9. Slovakia	19	0	0.0
10. Spain	4340	214	4.9
11. Switzerland	155	6	3.9
12. Turkey	470	32	6.8
13. UK	2201	203	9.2

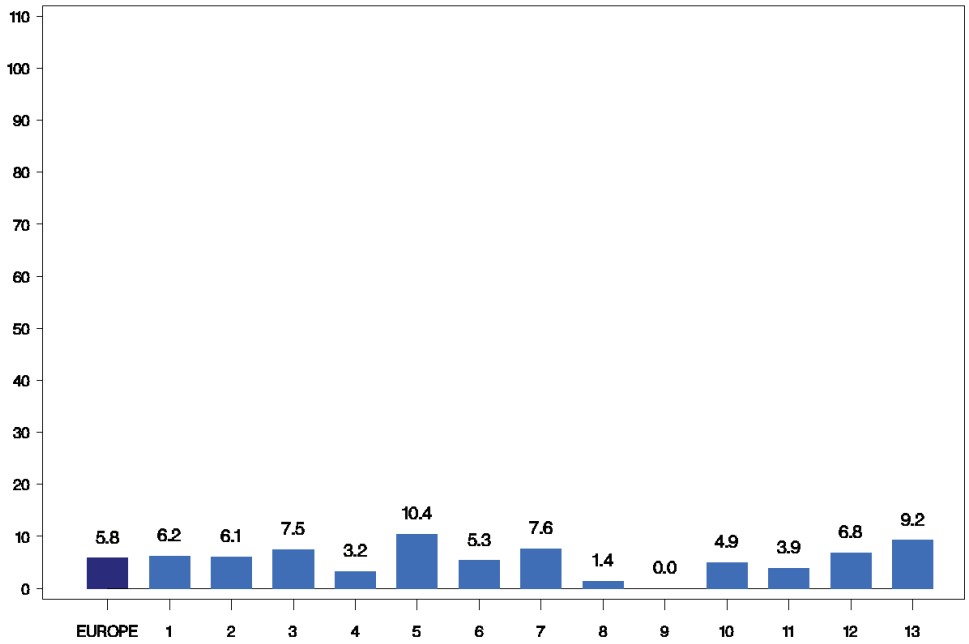
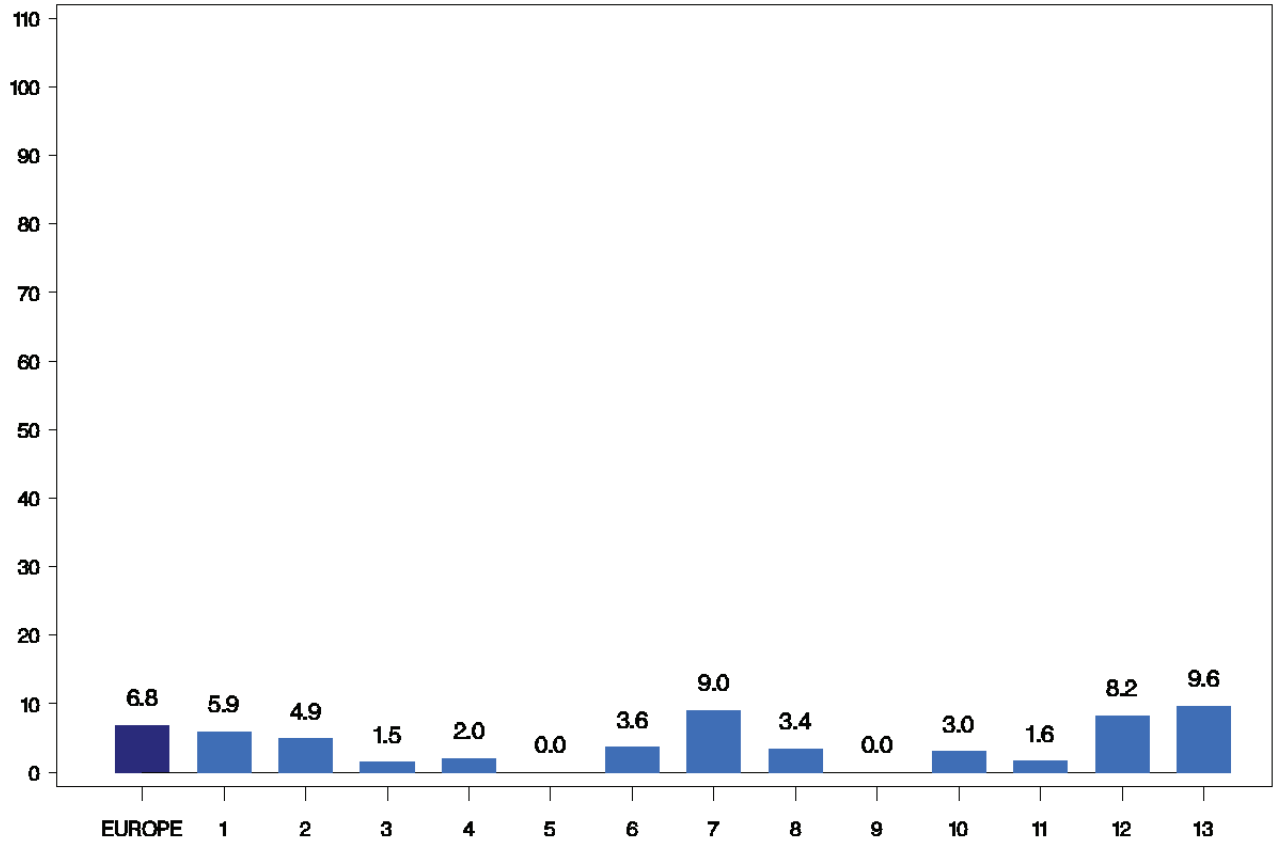


Table 170. Mortality of female COPD patients.

	Patients	Number	%
EUROPE	4775	325	6.8
1. Austria	321	19	5.9
2. Belgium	185	9	4.9
3. Croatia	137	2	1.5
4. Greece	248	5	2.0
5. Malta	28	0	0.0
6. Poland	221	8	3.6
7. Ireland	111	10	9.0
8. Romania	117	4	3.4
9. Slovakia	12	0	0.0
10. Spain	705	21	3.0
11. Switzerland	124	2	1.6
12. Turkey	122	10	8.2
13. UK	2444	235	9.6



What is the mortality rate among COPD patients after discharge caused by COPD?

In patients who died after discharge, it was recorded whether the death was related to COPD. In 17.2% of patients, the reason for death after discharge was not recorded in the medical file.

Table 171. Death of COPD patients after discharge.

	Patients		Death caused by COPD		Death not caused by COPD		Not recorded	
	N	%	N	%	N	%	N	%
EUROPE	925	100.0	511	55.24	255	27.57	159	17.19
1. Austria	48	5.19	25	52.08	9	18.75	14	29.17
2. Belgium	28	3.03	16	57.14	9	32.14	3	10.71
3. Croatia	22	2.38	12	54.55	8	36.36	2	9.09
4. Greece	32	3.46	16	50.00	10	31.25	6	18.75
5. Malta	8	0.86	3	37.50	2	25.00	3	37.50
6. Poland	34	3.68	18	52.94	15	44.12	1	2.94
7. Ireland	19	2.05	12	63.16	4	21.05	3	15.79
8. Romania	11	1.19	4	36.36	7	63.64	0	
10. Spain	235	25.41	142	60.43	72	30.64	21	8.94
11. Switzerland	8	0.86	1	12.50	6	75.00	1	12.50
12. Turkey	42	4.54	29	69.05	7	16.67	6	14.29
13. UK	438	47.35	233	53.20	106	24.20	99	22.60

Table 172. Death of COPD patients after discharge by sex.

	Death caused by COPD		Death not caused by COPD		Not recorded		Total	
	N	%	N	%	N	%	N	%
Male	326	54.33	183	30.50	91	15.17	600	64.86
Female	185	56.92	72	22.15	68	20.92	325	35.14
Total	511	55.24	255	27.57	159	17.19	925	100.0

Table 173. Death of male COPD patients after discharge.

	Total		Death caused by COPD		Death not caused by COPD		Not recorded	
	N	%	N	%	N	%	N	%
EUROPE	600	100.0	326	54.33	183	30.50	91	15.17
1. Austria	29	4.83	15	51.72	6	20.69	8	27.59
2. Belgium	19	3.17	10	52.63	6	31.58	3	15.79
3. Croatia	20	3.33	12	60.00	6	30.00	2	10.00
4. Greece	27	4.50	13	48.15	10	37.04	4	14.81
5. Malta	8	1.33	3	37.50	2	25.00	3	37.50
6. Poland	26	4.33	13	50.00	12	46.15	1	3.85
7. Ireland	9	1.50	5	55.56	2	22.22	2	22.22
8. Romania	7	1.17	2	28.57	5	71.43	0	
10. Spain	214	35.67	127	59.35	68	31.78	19	8.88
11. Switzerland	6	1.00	1	16.67	4	66.67	1	16.67
12. Turkey	32	5.33	21	65.63	6	18.75	5	15.63
13. UK	203	33.83	104	51.23	56	27.59	43	21.18

Table 174. Death of female COPD patients after discharge.

	Total		Death caused by COPD		Death not caused by COPD		Not recorded	
	N	%	N	%	N	%	N	%
EUROPE	325	100.0	185	56.92	72	22.15	68	20.92
1. Austria	19	5.85	10	52.63	3	15.79	6	31.58
2. Belgium	9	2.77	6	66.67	3	33.33	0	
3. Croatia	2	0.62	0		2	100.0	0	
4. Greece	5	1.54	3	60.00	0		2	40.00
6. Poland	8	2.46	5	62.50	3	37.50	0	
7. Ireland	10	3.08	7	70.00	2	20.00	1	10.00
8. Romania	4	1.23	2	50.00	2	50.00	0	
10. Spain	21	6.46	15	71.43	4	19.05	2	9.52
11. Switzerland	2	0.62	0		2	100.0	0	
12. Turkey	10	3.08	8	80.00	1	10.00	1	10.00
13. UK	235	72.31	129	54.89	50	21.28	56	23.83

Overall mortality

The overall mortality combining in hospital and post discharge deaths is as follows.

Table 175. Overall mortality.

	Patients	Number	%
EUROPE	15821	1705	10.8
1. Austria	823	82	10.0
2. Belgium	512	42	8.2
3. Croatia	445	62	13.9
4. Greece	1133	77	6.8
5. Malta	112	15	13.4
6. Poland	734	60	8.2
7. Ireland	237	26	11.0
8. Romania	629	14	2.2
9. Slovakia	32	1	3.1
10. Spain	5271	461	8.7
11. Switzerland	295	24	8.1
12. Turkey	612	62	10.1
13. UK	4986	779	15.6

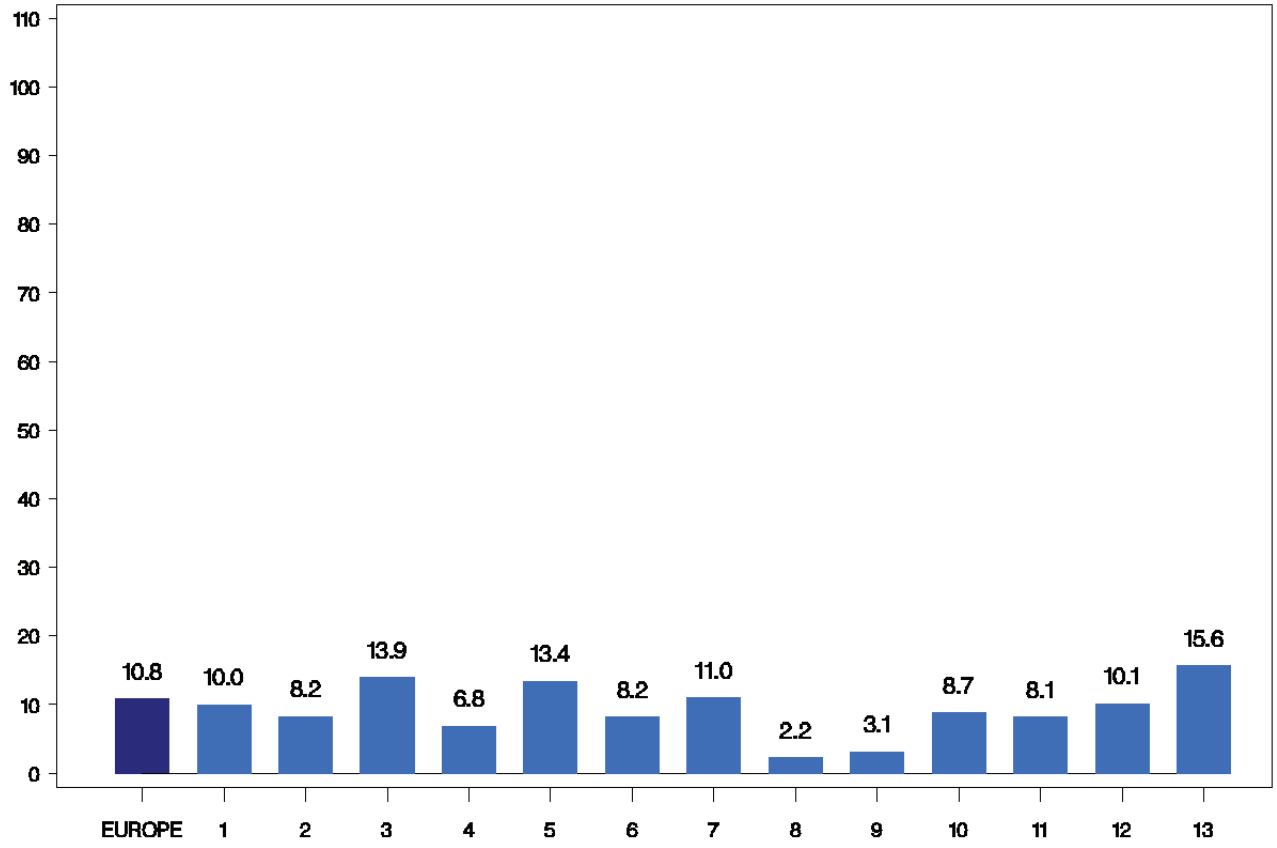


Table 176. Overall mortality by sex.

	Patients	Number	%
All	15821	1705	10.8
Male	10770	1104	10.3
Female	5051	601	11.9

Table 177. Males overall mortality.

	Patients	Number	%
EUROPE	10770	1104	10.3
1. Austria	486	47	9.7
2. Belgium	323	29	9.0
3. Croatia	299	51	17.1
4. Greece	874	61	7.0
5. Malta	82	13	15.9
6. Poland	506	45	8.9
7. Ireland	123	13	10.6
8. Romania	511	9	1.8
9. Slovakia	19	0	0.0
10. Spain	4533	407	9.0
11. Switzerland	165	16	9.7
12. Turkey	488	50	10.2
13. UK	2361	363	15.4

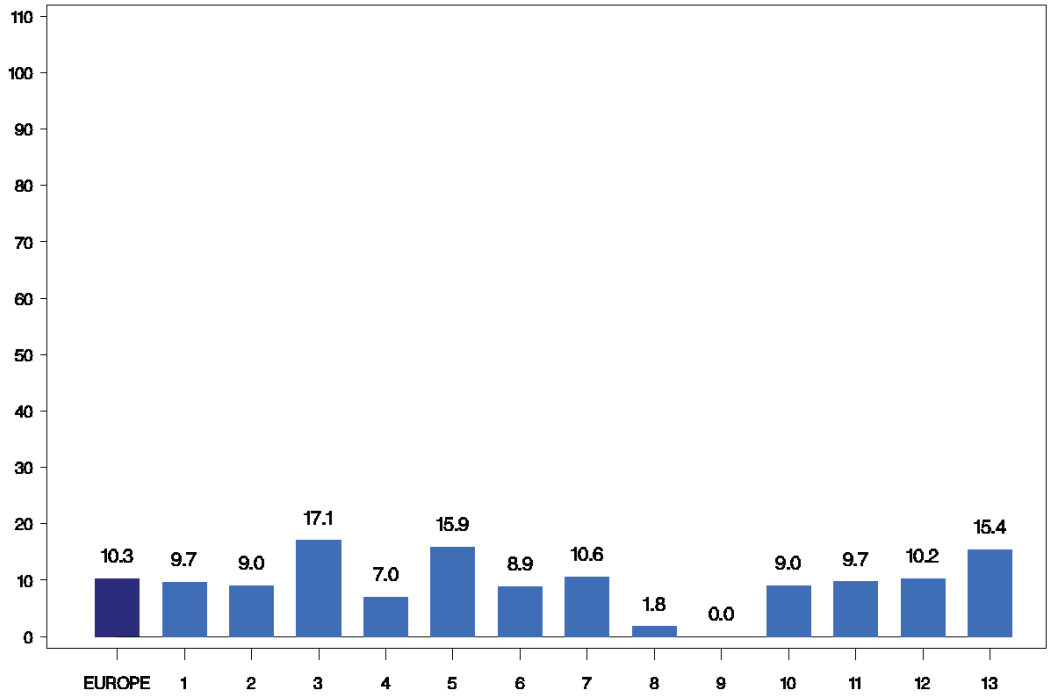
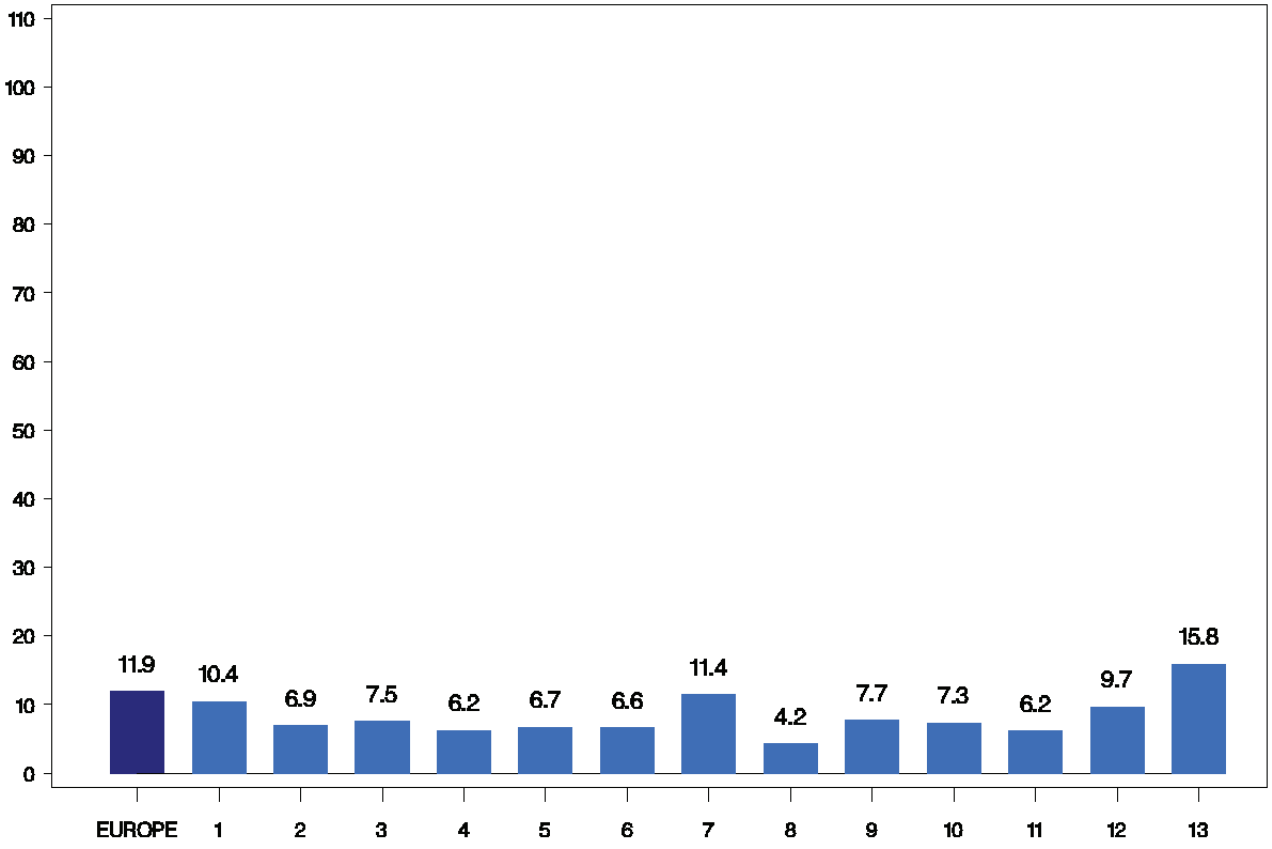


Table 178. Females overall mortality.

	Patients	Number	%
EUROPE	5051	601	11.9
1. Austria	337	35	10.4
2. Belgium	189	13	6.9
3. Croatia	146	11	7.5
4. Greece	259	16	6.2
5. Malta	30	2	6.7
6. Poland	228	15	6.6
7. Ireland	114	13	11.4
8. Romania	118	5	4.2
9. Slovakia	13	1	7.7
10. Spain	738	54	7.3
11. Switzerland	130	8	6.2
12. Turkey	124	12	9.7
13. UK	2625	416	15.8



Conclusion

The first European COPD Audit was a successful collaborative project of 13 European countries to collect clinical and organisational data.

There are a number of observations that can be made from the descriptive data. Future analysis will provide further information on confounding factors that may account for some of the variation observed. Some of the international variation will be a reflection of the smaller number of cases entered by some countries but there remains a remarkable difference even between those which contributed the highest numbers to the audit. It will also be argued by some that much of the variation may be accounted for by the difference in the type of hospitals submitting data within a country, but this raises the question "why should the standard of care offered to a patient be determined by the type of hospital to which they are admitted?"

1) There is a more than five-fold variation in the bed capacity of hospitals across Europe and a greater than 10-fold difference in emergency admissions across hospitals.

2) 21% of hospitals stated they did not have ICU beds available for COPD patients.

3) Only 49% of hospitals have an high dependency unit that accepts COPD patients.

4) Less than 50% of hospitals had a respiratory specialist on call every day, with a range of 1–21 specialists on the staff in a single hospital.

5) Many hospitals do not have a respiratory physiotherapist or a nurse specialist and 40% of COPD patients will not be seen by such a specialist during admission.

6) 80% of admissions will see a medical respiratory specialist.

7) 18% of hospitals do not have a respiratory ward and only 32% use specialty triage for emergency admissions.

8) Although 90% of hospitals have a non-invasive ventilation service, only 68% of hospitals state there is sufficient capacity to treat all eligible patients.

9) Invasive mechanical ventilation is not available to COPD admissions in 24% of hospitals.

10) Pulmonary rehabilitation for discharged patients is available in only 50% of hospitals.

11) Supported discharge programmes are offered by only 32% of hospitals.

12) In 40% of hospitals there is no formal access to palliative care services for end-of-life COPD patients.

13) There is significant variation in the proportion of admissions by sex across countries, with women forming a relatively high percentage of admissions compared to reported smoking prevalence in some countries (UK 53%, Ireland 48% and Switzerland 44%) but are a distinct minority in others (Spain 14%).

14) The average age of admissions varies considerably between countries (63 years in Romania and Slovakia, to 75 years in Spain).

15) A high proportion of admitted patients are current smokers (48% in Greece and 44% in Belgium).

16) A significant proportion of patients have comorbidities, particularly cardiovascular diseases.

17) Many patients have had a previous admission within 12 months.

18) Spirometry results are not available to admitting teams in a significant proportion of cases (UK and Greece 53%, Turkey 51%).

19) There is wide variation across Europe in the proportion of patients cared for on specialist respiratory wards (Switzerland 12% and Ireland 18%, to Romania and Turkey 90%).

20) Nearly all admitted patients had increased breathlessness, but the proportion with recorded increased (Switzerland 49% to Romania 80%) or coloured sputum (Switzerland 38% and Belgium 48%, to Greece 61% and Romania 64%) varied significantly across Europe.

21) Pre-admission treatment varies widely across Europe (antibiotics received: Austria 7% to UK 27%; systemic steroids received: Romania 1% to Belgium 33%; intravenous theophylline: Ireland and Northern Ireland <1%, to Turkey 51% and Croatia 86%).

22) A significant proportion of patients received high flow oxygen before admission (35% in Austria and Ireland).

23) Inpatient treatment with antibiotics, systemic steroids and intravenous theophylline varied widely across Europe (antibiotics given: Austria 54%, to Romania 93%, Malta 94% and Ireland 95%; systemic steroids given: Romania 51% to Ireland 96%; intravenous theophylline: Ireland and Northern Ireland <1%, to Turkey 51% and Croatia 86%).

24) The proportion of patients receiving non-invasive ventilation and/or invasive mechanical ventilation varied considerably across Europe (non-invasive ventilation: Poland 4.4%, to Turkey 30% and Switzerland 31%; invasive mechanical ventilation: Ireland, Romania and UK <1%, to 5% Belgium).

25) There were major differences in discharge medications across Europe (long-acting muscarinic antagonist: Malta 2% to Austria 81%; long-acting β_2 agonist/inhaled corticosteroid combination Malta 1% to Ireland 84%).

26) There were major differences in oxygen provision at discharge (Romania 14% and Malta 15%, to Greece 50% and Turkey 53%) .

27) There is a high mortality rate: about 5% of patients died in hospital and a further 6% in the 90 days after admission.

28) The majority of deaths were caused by COPD.

29) 35% of survivors were readmitted within the same time period.

30) The median length of stay was 8 days, with wide variations across Europe (Malta 5 days and UK 6 days, to Croatia 11 days and Slovakia 14 days).

Recommendations

We have completed the data collection phase of the audit. The next step is to prepare an appropriate quality improvement plan based on the most relevant findings to both our national and our individual services that will result in better patient care. This audit demonstrates that nearly half of all patients admitted to hospital with COPD exacerbation are either dead (11%) or back in hospital (35%) within 90 days. These figures challenge the European respiratory community to re-examine the care pathways for such patients. The audit data highlight massive variations in both pre-hospital and inpatient care, despite the existence of international management guidelines, while organisation of COPD care also varies considerably between countries. While there may be no one single patient pathway that is appropriate across all of Europe, the unacceptable differences in the care quality delivered across the current systems provides a compelling argument for review and reform. We recommend that a task force be established to drive forwards COPD care reform as a priority across Europe, with the aim of reducing inequalities both between and within countries and so raise the standard of care delivered to patients.

We recommend that, as part of a European quality improvement process, each hospital admitting patients with COPD exacerbations regularly audits the quality of the care provided and the patient outcomes.

We recommend that organisations, whether public or private, funding COPD healthcare support the collection of audit data of this kind from their hospital networks to monitor the quality of care provided as a means of understanding the value for money provided.

We recommend that audit data of this kind be made available to patients and the public so they may be informed about the standards of care provided.

We recommend that hospitals begin dialogues with other comparable hospitals, not only at a national level but also across European countries, in order to learn about different models of care delivery.

We recommend that future management guidelines recognise the complex nature of COPD care and emphasise the importance of managing comorbidities rather than COPD in isolation.

We recommend that future guidelines include recommendations on organisation of hospital care based upon the best evidence available.

We recommend that consideration be given to harmonising some healthcare roles across Europe, for example the respiratory nurse specialist.

We recommend that European national societies participate in future audits to measure improvements over time.

For more information about ERS school courses and an update on the schedule, please visit http://www.ersnet.org/courses.html

For more information about the CME modules, please visit www.ers-education.org/cmeOnline/

Appendix A: Definitions

Acidotic: increased acidity in the blood (pH ≤7.35).

Admission: an episode in which a patient with a COPD exacerbation is admitted to a ward and stayed in hospital for 4 hours or more prior to discharge or acceptance to an early discharge scheme.

Alkalotic: abnormally high alkalinity of the blood (pH ≥7.45).

BMI: a key index for relating a person's body weight to their height. The body mass index (BMI) is a person's weight in kilogrammes divided by their height in metres squared.

Catchment population: the total number of people living in a hospital's catchment area; the total population from which patients might be admitted to a certain hospital.

Chronic obstructive pulmonary disease (COPD): a preventable and treatable disease with some significant extrapulmonary effects that may contribute to its severity in individual patients. Its pulmonary component is characterised by airflow limitation that is not fully reversible. The airflow limitation is usually progressive and associated with an abnormal inflammatory response of the lung to noxious particles or gases (GOLD, 2010).

Current smoker: someone who is currently smoking or has quit in the month prior to admission.

Early discharge programme: have a variety of names, including "hospital at home" and "supported discharge programmes", or may be known by local acronyms. In essence, such a programme involves a multidisciplinary team caring for a patient at home, facilitating an earlier discharge from hospital than would otherwise have been possible.

Exacerbation: an event in the natural course of the disease characterised by a change in the patient's baseline dyspnoea, cough, and/or sputum that is beyond normal day-to-day variations, is acute in onset, and may warrant a change in regular medication in a patient with underlying COPD (GOLD, 2010).

Ex-smoker: someone who has stopped smoking at least 1 month before admission.

FEV1 : forced expiratory volume in 1 s.

FEV1/FVC: the FEV1 expressed as a percentage of the forced vital capacity (FVC), *i.e.* the proportion of the vital capacity exhaled in the first second.

Hospital: a healthcare facility located in a particular geographical site. It may be composed of one or several buildings, but these buildings are administered by a single executive board.

Hypercapnia: a condition that occurs when there is raised levels of carbon dioxide in the blood (arterial carbon dioxide tension (P_{a,CO_2}) >6.0 kPa; 45 mmHg).

Mortality: the total number of deaths in the total population studied.

Never-smoker: someone who has never smoked on a daily basis.

Pack-years: are calculated by multiplying the number of packs smoked per day by number of years that a patient has been a smoker. For example, 1 pack (20 cigarettes) per day for 10 years equates to 10 pack-years.

Respiratory department: an integrated clinical grouping of healthcare workers (clinicians and administrators) whose responsibility is to care for patients with respiratory conditions. This excludes healthcare workers whose responsibilities are purely research without a clinical role. A department may function within one hospital or across more than one hospital.

Respiratory nurse specialist: a nurse who has undergone additional specialist training that accredits them to perform additional responsibilities beyond those expected of the ward nursing staff. Most respiratory nurses are not ward based but have care responsibilities across a number of wards or departments.

Ward: clinical area in which patients are nursed in beds as admissions to hospital.

Unit: a functional healthcare facility that is often identical to a hospital but may include more than one hospital and or more than one geographical location. The unit, however, functions as a single administrative and healthcare facility. Examples may include two, or even more, hospitals that previously were independent but have then merged clinical and administrative functions.

GOLD criteria: Global Initiative for Chronic Obstructive Lung Disease

Drug class		Generic name	Brand name
β_2-agonist	Short-acting	Levalbuterol	Xopenex, Xopenex HFA
		Terbutaline	Brethine
		Metaproterenol	Alupent
		Pirbuterol	Maxair
		Albuterol	Ventolin
	Long-acting	Formoterol	Foradil, Perforomist
		Salmeterol	Serevent
		Indicaterol	Arcapta
Anticholinergics	Short-acting	Ipratropium bromide	Atrovent, Apovent, Aerovent
	Long-acting	Tiotropium	SPIRIV
Methylxanthines		Theophylline	Slo-Bid, Theochron, Theo-Dur, Theo-24, Uniphyl
Corticosteroids	Inhaled	Beclomethasone	Qvar
		Budesonide	Pulmicort
		Fluticasone	Flovent
	Systemic	Prednisone	Deltasone, Liquid Pred, Orasone, Adasone, Deltacortisone, Prednisonum
		Methyl prednisolone	Medrol
Combined therapy	Short-acting	Fenoterol ipatropium	Berodual
		Salbutamol/ipatropium	Combivent
	Long-acting	Formoterol/budesonide	Symbicort
		Salmeterol/fluticasone	Seretide

From the *Global Strategy for Diagnosis, Management, and Prevention of COPD updated 2010*, used with permission from the Global Initiative for Chronic Obstructive Lung Disease (GOLD), www.goldcopd.org

Appendix B: Organisational survey

Question
Hospital ID
Status
Hospital
Country
Total number of beds in the hospital
How many people have access to your hospital?
Teaching/university hospital
Does your hospital belong to a government or state funded health service or is it a private company?
Does your hospital have an intensive care unit?
Does your hospital have an ICU that admits COPD patients?
If yes, how many beds?
Does your hospital have spirometry available?
Is there a respiratory physician on call every day of the year?
Does your hospital have a respiratory ward?
Does your hospital have a respiratory team?
Give details of any COPD service or clinical practice that you think is particularly good and might be of interest to other hospitals
Does your unit have a respiratory outpatient clinic available?
Does your unit have an outpatient clinic for COPD?
How many emergency admissions for any cause did your unit take in 2009?
How many respiratory specialists are there in your unit?
How many respiratory medical trainees are there in your team?
How many chest physiotherapists/respiratory therapists are there in your unit?
How many nurse specialists are there in your unit?
How many lung function technicians are there in your unit?
Does your unit have a respiratory ward?
If yes, what percentage of COPD patients admitted during a year are managed on the respiratory ward?
How many ward rounds by the admitting specialist are there in the first 24 hours of a COPD admission in a working day?
Does your unit operate a system of specialty triage for COPD?
Does your unit have an emergency department?
Does your unit have an admissions ward in which some/all COPD patients are treated?
Does your unit have a high dependency unit that admits COPD patients?
If yes, how many beds?

What percentage of COPD patients are seen by a chest physiotherapist or respiratory nurse specialist during an admission in your unit?
What percentage of COPD patients are seen by a respiratory medical specialist during an admission in your unit?
Does your unit offer non-invasive ventilation for acidotic respiratory failure patients?
If yes, do you have the capacity to treat all eligible patients?
Does your unit offer invasive mechanical ventilation for acidotic respiratory failure patients?
If yes, do you have the capacity to treat all eligible patients?
Does your unit have access to a pulmonary rehabilitation programme for discharged COPD admissions?
If yes, what type of programme do you carry out?
If yes, what percentage of eligible discharged patients receives pulmonary rehabilitation within 6 months?
Does your unit operate an early/supported discharge programme for COPD admissions?
If so, what percentage of admissions enters this programme?
Does your unit have access to a palliative care service for end-of-life COPD admissions?
Does your unit take care of long-term oxygen patients?
Does your hospital take care of home ventilated patients?

Appendix C: Clinical survey

Question

Case number
Country
Hospital
Doctor
Status
Entry date
Last update
Birth date
Age
Gender
Current smoking status
Pack-years
Comorbidities Charlson index
Number of admissions (hospital stay ≥12 hours) in the previous 12 months for COPD exacerbation
Spirometry results available?
Spirometry results FVC (%)
Spirometry results FEV_1 (%)
Spirometry results FEV_1/FVC (%)
Ward
Admission date
Dyspnoea increase?
Sputum increase?
Sputum colour change?
Height cm
Weight kg
BMI $kg \cdot m^{-2}$
Treatment for the exacerbation before admission
Was the patient given high flow oxygen in the hour before admission?
Arterial blood gas taken on admission?
pH
HCO_3 $mmol \cdot L^{-1}$
P_{a,O_2}
P_{a,CO_2}
Was the arterial blood gas taken whilst patient was on supplemental oxygen?

Any relevant abnormality on chest radiograph
Treatments for the exacerbation during admission
Oxygen?
Ventilatory support
Explain why the patient didn't receive ventilation support?
Treatment at discharge
Oxygen at discharge
Non-invasive ventilation at discharge?
Death during current admission?
Has the patient been discharged?
Discharge date
Length of stay
For what reason is the patient not discharged?
Date of death during admission
Death caused by COPD
Comments
Readmission within 90 days
The reason for readmission is
Death within 90 days
Date of death
Death caused by COPD?
Comments

Appendix D: Inclusion and exclusion criteria

Inclusion criteria

Patients admitted to hospital for 12 hours or longer with a senior clinician made diagnosis of COPD exacerbation or any other synonym, confirmed at discharge as judged by the investigator/audit lead.

Patients admitted to hospital for 12 hours or longer with a respiratory cause of admission, as referred by the discharge report and a history compatible with COPD.

Exclusion criteria

A patient admitted as a clinical case of COPD exacerbation that is later judged to have another primary diagnostic reason for admission, e.g. the subsequent diagnosis is changed from COPD to heart failure.

Any other primary cause of deterioration and hospital admission, such as:

- Pneumonia
- Pulmonary embolism
- Pulmonary oedema
- Pneumothorax
- Thoracic trauma
- Pleural effusion
- Asthma
- Pulmonary fibrosis
- Sleep apnoea with no treatment
- Kyphoscoliosis
- Obesity-hypoventilation syndrome
- Neuromuscular pathology
- Tracheal or upper airway stenosis
- Severe bronchiectasis
- Severe tuberculosis sequelae
- Bronchogenic carcinoma or any other thoracic neoplasm

Extrapulmonary diseases as the primary diagnosis for admission that may produce similar symptoms, such as:

- Extensive cancer
- Hepatic insufficiency
- Renal insufficiency
- Cardiac failure
- Any other condition, as judged by the investigator

Note: a patient with a primary diagnosis of COPD exacerbation may also have comorbidities that include conditions taken from the list above. The key to exclusion or inclusion is to determine the primary diagnostic cause for admission.

Appendix E: Charlson index

The Charlson comorbidity index predicts the 1-year mortality for patients with a range of comorbid conditions. Each of 22 comorbidities is assigned a score of 1, 2, 3 or 6 depending on the risk of death. The sum of the score predicts mortality (Charlson *et al.*, 1987).

Condition	Weight	ICD-10	Description
Myocardial infarction	1	121/122/125.2	Acute/Subsequent/Old myocardial infarction
Congestive heart failure	1	150	Heart failure
Peripheral vascular diseases	1	171	Aortic aneurysm and dissection
		173	Other peripheral vascular diseases
		R02	Gangrene, nec
		Z958, Z959	Presence of cardiac and vascular implants and grafts
Cerebrovascular diseases	1	160-161	Subarachnoid or intracerebral hemorrhage
		162	Other nontraumatic intracranial hemorrhage
		163	Cerebral infarction
		164	Stroke, not specified as hemorrhage or infarction
		1670	Dissection of cerebral arteries, nonruptured
		1676	Nonpyogenic thrombosis of intracranial venous system
		1678	Other specified cerebrovascular diseases
		169	Sequelae of cerebrovascular disease
		G45	Transient cerebral ischemic attacks and related syndromes
		G46	Vascular syndromes of brain in cerebrovascular diseases
Dementia	1	F00-F03/F051	Mental disorders/Delirium superimposed on dementia
Chronic pulmonary disease	1	J40-J47	Chronic lower respiratory diseases
		J96.1	Chronic respiratory failure
		J84.1	Other interstitial pulmonary diseases with fibrosis
		127.9	Pulmonary heart disease, unspecified
		J60-J65	Pneumoconiosis
		J66	Airway disease due to specific organic dust
		J67	Hypersensitivity pneumonitis due to organic dust
		J68	Respiratory conditions due to inhalation of chemicals, gases, fumes, vapors
Connective tissue disease	1	L93	Lupus erythematosus
		M32	Systemic lupus erythematosus
		M33	Dermatopolymyositis
		M34	Systemic sclerosis
		M05	Inflammatory polyarthropathies
		M06	Other rheumatoid arthritis
		M08	Juvenile arthritis
		M35.3	Polymyalgia rheumatic
Ulcer disease	1	K25/K26/ K27/K28	Gastric/Duodenal/Peptic (site unspecified)/Gastrojejunal ulcer

Mild liver disease	1	K70/K74/K73	Alcoholic liver disease/Fibrosis and cirrhosis of liver/
Diabetes	1	E10-E14	Chronic hepatitis nec
Diabetes e/end organ damage	2	E10-E14	Diabetes mellitus, excluding subdivisions 2, 3, 4 e 5.
Hemiplegia or paraplegia			Diabetes mellitus, subdivisions 2, 3, 4 e 5.
Renal disease	2	G81/G82	Hemiplegia/Paraplegia and tetraplegia
	2	N01/N03	Rapidly progressive nephritic syndrome/Chronic nephritic syndrome
		N18/N19	Chronic renal failure/Unspecified renal failure
		N25	Disorders from impaired renal tubular function
		N052-N056	Unspecified nephritic syndrome
		N072-N074	Hereditary nephropathy, nec
Any tumour, including leukemia and lymphoma	2	C00-C76	Malignant neoplasms
		C80	Malignant neoplasm without specification of site
Moderate or severe liver disease		C81-C97	Malignant neoplasms, stated or presumed to be primary
	3	K76.6/185	Portal hypertension/Esophageal varices
Metastatic solid tumour			
AIDS	6	C77-C79	Secondary and unspecified malignant neoplasm
AIDS+Any tumour, including	6	B20, B22-B24	Human immunodeficiency virus (HIV)
leukemia and lymphoma	8	B21	(HIV)-related disease resulting in malignant neoplasms

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