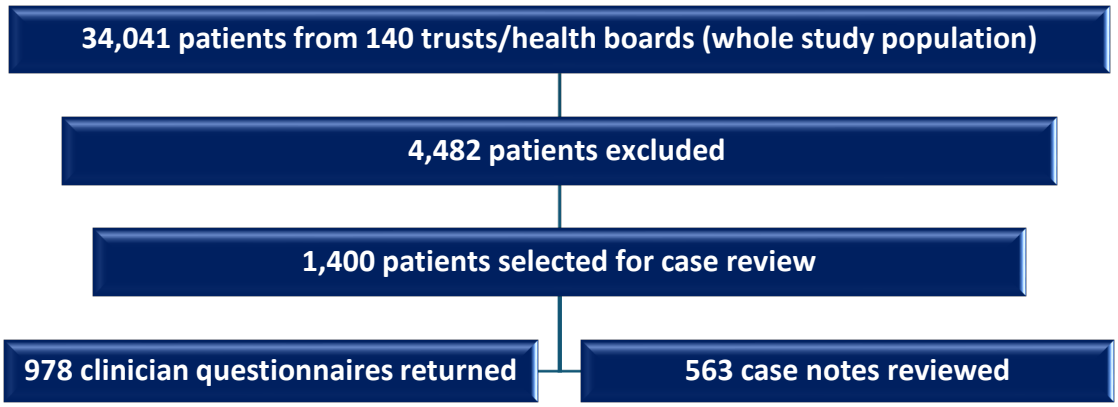
2 DATA RETURNED AND THE STUDY POPULATION

Data returns



F2.1 Data returned

Organisational data

- Organisational questionnaire: 173/200 hospital questionnaires returned

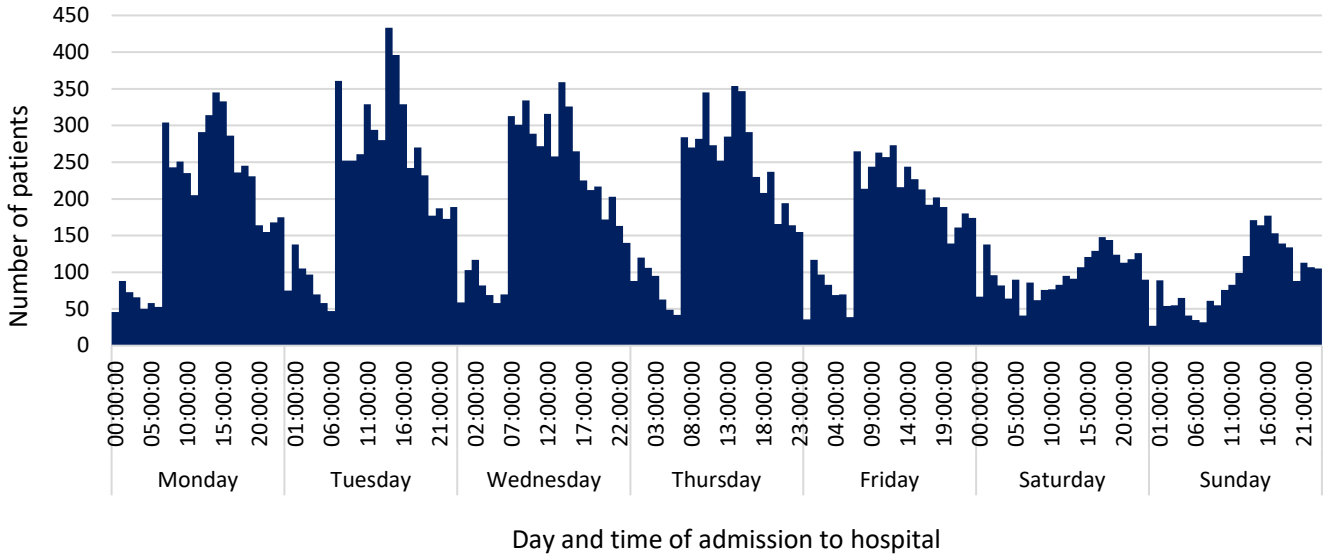
Survey data

- Health and social care professional survey: general medicine 455 and emergency medicine/intensive care medicine 242
- Patient survey: 45

Whole study population

In total, 34,041 patients who underwent a chest drain or pleural aspiration during the study time period were identified across 140 hospitals. Once patients meeting the exclusion criteria (mainly trauma patients) were removed, 29,559 remained for the analysis. The average age was 67 years (median 71 years) and 17,119/29,559 (57.1%) were men.

Patients were admitted less frequently at weekends and out of hours. The pattern of daytime admissions showed a peak at 7am with a further peak between 2 and 3pm (F2.2).



F2.2 Day and time of admission to hospital, whole study population; *n=29,559*

Spreadsheet data

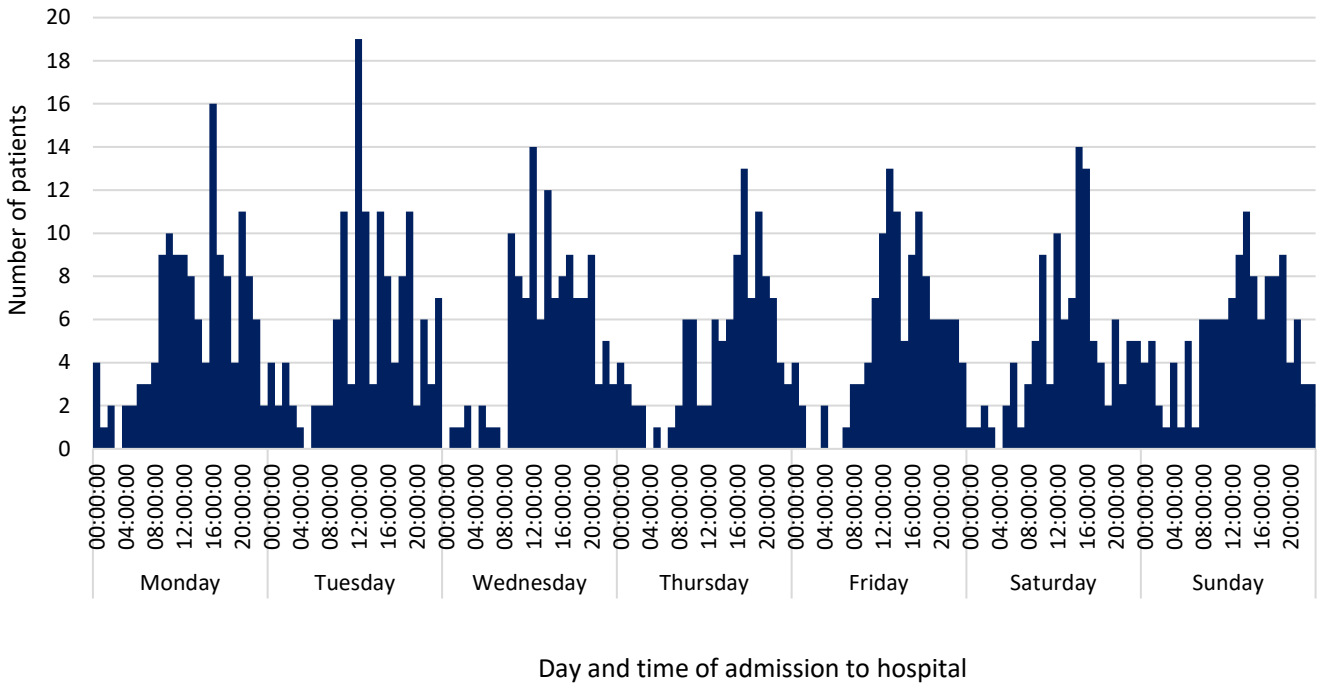
Procedure codes were available for 29,316 patients. Of these, 9,816/29,316 (33.5%) patients had a pleural aspiration. Pleural aspiration was undertaken much more frequently for patients with a pleural effusion (4,036/7,869; 51.3%) than for those with a pneumothorax (114/2,582; 4.4%).

Data on length of stay were available for 17,109 patients with a pleural effusion and 4,918 with a pneumothorax. There were 246/4,918 (5.0%) patients with a pneumothorax treated with a zero length of stay. Of those with a pleural effusion, 3,186/17,109 (18.6%) had a zero length of stay. Overall, 14,333/29,559 (48.5%) patients had a length of stay of ≤7 days and 26,012/29,559 (88.0%) ≤28 days.

The overall patient cohort occupied a total of 411,755 bed days, illustrating the impact on acute hospital bed occupancy at a cost of around £231m. The discharge destination was available for 29,029 patients. Most patients were discharged home (23,746/29,029; 81.8%). There were 2,897/29,029 (10.0%) patients who died during the hospital admission and of these 483/2,897 (16.7%) had a diagnosis of pneumothorax.

Study population selected for case review

Among the patients selected for inclusion in the study, the pattern of hospital admissions showed a more even distribution through the days of the week and a later initial peak in the working day (9-11am) (F2.3), reflecting the sampling strategy's focus on out of hours admission.



F2.3 Day and time of admission to hospital, sampled population; *n=978*
Clinician questionnaire data

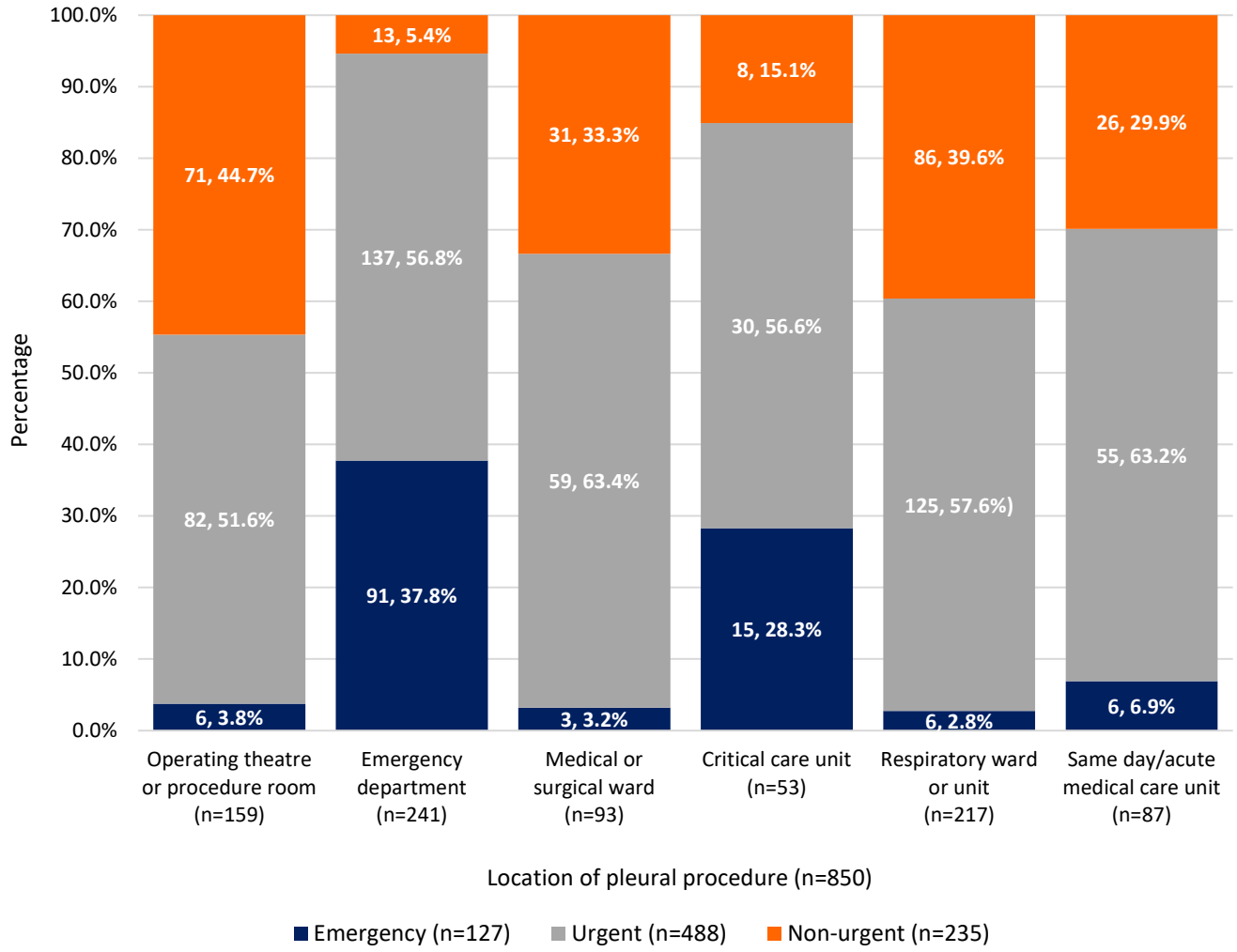
The mean age of the sample population was 66 years (median 70 years) and 580/978 (59.3%) of the sample were men. Overall 588/978 (60.1%) patients were treated for pleural effusion (mean age 70.2 years).

Where it was documented, 374/452 (82.7%) of the pleural effusions were exudates and 78/452 (17.3%) were transudates. There were 276/978 (28.2%) patients treated for pneumothorax (mean age 58.5 years), and 159/978 (16.3%) for pleural infection (mean age 63.5 years). Excluding pleural aspirations, case review

data showed that of 448 chest drains, 109/448 (24.3%) were in place for less than a day and 323/448 (72.1%) patient for five days or less (unknown in 16).

The clinician questionnaire recorded the urgency of the procedure for 933 patients. The procedure was undertaken as an emergency in 129/933 (13.8%) patients, it was urgent in 542/933 (58.1%) and non-urgent in 262 (28.1%).

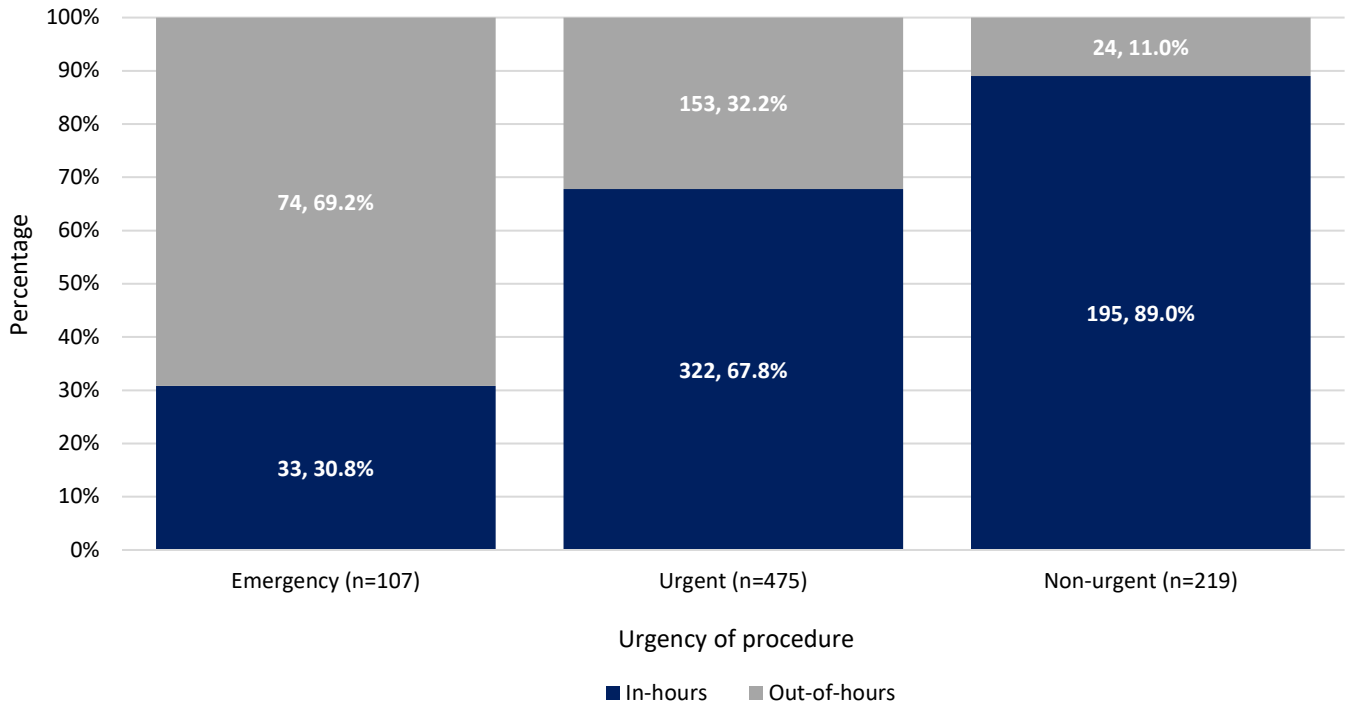
Emergency procedures were most required in acute care areas such as the emergency department (91/241; 37.8%), and critical care (15/53; 28.3%) (F2.4).



F2.4 Urgency of procedure vs location of procedure
Clinician questionnaire data; n=850

Recent British Thoracic Society quality standards recommend that pleural procedures should only be undertaken outside of normal working hours (usually 9-5) in an emergency situation.[1]

There were 153/475 (32.2%) urgent and 24/219 (11.0%) non-urgent procedures undertaken out of hours (F2.5). Overall, only 74/251 (29.5%) out of hours procedures were considered emergencies, Indicating room to improve compliance with best practice.



F2.5 Timing of procedure versus urgency
Clinician questionnaire data; *n=801*

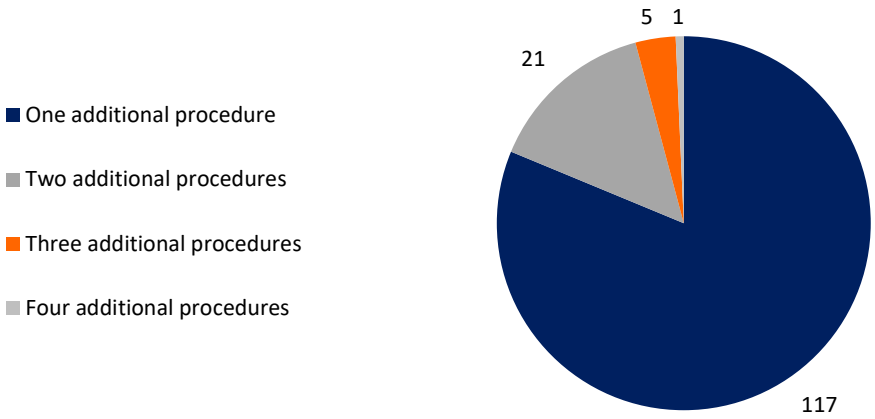
Indication for the procedure

The indication for a pleural procedure among patients included in the in-depth case note review was similar to the overall population (effusion 325/547 (59.4%); pneumothorax 170/547 (31.1%); infection 52/547 (9.3%)) (unknown in 16).

Of the 170 patients with a pneumothorax, 51/170 (30.0%) were primary spontaneous, 87/170 (51.2%) were secondary spontaneous, and 20/170 (11.8 %) were iatrogenic. There were 5/170 (2.9%) patients with tension pneumothorax and six where the cause was not categorised. Of the 52 patients with infection, the underlying cause was pneumonia in 44.

Repeat chest drain insertions

There were 144/978 (14.7%) patients who required at least one additional drain insertion during the hospital admission. The majority (117/144; 81.3%) of patients had one additional procedure (F2.6).

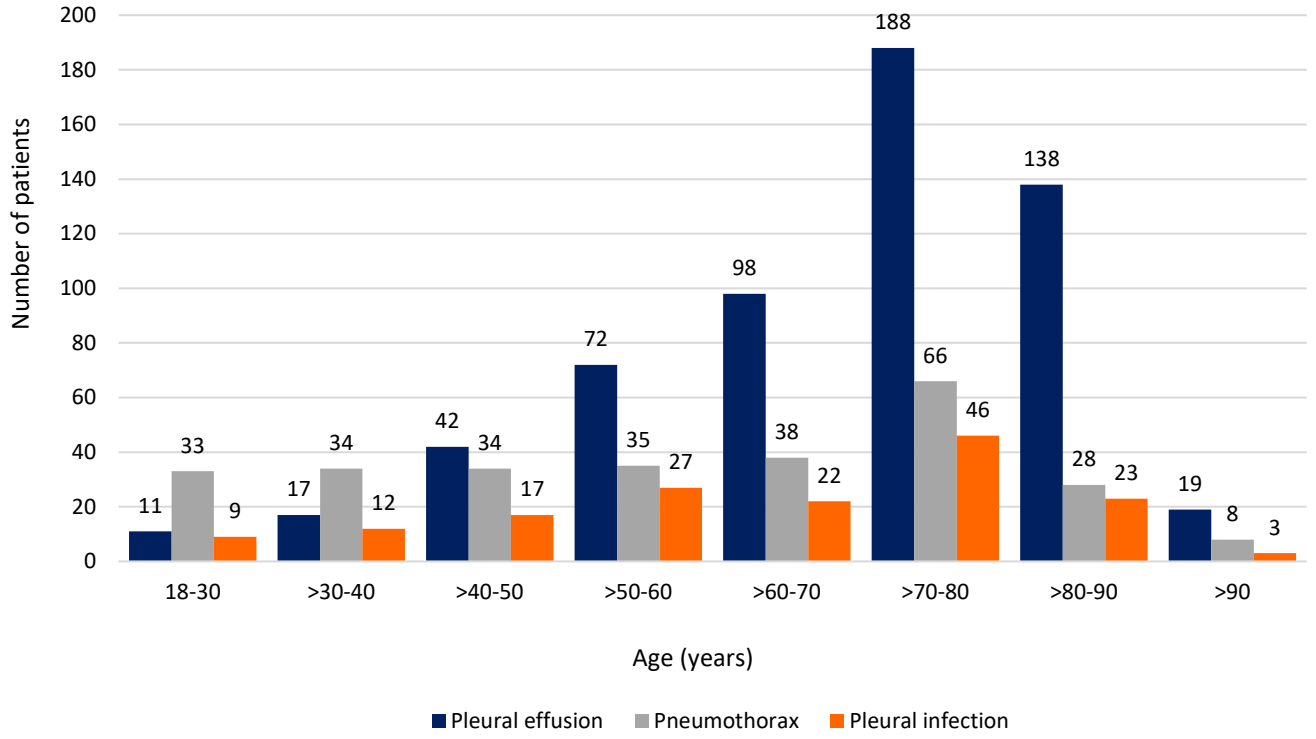


F2.6 Number of additional procedures
Clinician questionnaire data; *n=144*

The underlying indication for the procedure in these patients was pleural effusion in 69, pneumothorax in 53 and infection in 22. This means that a greater proportion of those with a pleural infection (22/95; 23.2%) or a pneumothorax (53/260; 20.4%) needed a repeat procedure than those with pleural effusion (69/573; 12.0%).

Demographic data

Patients aged 60 years or younger made up a higher proportion of those with a pneumothorax (136/276; 49.3%) or pleural infection (65/159; 40.9%) than with a pleural effusion (142/585; 24.3%) (F2.7).



F2.7 Age distribution of patients with effusion, pneumothorax and infection

Clinician questionnaire data; n=978

Data on ethnicity showed that White British/White-other groups were slightly overrepresented compared with UK census data (T2.1). This may in part be explained by the proportion of older people included in this study, as 93.6% of people in the over 65 age group in the UK are of white ethnicity.[2] There were 145/978 (14.8%) patients whose ethnicity was not known.

T2.1 Ethnicity of the study population	Number of patients	%	2021 census data
White British/White-other	750	90.0	81.7
Asian/Asian British (Indian, Pakistani, Bangladeshi, Chinese, other Asian)	47	5.6	9.3
Black/African/Caribbean/Black British	21	2.5	4.0
Mixed/Multiple ethnic groups	3	0.4	2.9
Other ethnic group	12	1.4	2.2
Subtotal	**833**		
Unknown	145		
Total	**978**		

Clinician questionnaire data

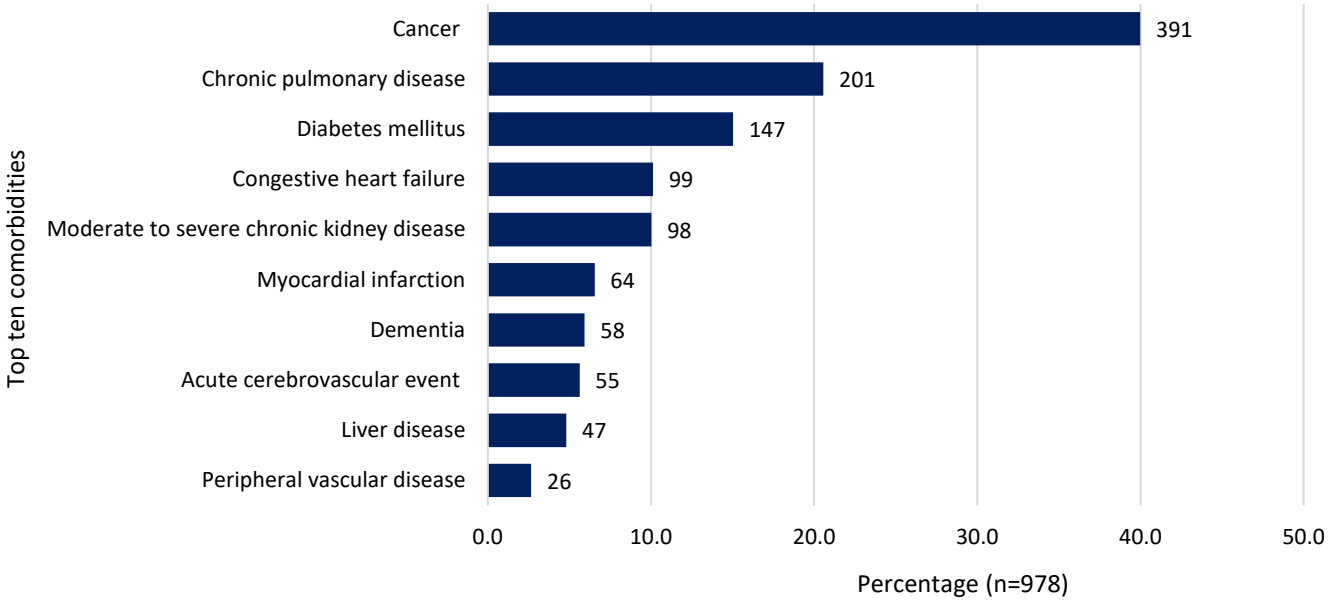
Frailty and comorbidity

The Rockwood clinical frailty scale was developed to describe overall functional status of patients.[3] Originally developed for people aged 65 or older, it is now commonly used in patient assessment in UK hospitals. Scores range from one (very fit) to nine (terminally ill).

The proportion of fit patients (Rockwood clinical frailty score of 1–4) who had a pneumothorax was greater (208/569: 36.6%) than the proportion who were mildly frail or worse (Rockwood clinical frailty score 5–9: 57/348; 16.4%).

There was at least one comorbid condition in 871/978 (89.1%) patients. Multimorbidity (the presence of at least two comorbid conditions) has an overall population prevalence of 23-27%,[4] and 468/978 (47.9%) patients had multimorbidity (F2.8).

The most common comorbidity was cancer (localised or metastatic, including haematological) in 391/978 (40.0%) patients, of whom 254/391 (65.0%) had a pleural effusion and 61/391 (15.6%) a pneumothorax. A total of 201/978 (20.6%) patients had chronic obstructive pulmonary disease (COPD), and among these, 95/201 (47.3%) had a pneumothorax and 90/201 (44.8%) a pleural effusion.



F2.8 Most common comorbidities

Clinician questionnaire data; n=978 (answers may be multiple)

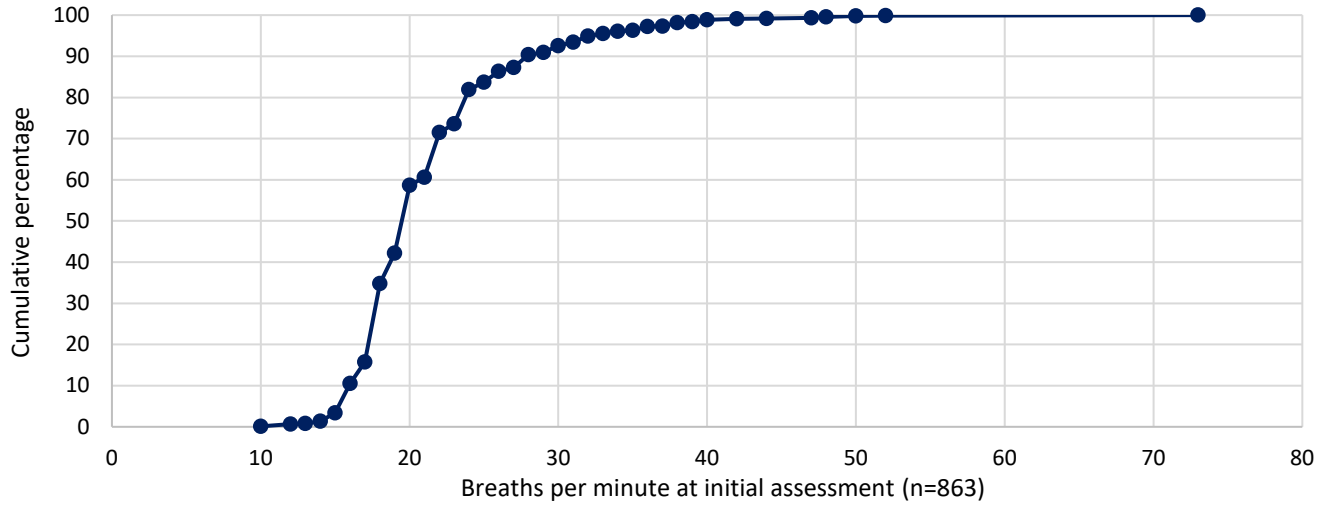
Of the patients with a pleural effusion, cancer was a comorbidity in 254/588 (43.2%), heart failure in 67/588 (11.4%) and kidney disease in 63/588 (10.7%). Of those who had a pneumothorax, chronic obstructive pulmonary disease was a comorbidity in 95/276 (34.4%).

Respiratory parameters of the study population

At their initial assessment, 357/863 (41.4%) patients had a respiratory rate above 20 breaths per minute, and 156/863 (18.1%) had a rate ≥25 (unknown in 112) (F2.9). Both findings would add points to the NEWS2 score, indicating that many of these patients were significantly unwell.[5]

The use of oxygen can also indicate severity of illness, although it is sometimes used conservatively to help resolve small pneumothoraces more quickly. In total, 398/978 (40.7%) patients were treated with

supplemental oxygen. Of these, 170/398 (42.7%) had a normal oxygen saturation of 95–100%; among this group, 47/170 (27.6%) were being treated for pneumothorax.



F2.9 Number of breaths per minute at the initial assessment

Clinician questionnaire data; n=863