Original Article

The experiences of NHS hospital acute medicine departments in England during the first wave of the COVID-19 pandemic

S Bartlett-Pestell, I Adelaja, A Navaratnam, V Gandhi, T Briggs, P Dyer & M Jones

Abstract

We conducted a survey exploring the experiences of NHS hospital acute medicine services in England during the 1st wave of the COVID-19 pandemic. Responses were collected from 26th May to 8th July 2020. The results of 91 sites are presented. The total number of patients referred to the medical take for assessment and admitted from the medical take decreased from pre-pandemic levels compared to peak COVID-19 activity. The total number of acute medical beds decreased, however critical care beds increased by 162%. We report the median timeline from first admission of COVID-19 to when baseline critical care capacity was reached. We found regional variation across the results. These findings can assist healthcare leaders prepare for future pandemics.

Keywords

Acute medicine; COVID-19; surge planning; acute medical units.

Key Points

- The number of critical care beds in England increased significantly during the first wave of the COVID-19 pandemic; however acute medical beds decreased.
- The number of patients admitted from the medical take at peak COVID-19 activity fell compared with pre-pandemic levels.
- The median time of planning by AMUs for COVID-19 before the first COVID-19 admission was 9 days.
- Baseline ICU capacity was reached typically 20 days following the first ICU COVID-19 admission.
- Nursing staff level was the most cited rate limiting factor to the delivery of care for acute medical services.

Introduction

The COVID-19 pandemic has placed overwhelming pressure on healthcare systems globally. Healthcare leaders have faced challenges in attempting to provide high quality care to both COVID and non-COVID patients. In addition, the working environment for healthcare workers has changed significantly.[1] As the major receiving unit for patients with acute medical illness, the acute medical unit (AMU) and the acute medical service is central to the patient pathway, providing rapid assessment of, investigation and treatment for patients. The AMU contributes positively to patient outcomes, including reductions in length of stay, inpatient morbidity and mortality.[2,3]

In response to the COVID-19 pandemic, many AMUs have had to rapidly adjust their capacity, re-organise their workforce and adapt service provision to ensure they are able to respond to the change in demand placed upon them. Getting it Right First Time (GIRFT) conducted a survey exploring the experiences of NHS hospital acute medicine services in England during the first wave of the COVID-19 pandemic, aiming to identify temporal and regional variations as these centres received their first inpatients and rapidly responded to this public health emergency.

Methods

An online questionnaire consisting of 59 quantitative and qualitative questions related to the experiences of the acute medicine service and the AMU was created using the Citizen Space survey platform. The survey was tested on a small group of acute medicine consultants before wider dissemination. All NHS acute secondary care hospitals in England were invited to participate via an e-mail directed to the Acute Medicine Clinical Lead for each hospital. Centres were given 44 days to submit their response, from 26th May 2020 to 8th July 2020. There was no set threshold for the number of responses and the survey was closed after the agreed date to end the survey. Data was analysed using Microsoft Excel. The questionnaire can be found in Appendix 1.

Results

97 hospitals (49%) completed the survey from the 198 hospitals that were invited to participate.

Sam Bartlett-Pestell
MBChB
Clinical Fellow,
NHS England and Improvement,
Respiratory Registrar
St George's University Hospitals NHS Trust

Ini Adelaja
MBChB
NHS England and Improvement,
Internal Medicine Trainee,
Kingston Hospital NHS Foundation Trust

Annakan Navaratnam
MBChB
NHS England and Improvement,
ENT Registrar,
University College Hospital London

Vanita Gandhi
MBBS
NHS England and Improvement,
Oncology Registrar,
University College Hospital London

Tim Briggs
MD
NHS England and Improvement,
Consultant Orthopaedic Surgeon,
Royal National Orthopaedic Hospital

Philip Dyer
MBChB
Acute and General Medicine,
Consultant in Endocrinology and Acute Medicine,
University Hospitals Birmingham NHS Foundation Trust

Mike Jones
MD
Acute and General Medicine,
Consultant in Acute Medicine
University Hospital of North Durham

Correspondence:
Sam Bartlett-Pestell
Respiratory department,
St George's Hospital,
Blackshaw Road,
London
Email: Sam.bartlett2@nhs.net

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Six hospitals participated but opted out of peer-review and we present the results of the remaining 91 hospitals. The participation rate by region is presented in Table I.

Patient activity

Total number of patients assessed and the total number requiring admission

Table II shows the number of patients assessed and admitted from the medical take before COVID-19

Table 1. Responses by region.

Region	Acute hospitals invited	Acute hospitals that participated	Participation (%)
East of England	19	9	47
London	32	12	38
Midlands	37	12	32
North East & Yorkshire	36	16	44
North West	29	15	52
South East	27	15	56
South West	18	12	67
TOTAL	**198**	**91**	**46**

Table 2. Patient activity, beds, planning and staffing.

	Total	Median	Range	IQR
Number of patients assessed on the medical take per 24 hours				
Prior to COVID-19	5775	61	17-155	46-80
At peak COVID-19 activity	4395	45	15-141	35-60
Patients assessed on the medical take with suspected or confirmed COVID-19 at peak COVID-19 activity (%)	57	59	5-100	46-71
Number of patients admitted from the medical take per 24 hours				
Prior to COVID-19	4098	45	14-133	32-55
At peak COVID-19 activity	3700	41	16-155	26-50
Patients admitted from the medical take with suspected or confirmed COVID-19 at peak COVID-19 activity (%)	60	60	5-100	44-76
AMU beds				
Prior to COVID-19	4076	47	15-96	30-56
At peak COVID-19 activity	3098	44	6-93	30-55
Medical beds				
Prior to COVID-19	25655	288	46-845	220-376
At peak COVID-19 activity	27715	310	46-845	225-410
Level-3 critical care beds				
Prior to COVID-19	1456	11	4-86	8-17
At peak COVID-19 activity	3808	31	6-187	21-42
Planning				
Planning by AMU's prior to 1st COVID-19 admission (days; negative number = planning started before 1st admission; positive = planning started after 1st admission)	n/a	-9	-65 to +20	-24 to 0.25
Number of patients per staff nurse				
AMU pre-COVID-19	n/a	6	1.25 - 10	5 - 6.13
AMU peak COVID-19 Activity	n/a	6	1.5 - 8	4 - 6
AMU enhanced care areas pre COVID-19	n/a	3.5	1 - 7	2 -4
AMU enhanced care areas peak COVID-19 activity	n/a	4	1 - 6	2.75 - 4

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(the period before any COVID-19 admissions) and at peak COVID-19 activity of the 1st wave (the day of the highest number of COVID-19 admissions). The total number of patients assessed (over 24 hours) reduced by 24% from pre COVID-19 levels to peak COVID-19 activity. The total number of patients admitted from the medical take reduced by 10%. The range of the percentage of patients assessed with suspected or confirmed COVID-19 was wide (5-100%).

Figure 1 shows the median numbers of patients assessed on the medical take and admitted from the medical take before and during the peak of the COVID-19 pandemic 1st wave in England, by region. The median number of patients seen in each region before COVID-19 was greater than at the peak of the pandemic 1st wave, except in London. The median number of patients admitted at the peak of COVID-19 1st wave compared to pre-COVID-19 fell in all regions except East of England (increased by 11%) and London (increased by 9%).

Timing of admissions, peak numbers and reaching baseline ICU capacity

Figure 2 shows the median and the range of the date of first COVID-19 admission, peak medical COVID-19 admissions, first COVID-19 ICU admission and when baseline ICU capacity was reached. London had the earliest median first COVID-19 admission (05/03/20), median peak of medical admissions and median date of baseline ICU capacity reached.

Medical bed provision

Table II shows the number of AMU, medical and Level 3 critical care beds both before COVID-19 and at peak COVID-19 activity. The number of

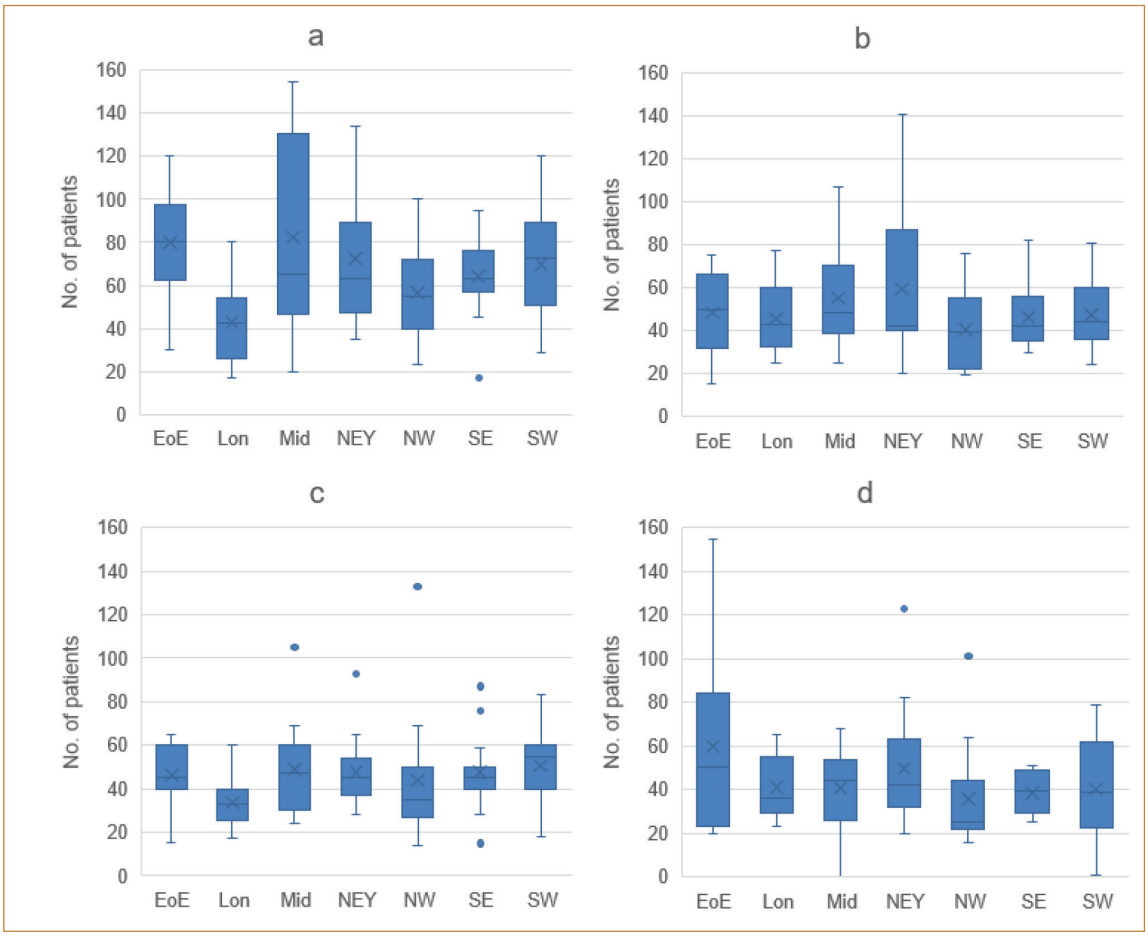


Figure 1. The number of patients assessed and the number of patients admitted before and at the peak activity of the COVID-19 pandemic 1st wave.

The number patients assessed on the medical take before COVID-19 (in 24 hours) (a), and the number of patients admitted from the medical take before COVID-19 (in 24 hours) (c) compared with the number of patients assessed (b), and admitted (d), at the peak of COVID-19 activity.

(Boxes represent the IQR, the line in the box equals the median value and the cross equals the mean. The range is shown by the lines outside of the box and the dots show outliers)

EoE = East of England; Lon= London; Mid = Midlands; NEY = North East and Yorkshire; NW = North West; SE = South East; SW = South West

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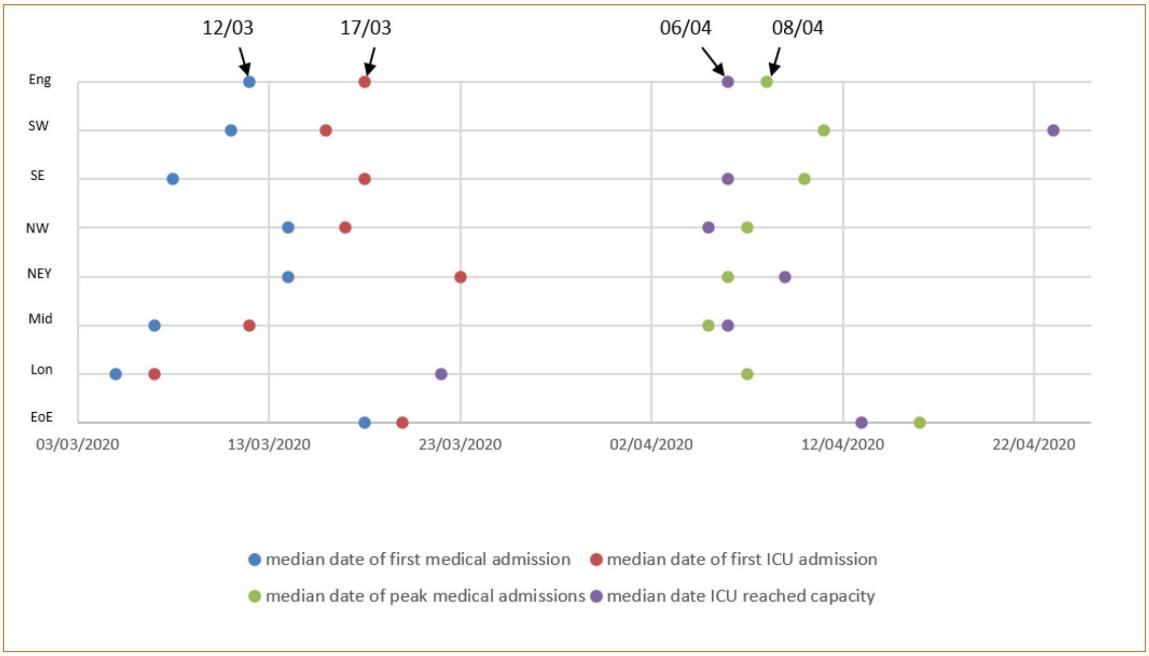


Figure 2. Key dates by region.
EoE = East of England; Lon= London; Mid = Midlands; NEY = North East and Yorkshire; NW = North West; SE = South East; SW = South West; Eng = England

AMU beds reduced by 4%. The number of medical beds increased by 7% and level-3 critical care beds increased by 162%.

Planning by the acute hospital for the COVID-19 1st wave

The median time, range and IQR, of planning by AMUs for COVID-19 before the first COVID-19 admission is shown in Table II. 23 sites (25%) reported planning commenced after the first COVID-19 admission.

Clinical Processes

31 sites (34%) increased the use of non-invasive ventilation (NIV) (including continuous positive airway pressure (CPAP)) in the AMU during the 1st wave of the pandemic. 13 of those sites did not provide NIV in the AMU prior to the 1st wave of the pandemic. 29 (32%) sites provided NIV (including CPAP) prior to the pandemic.

Rate limiting factors

Centres were asked to rank the top three rate limiting factors to delivering care during the 1st wave of the pandemic and had the option to select 'no limiting factors' at any position (1, 2 or 3). 85 sites selected a number 1 rate limiting factor, 48 selected a number 2 and 37 selected a number 3. The most cited rate limiting factors were nursing staffing levels (33 sites), physical bed capacity (32 sites), no rate limiting factors (31 sites) and medical staffing capacity (25 sites).

The number 1 factors ranked regionally included equipment shortages by East of England, London and the Midlands, bed capacity by North East and Yorkshire and medical staff by the South East. In South West, 50% of respondents reported no rate limiting factors. This is shown in Figure 3.

Staffing

The number of patients per staff nurse for AMU and enhanced areas of care within AMU are shown in Table II. The median number of patients per nurse remained the same from pre-COVID compared with peak COVID-19 activity and in enhanced areas of care in AMU the median increased.

The reported levels of medical and nursing staffing on AMU at peak COVID-19 activity are shown in Table III. More sites reported nursing understaffing than medical understaffing.

Discussion

This is a large-scale national survey of acute hospitals regarding organisation of their acute medical service during the 1st wave of the COVID-19 pandemic. It provides a unique view of the challenges faced, and the adaptations that were made, by AMUs and hospitals across England during the 1st wave of the COVID-19 pandemic.

The fundamental considerations for preparing for a surge in activity include space, staff and equipment,[4,5] and requires sufficient time for action plans to be developed. AMUs spent 10 days (median) planning for COVID before the first admission and

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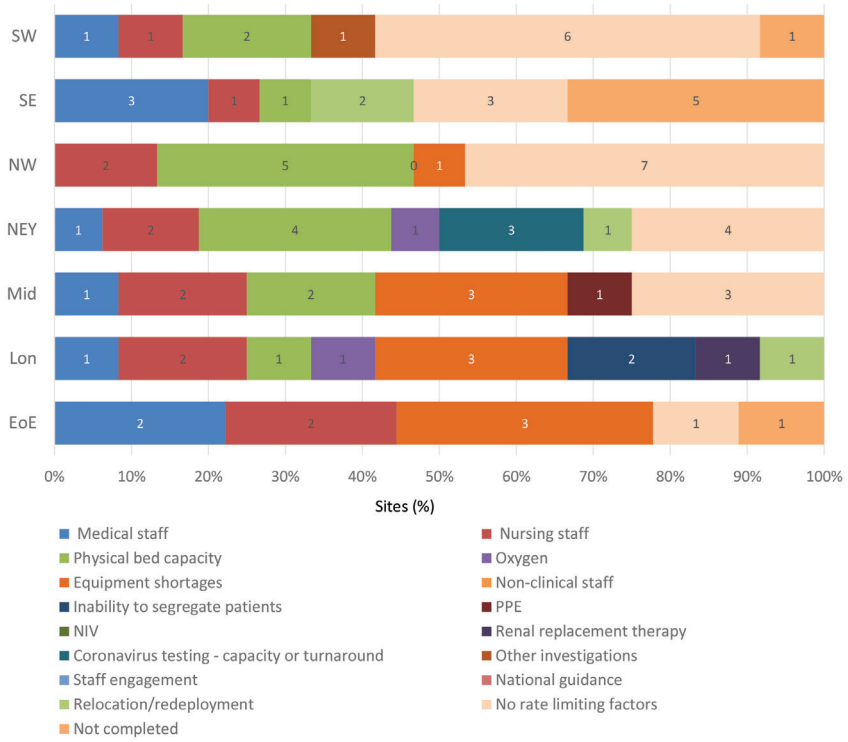


Figure 3. Number 1 rate limiting factor by region.
EoE = East of England; Lon= London; Mid = Midlands; NEY = North East and Yorkshire; NW = North West; SE = South East; SW = South West
Numbers in bars represent the number of sites

Table 3. Medical and nursing staffing

Reported levels of staffing at the peak of COVID-19 activity		
	Medical Staffing no. of sites (%)	**Nursing staffing no. of sites (%)**
Very understaffed	0 (0)	2 (2)
Understaffed	4 (4)	11 (12)
Adequate	42 (46)	62 (68)
Overstaffed	38 (42)	14 (15)
Very overstaffed	7 (8)	2 (2)

we found significant variation between units. The range in planning was 65 days prior to the first admission to 20 days after the first admission. 23 (25%) sites started planning for COVID after the first patient with COVID-19 was admitted. This suggests many sites may have been underprepared for managing patients with COVID-19.

Preparing space includes creating additional capacity and planning patient flow. In preparing for the first wave acute trusts in England were asked to increase their critical care bed capacity.[6] We found that the number of critical care beds increased significantly (162%), however the number of AMU beds decreased. Some units may have seen their AMU bed numbers fall to facilitate an increase in level 3 beds.[7]

The number of patients seen on the medical take decreased from pre-pandemic levels to peak COVID-19 activity and the median number of patients admitted from the medical take fell by 10%. This is in keeping with published data on admissions. Admissions via Accident and Emergency (A&E) fell from February to March 2020 [8] and A&E attendances fell to the lowest level since records began in April 2020.[9] Mafham et al. noted a drop in acute coronary syndrome admissions from March 2019 to March 2020 by 40%.[10] Our survey demonstrates some regional variation: the median

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number of patients seen in London remained the same; however, fell for every other region. The highest burden in terms of absolute numbers of patients with COVID-19 admitted to hospital was in London during March 2020.[11] From our survey, hospitals in London reported admitting more confirmed or suspected patients with COVID-19 in 24 hours at their peak than other regions. The regional variation in patient numbers suggests a regional response to capacity requirements may have been beneficial.

Despite the fall in admissions, AMU bed capacity was commonly cited as a rate limiting factor for care delivery in our survey. Bed capacity may have been listed as a rate limiting factor because of difficulties in cohorting patients, for example due to few side rooms, and concerns of increased nosocomial spread. One metanalysis showed 44% of COVID-19 infections were from nosocomial spread[12] and reports suggest between 15% and 38% of inpatients in the UK likely acquired COVID-19 whilst in hospital.[13,14] In one UK study the majority of patients who acquired COVID-19 in hospital did so by sharing space, a bay or ward, with patients who were COVID-19 PCR positive.[13]

To our knowledge there has not been a description of the temporal association between the first COVID-19 admission, ICU admission, peak medical admissions and baseline ICU capacity being reached. We show that, based on median values, the first ICU admission typically occurred 5 days after the first hospital admission. Following the 1st COVID-19 ICU admission, baseline ICU capacity was reached 20 days later and 2 days following this, medical admissions peaked. In London, the median date of first ICU admission and the median time when baseline ICU capacity was reached were both 20 days before the national median, demonstrating that COVID-19 surges impacted London ahead of the other regions. These timelines may help to guide future surge planning for subsequent COVID-19 waves and for future planning in the event of other pandemics.

Effective staff preparation for surge planning includes workforce reorganisation, including redeployment, training and wellbeing.[15] With 80% of sites reporting redeployment of medical staff to acute medicine, it is surprising that less than one in five sites provided a COVID-19 induction for redeployed AMU staff. This suggests many staff were working in unfamiliar environments within acute medicine without the required orientation processes put in place. There is a large psychological burden placed on caregivers of patients with COVID-19[16] and therefore it is imperative staff are afforded adequate support. This includes the necessary information required to be safe at work and perform their job properly.

There is a discrepancy between what was felt to be a rate limiting factor and the perceived level of staffing. Only 33% of units who rated medical staffing as their number one rate limiting factor to care delivery described themselves as understaffed. This discrepancy may be due to perceptions that staffing levels would have been critically low without mitigation plans such as redeployment and rota changes. In addition, redeployed staff would likely need training in acute medicine, or partnering with acute medicine trained staff;[17] and rota changes are likely to be unsustainable for long periods. In one trust all medical grades had their rota changed between March and June 2020 which resulted in a significantly increased presence of all medical grades.[17] The feedback was largely positive, however non-urgent elective care was cancelled during this period. To be sustainable, rota changes should factor elective and outpatient activities; possibly by creating split rotas where clinicians would spend some time in their base department and some time on pandemic work.

We found sites reported a wide range in nurse-to-patient ratios both before and during the pandemic. In enhanced care areas the lowest ratio was 1 nurse to 7 patients and for these level-2 beds the suggested ratio is 1:2.[18] A lack of nursing staff may be the reason only a third of AMUs were able to provide NIV support to patients prior to the COVID-19 pandemic, despite NIV provision being recommended in the Acute Medicine Task Force Report.[19] Audit standards have been created for measuring the care provision and performance of AMUs and includes the provision of level 2 beds in larger hospitals (>500 beds). In 2009 less than 42% of larger hospitals had AMU level 2 beds.[20] To increase the provision of high levels of care by AMUs staffing levels will likely need to be increased and attention should specifically be given to increasing the number of nurses.

Limitations

The data we collected from the survey was self-reported and included possible estimations. The survey was open during May-July 2020 and would have been subject to recall bias. For the medical take and admissions, we found a wide variation in responses and it is possible some sites included data for their acute ambulatory service.

Conclusion

The findings of this national survey demonstrate the regional variation in experiences of acute medical units across the country both in patient activity

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and the impact on hospital resources. Critical care bed capacity increased significantly across England. Furthermore, the rapidity of COVID-19 surges from 1st hospital admission to critical care capacity being overwhelmed emphasises the importance of prior planning at a local level and the implementation of flexible strategies to mitigate against depletion of staffing, equipment and clinical space to manage severely unwell patients. These key themes highlight areas for clinical and managerial leaders to prepare for as further outbreaks of COVID-19 occur and in the event of another novel pandemic in the future.

Conflicts of interest:

None of the authors have any conflicts of interest.

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