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Organ support and early death in a Nigerian tertiary intensive care unit: A two-year retrospective cohort of 255 admissions

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Additional Declarations:
The authors declare no competing interests.

Ethics Statement: This study was reviewed and approved by the Health Research Ethics Committee (HREC) of the Federal Medical Centre, Ebute Metta, Lagos, Nigeria. The study was conducted in accordance with the National Code of Health Research Ethics (NCHRE) in Nigeria and the ethical principles of the Declaration of Helsinki.

The requirement for informed consent from individual participants was waived by the Health Research Ethics Committee (HREC) of the Federal Medical Centre, Ebute Metta, Lagos, Nigeria, in accordance with the National Code of Health Research Ethics in Nigeria, which permits a waiver where the research poses no more than minimal risk and could not practicably be carried out without the waiver. As a teaching hospital study reviewed and approved by the hospital's board/HREC, the committee formally determined that the criteria for a consent waiver were satisfied

Organ support and early death in a Nigerian tertiary intensive care unit: a two-year retrospective cohort of 255 admissions

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Running title: Organ support and early ICU death, Lagos

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Abstract

Background. Patient-level outcome data from Nigerian intensive care units (ICUs) are scarce, limiting service planning and quality improvement.

Methods. Retrospective cohort of all 255 consecutive admissions to the ICU of Federal Medical Centre, Ebute Metta, Lagos, between May 2022 and May 2024. The primary outcome was ICU mortality. Factors associated with death were examined by multivariable logistic regression.

Results. Median age was 51 years (IQR 37–65) and 50.6% were female. Medical neurological conditions, predominantly stroke, were the commonest diagnosis group (30.6%). Mechanical ventilation was used in 65.1% and inotropes in 33.7%. ICU mortality was 57.6% (95% CI 51.5–63.6), rising from 33.3% in patients receiving neither intervention to 81.9% in those receiving both. Ventilation (adjusted OR 3.32 (1.83–6.02)), inotropes (3.02 (1.61–5.67)) and a medical neurological diagnosis (2.47 (1.32–4.63)) were independently associated with death; age and sex were not. Fifteen of 16 patients staying under 24 hours died, and 31.3% of all deaths occurred within 48 hours of admission. Daily census never exceeded 7 patients in a ten-bed unit, reflecting staffing and equipment availability rather than bed numbers.

Conclusions. Mortality was driven by severity of illness rather than age and was concentrated early after admission, implicating the pathway into critical care. Routine admission severity scoring and measurement of referral-to-admission time are needed before this mortality can be benchmarked.

Keywords: intensive care units; critical illness; hospital mortality; mechanical ventilation; clinical audit; Nigeria

Introduction

Critical illness is a leading contributor to the global burden of disease, and the capacity to treat it is least developed where need is greatest [1]. The African Critical Illness Outcomes Study recently showed that one in eight hospital inpatients in Africa is critically ill that one in five of these patients dies within seven days, and that most are cared for in general wards rather than intensive care units [2]. In Nigeria, critical care services face long-recognised constraints in staffing, equipment and infrastructure [3], and published single-centre series report ICU mortality of roughly one third, with wide variation in case mix [4–6].

International data show that ICU outcome depends heavily on case mix and on organisational factors, including staffing and the availability of equipment [7,8]. Translating those insights into local improvement requires local denominators: a documented account of who is admitted, what organ support they receive, how long they stay and how many survive. Such an account also establishes the baseline against which any subsequent change must be measured.

We therefore reviewed two years of consecutive admissions to the ICU of a federal tertiary hospital in Lagos, with three aims: to describe case mix, organ-support use and resource use; to identify factors independently associated with ICU death; and to establish a baseline for re-audit.

Methods

Design and setting

This was a retrospective cohort study of consecutive admissions to the ICU of Federal Medical Centre, Ebute Metta, Lagos, Nigeria, a federal tertiary referral hospital. Reporting follows the STROBE statement for observational studies [9]. The unit has ten ICU beds and a further three beds used interchangeably as high-dependency or ICU beds according to need. Between seven and eight ventilators were in service at any one time, the number varying as equipment was withdrawn for maintenance; beds were also intermittently out of service for the same reason. The nurse-to-patient ratio varied with staff availability and patient acuity but was most often one nurse to three or four patients. The unit operates a hybrid model in which the admitting specialty retains primary responsibility for the patient and collaborates with the anaesthesia and intensive care team.

Participants

All patients admitted between 2 May 2022 and 29 May 2024 were included, with no exclusions. The ICU register was complete for the study period. Records with missing values were retained and the missingness reported, rather than excluding patients and biasing the denominator (Supplementary Figure S1).

Variables

Age, sex, hospital number, admission date, admission diagnosis, admitting specialty, mechanical ventilation, inotropic support, length of stay, outcome and outcome date were extracted from the register. Mechanical ventilation and inotropic support were recorded as binary exposures at any time during the ICU stay.

Admission diagnosis was recorded as free text. Each of the 219 distinct entries was assigned by clinical review to one of ten groups according to the principal reason for ICU admission (Supplementary Table S4). Stroke and other non-traumatic neurological conditions were separated from neurotrauma and neurosurgical admissions. Pregnancy-related and gynaecological surgical admissions were grouped together. 4 entries recorded only as unconsciousness without a stated cause were assigned to the medical neurological group as undifferentiated coma.

The primary outcome was ICU mortality, defined as death before leaving the ICU. Patients transferred to a ward, referred to another institution, discharged directly home or self-discharged were classified as ICU survivors. Outcome after ICU discharge was not recorded, so hospital mortality could not be determined.

Length of stay was taken from the register. In 2 records where it was blank but both admission and outcome dates were present, it was derived from the dates. Daily census was reconstructed from admission date and length of stay; because ventilation was recorded as ever or never, the ventilated census is an upper bound.

Statistical analysis

Continuous variables are summarised as median and interquartile range (IQR) and categorical variables as counts and percentages, with Wilson 95% confidence intervals (CI) for proportions. Groups were compared with the chi-square or Fisher exact test and continuous variables with the Mann–Whitney U test.

Factors associated with ICU death were examined by multivariable logistic regression including age (per 10 years), sex, mechanical ventilation, inotropic support and a medical neurological diagnosis, the largest diagnosis group. Length of stay was not included as a covariate because it is partly determined by the timing of death. An interaction between ventilation and inotropes was tested. Discrimination was assessed by the area under the receiver operating characteristic curve (AUC) and calibration by the Hosmer–Lemeshow test. A model including all diagnosis groups is reported in Supplementary Table S1.

Because 10 hospital numbers appeared twice, admission episodes were the unit of analysis. Two sensitivity analyses repeated the model restricted to the first admission episode per patient and to adults aged 18 years or over. Two-sided $p < 0.05$ was taken as statistically significant. Analyses used Python 3 with pandas, SciPy and statsmodels. No imputation was performed.

No severity-of-illness score was recorded, so mortality is unadjusted for physiological severity.

Ethical considerations

The study used anonymised, routinely collected data from the ICU register. Patient names and hospital numbers were removed before analysis, and no identifiable information is reported.

Results

Cohort and case mix

There were 255 admission episodes over 25 months, a mean of 10.2 per month (median 9, range 3–22). The busiest month was June 2022 (22 admissions; Figure 2a). Because 10 hospital numbers appeared twice, these episodes represent at most 245 patients.

Median age was 51 years (IQR 37–65; range 3 months to 93 years). 64 patients (25.1%) were aged 65 or over and 16 (6.3%) were children. There were 129 female (50.6%) and 126 male (49.4%) patients (Table 1, Figure 1).

Medical neurological conditions were the largest diagnosis group (78, 30.6%), and 66 of these 78 admissions were for ischaemic or haemorrhagic stroke. Sepsis and severe infection accounted for 43 admissions (16.9%). Internal Medicine was the admitting specialty for 155 patients (60.8%).

Table 1. Characteristics of 255 consecutive ICU admissions and ICU mortality by subgroup

Characteristic	Admissions, n (%)	Deaths, n	ICU mortality, % (95% CI)
All admissions	255 (100.0)	147	57.6 (51.5–63.6)
Age group, years			
0–17	16 (6.3)	8	50.0 (28.0–72.0)
18–39	60 (23.5)	26	43.3 (31.6–55.9)

40–64	115 (45.1)	76	66.1 (57.0–74.1)
≥65	64 (25.1)	37	57.8 (45.6–69.1)
Sex			
Female	129 (50.6)	76	58.9 (50.3–67.0)
Male	126 (49.4)	71	56.3 (47.6–64.7)
Admission diagnosis group			
Neurological (medical)	78 (30.6)	55	70.5 (59.6–79.5)
Sepsis / severe infection	43 (16.9)	25	58.1 (43.3–71.6)
Post-operative / trauma (non-neurological)	31 (12.2)	17	54.8 (37.8–70.8)
Neurotrauma / neurosurgical	26 (10.2)	14	53.8 (35.5–71.2)
Obstetric / gynaecological	23 (9.0)	9	39.1 (22.2–59.2)
Respiratory	18 (7.1)	8	44.4 (24.6–66.3)
Renal / metabolic	13 (5.1)	8	61.5 (35.5–82.3)
Haematological / oncological	10 (3.9)	5	50.0 (23.7–76.3)
Cardiovascular	9 (3.5)	5	55.6 (26.7–81.1)
Anaphylaxis / poisoning	4 (1.6)	1	25.0 (4.6–69.9)
Admitting specialty			
Internal Medicine	155 (60.8)	97	62.6 (54.7–69.8)
General Surgery	24 (9.4)	14	58.3 (38.8–75.5)
Obstetrics and Gynaecology	23 (9.0)	10	43.5 (25.6–63.2)
Neurosurgery	22 (8.6)	13	59.1 (38.7–76.7)
Orthopaedics	8 (3.1)	2	25.0 (7.1–59.1)
Urology	5 (2.0)	3	60.0 (23.1–88.2)
Cardiothoracic Surgery	5 (2.0)	1	20.0 (3.6–62.4)
Other and shared care	13 (5.1)	7	53.8 (29.1–76.8)
Organ support			
Mechanical ventilation	166 (65.1)	115	69.3 (61.9–75.8)
Inotropic support	86 (33.7)	66	76.7 (66.8–84.4)

Percentages of admissions are of 255. Diagnosis groups were assigned by clinical review of the free-text admission diagnosis (Supplementary Table S4). Between-group comparison of mortality: diagnosis group p = 0.21. CI, confidence interval.

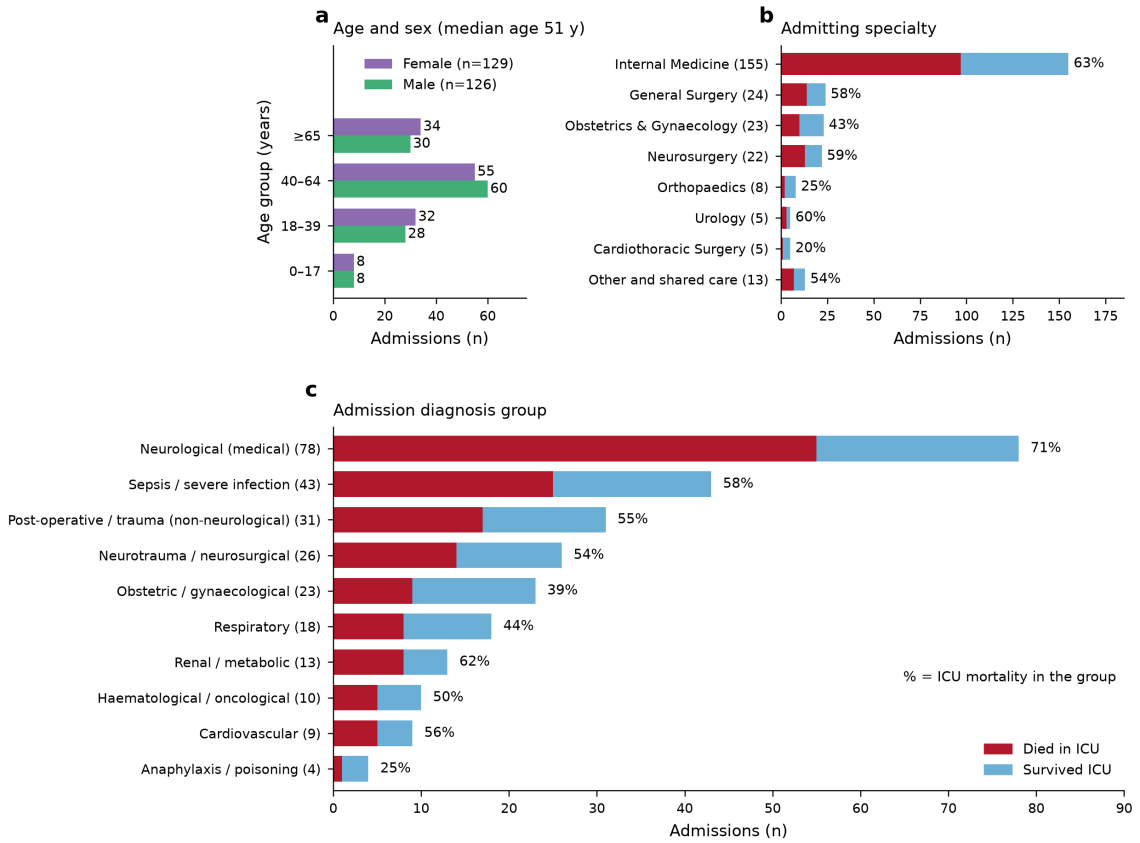


Figure 1. Case mix. (a) Age group by sex. (b) Admitting specialty and (c) admission diagnosis group, each divided by ICU outcome; the percentage at the end of each bar is ICU mortality for that group.

Activity and functional capacity

The reconstructed daily census had a median of 3 patients (IQR 2–4; mean 2.9) and never exceeded 7, a level reached on 5 of 759 days (Figure 2b). The ventilated census never exceeded 6, even on the upper-bound assumption that ventilated patients were ventilated throughout their stay. Mean occupancy was therefore 29% of the ten nominal ICU beds.

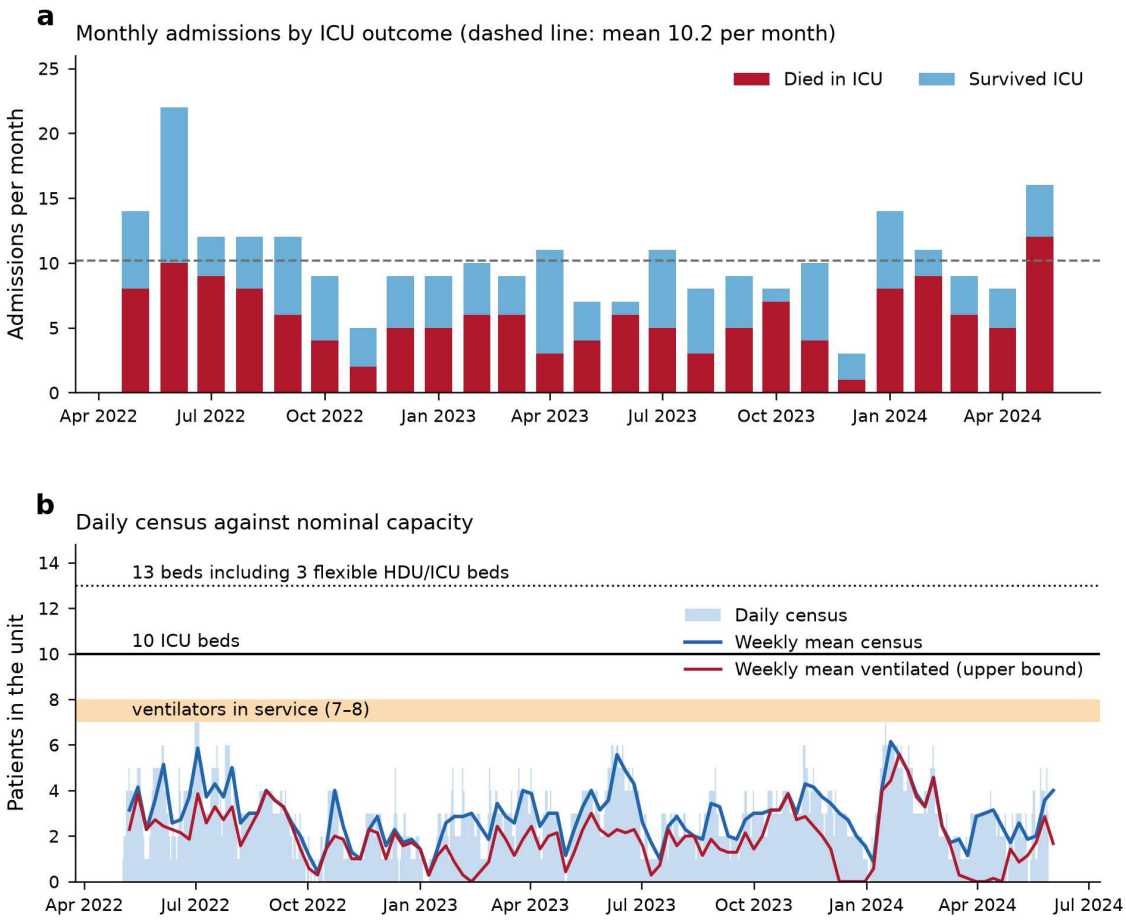


Figure 2. Admissions and daily census. (a) Monthly admissions by ICU outcome; the dashed line is the mean of 10.2 per month. (b) Daily census reconstructed from admission date and length of stay (shaded), with weekly means for all and for ventilated patients, against the ten ICU beds, thirteen beds including the flexible high-dependency beds, and the seven to eight ventilators typically in service. The ventilated census is an upper bound.

ICU outcome and organ support

ICU mortality was 57.6% (147/255; 95% CI 51.5–63.6). Of the 108 ICU survivors, 104 (40.8% of all admissions) were transferred to a ward, 2 were referred to another institution, 1 was discharged directly home and 1 self-discharged against medical advice. Mortality was 54.7% in 2022, 53.9% in 2023 and 69.0% in the five months of 2024 (p = 0.14).

Mechanical ventilation was used in 166 admissions (65.1%; 95% CI 59.1–70.7) and inotropes in 86 (33.7%). Mortality was 69.3% with and 36.0% without ventilation, and 76.7% with and 47.9% without inotropes. It rose from 33.3% in patients receiving neither intervention to 59.6% with ventilation alone and 81.9% with both (p < 0.001; Table 2, Figure 3a).

Crude mortality was highest in the medical neurological group (70.5%), but differences across all ten diagnosis groups were not statistically significant (p = 0.21) and confidence intervals for the smaller groups were wide (Table 1).

Table 2. Organ support, length of stay and ICU outcome

	Admissions, n	Deaths, n	ICU mortality, % (95% CI)
Organ support received			
Neither ventilation nor inotropes	75	25	33.3 (23.7–44.6)
Mechanical ventilation only	94	56	59.6 (49.5–68.9)
Inotropes only	14	7	50.0 (26.8–73.2)
Ventilation and inotropes	72	59	81.9 (71.5–89.1)
ICU length of stay			
Less than 24 hours	16	15	93.8 (71.7–98.9)
1–7 days	144	77	53.5 (45.3–61.4)
8–14 days	45	26	57.8 (43.3–71.0)
15–30 days	32	21	65.6 (48.3–79.6)
More than 30 days	14	6	42.9 (21.4–67.4)
Not recorded	4	2	50.0 (15.0–85.0)
ICU outcome	n (%)		
Died in ICU	147 (57.6)		
Transferred to a ward	104 (40.8)		
Referred to another institution	2 (0.8)		
Discharged directly home	1 (0.4)		
Self-discharged against medical advice	1 (0.4)		

Comparison of mortality across organ-support categories: chi-square p < 0.001.

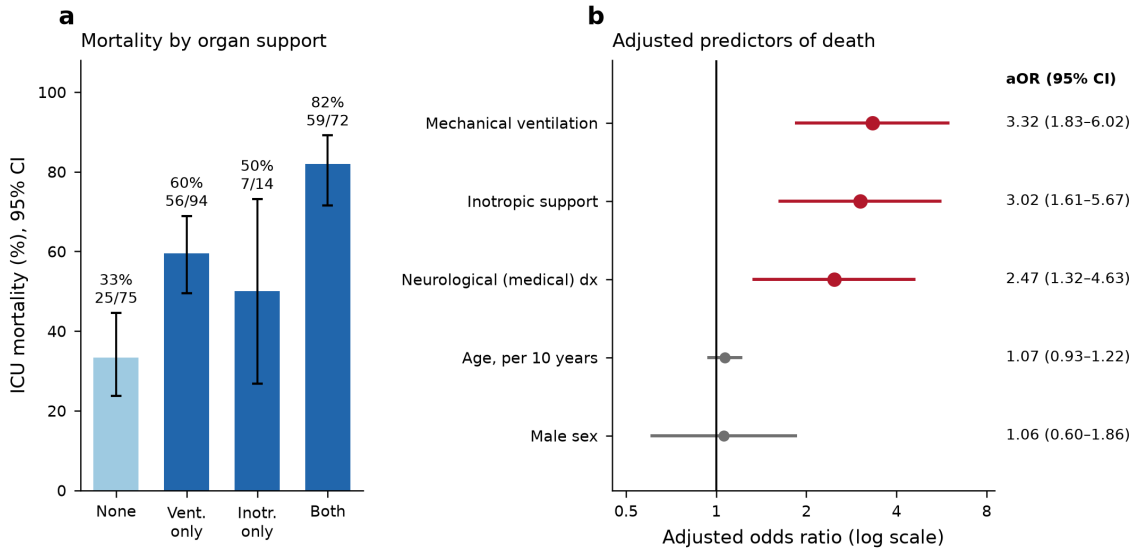


Figure 3. Organ support and risk of death. (a) ICU mortality by organ support received, with Wilson 95% confidence intervals; labels give deaths over admissions. (b) Adjusted odds ratios for ICU death from the multivariable logistic model (n = 255); red denotes p < 0.05. Organ-support requirement is a marker of severity of illness, and these associations are not causal.

Factors associated with ICU death

In the multivariable model, mechanical ventilation (adjusted OR 3.32 (95% CI 1.83–6.02)), inotropic support (3.02 (95% CI 1.61–5.67)) and a medical neurological diagnosis (2.47 (95% CI 1.32–4.63)) were independently associated with ICU death. Age (OR 1.07 (0.93–1.22) per 10 years) and male sex (1.06 (0.60–1.86)) were not (Table 3, Figure 3b). There was no interaction between ventilation and inotropes (p = 0.35). The model discriminated moderately (AUC 0.74) and was well calibrated (Hosmer–Lemeshow p = 0.79).

Results were consistent in both sensitivity analyses (Supplementary Table S2). Adjusted odds ratios for ventilation were 3.57 among first admission episodes and 4.03 among adults, and for inotropes 3.66 and 2.77.

Table 3. Crude and adjusted odds ratios for ICU death (logistic regression, n = 255)

Variable	Crude OR (95% CI)	p	Adjusted OR (95% CI)	p
Mechanical ventilation	4.02 (2.33–6.92)	<0.001	3.32 (1.83–6.02)	<0.001
Inotropic support	3.59 (2.00–6.43)	<0.001	3.02 (1.61–5.67)	<0.001
Medical neurological diagnosis	2.21 (1.25–3.90)	0.006	2.47 (1.32–4.63)	0.005
Age, per 10 years	1.08 (0.96–1.22)	0.22	1.07 (0.93–1.22)	0.35
Male sex	0.90 (0.55–1.48)	0.68	1.06 (0.60–1.86)	0.84

Reference categories: no ventilation, no inotropes, all other diagnosis groups, female sex. Model likelihood-ratio p < 0.001; pseudo-R^2 0.138; AUC 0.74; Hosmer–Lemeshow p = 0.79. OR, odds ratio; CI, confidence interval.

Length of stay and timing of death

Median length of stay was 5 days (IQR 2–10; range 0–71; n = 251), totalling 2,211 bed-days. Length of stay did not differ between patients who died (median 4 days) and survivors (5 days; p = 0.25), nor between ventilated and non-ventilated patients (p = 0.82).

Deaths were concentrated early (Figure 4). Of 16 patients who stayed less than 24 hours, 15 died. Among the 76 patients who stayed two days or fewer there were 46 deaths, 31.3% of all ICU deaths. At the other extreme, 46 patients (18.3%) stayed longer than 14 days and accounted for 1,280 bed-days (57.9% of the total); 58.7% of them died. Ventilated patients accounted for 65.0% of bed-days.

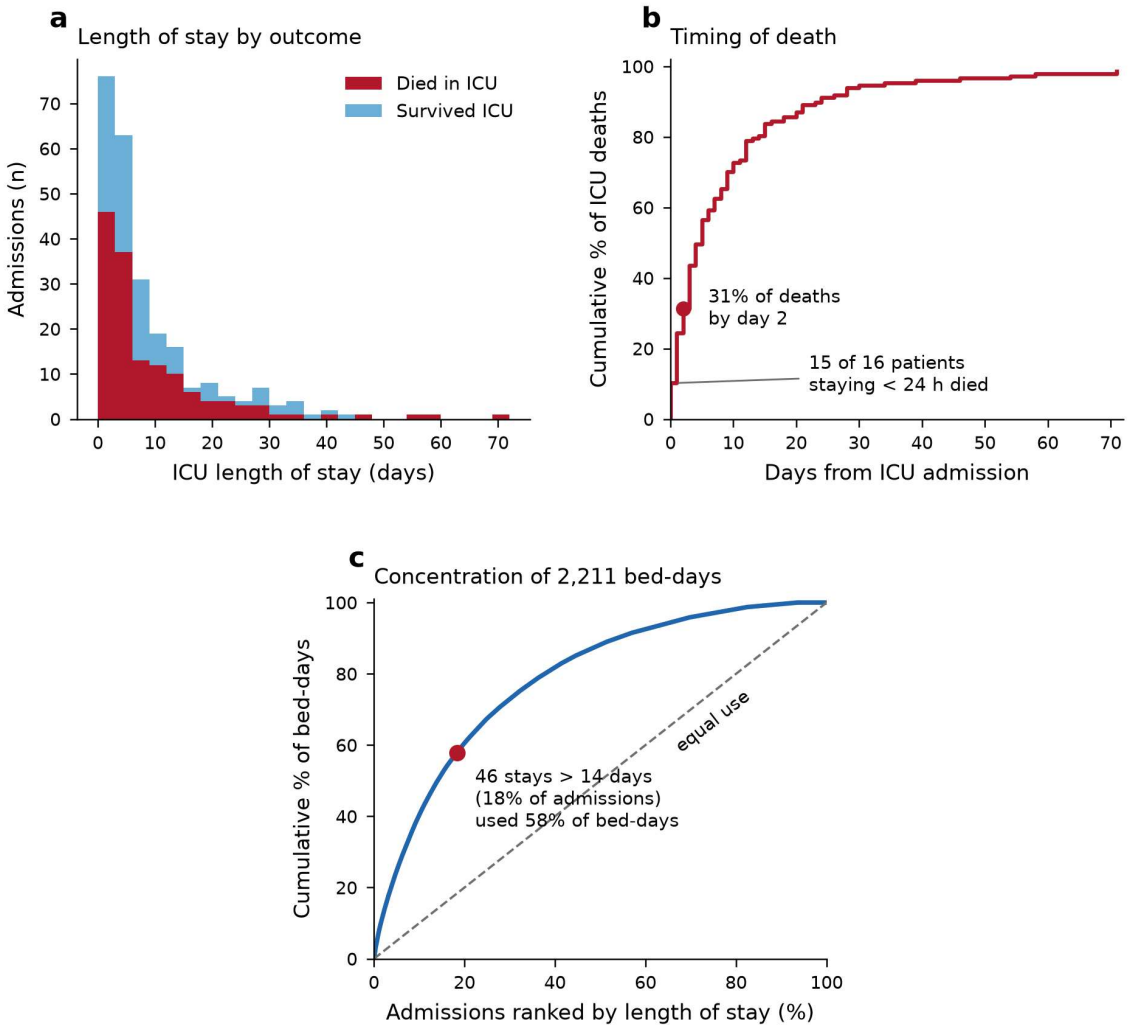


Figure 4. Length of stay, timing of death and use of bed-days (n = 251). (a) Length of stay by ICU outcome. (b) Cumulative share of all ICU deaths by day after admission. (c) Cumulative share of bed-days against admissions ranked from longest to shortest stay; the dashed diagonal represents equal use.

Discussion

In two years of consecutive admissions to this federal tertiary ICU, 57.6% of patients died before leaving the unit. Outcome tracked the need for organ support rather than patient age: ventilation and inotropic support each roughly tripled the adjusted odds of death, and mortality rose steeply with the number of organs supported. Age and sex carried no independent association. The finding of greatest practical importance, however, is the timing of death. Almost every patient who spent less than a day in the unit died, and nearly a third of all deaths occurred within 48 hours of admission.

Forty-eight hours is too short for most intensive care interventions to change a trajectory, so this pattern points to the pathway into critical care as much as to care within the unit. Three mechanisms are plausible and compatible: deterioration recognised late on the wards or in the emergency department, so that referral occurs after the point of reversibility; delay between referral and admission; and admission of patients whose physiology is already beyond rescue. The same pattern

has been described in Calabar, where 64% of ICU deaths occurred in the first 24 hours and early identification and referral from the wards was the leading recommendation [5]. Distinguishing between these mechanisms requires two data items this unit does not yet record: the interval from referral to admission and a physiological severity score at admission. Both can be introduced without new equipment. Where laboratory inputs for APACHE II are not reliably available, simplified scores developed for resource-limited settings are an option [10].

The capacity finding reframes what resource constraint means in this unit. The daily census never exceeded 7 patients in a unit with ten ICU beds and three flexible beds, and mean occupancy was 29%. With a nurse-to-patient ratio of approximately one to three or four, and with beds and ventilators intermittently out of service for maintenance, the functional capacity of the unit was set by staffing and working equipment rather than by its nominal bed number. A similar picture of low bed occupancy alongside equipment failure was reported from Calabar [5]. This distinction matters for planning: adding beds would not raise capacity, whereas nursing establishment, preventive maintenance and a reliable ventilator pool would. The concentration of bed-days in a small group of long-stay patients reinforces the point. Fewer than one patient in five consumed more than half of all bed-days, and their mortality was no lower than that of the cohort as a whole.

Mortality here is higher than the roughly one-third reported from Enugu and Calabar [4–6], but the populations differ. In Enugu, 16.7% of patients were ventilated and severe traumatic brain injury predominated [4]; in Calabar, 19% were ventilated and three quarters of admissions came from the operating theatre [5]. In the present cohort, 65% were ventilated and three in five were medical admissions, led by stroke. A unit that admits a sicker, more medical population will record higher crude mortality, which is why unadjusted rates should not be compared across units or read as a measure of quality of care [7,8].

The predominance of stroke among medical neurological admissions, and the independent association of this group with death, reflect the growing burden of non-communicable disease in Nigerian hospitals. It has implications for the skills mix of the ICU team and for timely access to neuroimaging, neurosurgical opinion and early decisions about the appropriateness of escalation.

Limitations

- No severity-of-illness score was recorded, so mortality is unadjusted for physiological severity and cannot be compared with other units.
- Outcome after ICU discharge is unknown. The 104 patients transferred to a ward are counted as survivors, so hospital mortality is higher than 57.6% by an unknown margin.
- This is a single-centre study, and the unit's staffing, equipment and admission practices shape its results.
- Data were extracted retrospectively from a register maintained for clinical purposes. Length of stay could not be determined in 4 records and disagreed with the admission-to-outcome interval in 5.
- The 255 admission episodes arose in at most 245 patients. Sensitivity analysis restricted to first episodes gave consistent results.

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- Ventilation and inotropic support were recorded as ever or never, without duration or dose, so the reconstructed ventilated census is an upper bound.
- Patients referred to but not admitted to the ICU were not recorded, so admission thresholds could not be assessed.
- Some authors participated in the clinical care of patients in this cohort. Outcomes were taken from the register rather than assigned by the authors.

Conclusions

ICU mortality in this Nigerian federal tertiary unit was 57.6%, and the requirement for mechanical ventilation or inotropes, not patient age, identified those at highest risk. Nearly a third of deaths occurred within 48 hours of admission, implicating the route into critical care as much as the care given within it. Functional capacity was limited by staffing and working equipment rather than bed numbers. Two measures would make the next audit cycle interpretable and are achievable with existing resources: routine recording of a physiological severity score at admission, and of the interval between referral and admission.

Declarations

Funding. No external funding was received.

Conflicts of interest. All authors work in the ICU studied and participated in the care of some patients in this cohort. Outcome data were taken from the clinical register and were not assigned by the authors. The authors declare no financial conflicts of interest.

Data availability. The anonymised dataset and the diagnosis classification are available from the corresponding author on reasonable request.

Author contributions. OD-O conceived the study, curated and analysed the data and wrote the first draft of the manuscript. OI contributed to data collection and critically revised the manuscript. DI supervised the study and critically revised the manuscript. All authors approved the final version.

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References

1. Adhikari NKJ, Fowler RA, Bhagwanjee S, Rubenfeld GD. Critical care and the global burden of critical illness in adults. Lancet. 2010;376(9749):1339–46. doi:10.1016/S0140-6736(10)60446-1
2. African Critical Illness Outcomes Study (ACIOS) Investigators. The African Critical Illness Outcomes Study (ACIOS): a point prevalence study of critical illness in 22 nations in Africa. Lancet. 2025;405(10480):715–24. doi:10.1016/S0140-6736(24)02846-0
3. Okafor UV. Challenges in critical care services in Sub-Saharan Africa: perspectives from Nigeria. Indian J Crit Care Med. 2009;13(1):25–7. doi:10.4103/0972-5229.53112
4. Onyekwulu FA, Anya SU. Pattern of admission and outcome of patients admitted into the intensive care unit of University of Nigeria Teaching Hospital Enugu: a 5-year review. Niger J Clin Pract. 2015;18(6):775–9. doi:10.4103/1119-3077.163291

5. Ilori IU, Kalu QN. Intensive care admissions and outcome at the University of Calabar Teaching Hospital, Nigeria. J Crit Care. 2012;27(1):105.e1–4. doi:10.1016/j.jcrc.2011.11.011

6. Eya JI, Ejikem M, Ogamba C, et al. Admission and mortality patterns in intensive care delivery at Enugu State University of Science and Technology Teaching Hospital: a three-year retrospective study. Cureus. 2022;14(7):e27195. doi:10.7759/cureus.27195

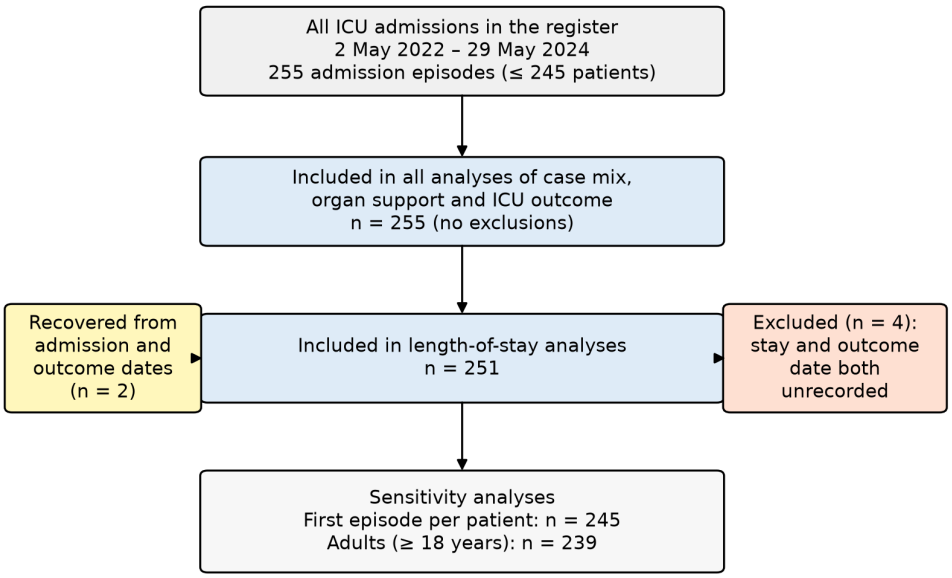
7. Vincent JL, Marshall JC, Ñamendys-Silva SA, et al. Assessment of the worldwide burden of critical illness: the Intensive Care Over Nations (ICON) audit. Lancet Respir Med. 2014;2(5):380–6. doi:10.1016/S2213-2600(14)70061-X

8. Sakr Y, Moreira CL, Rhodes A, et al. The impact of hospital and ICU organizational factors on outcome in critically ill patients: results from the Extended Prevalence of Infection in Intensive Care study. Crit Care Med. 2015;43(3):519–26. doi:10.1097/CCM.0000000000000754

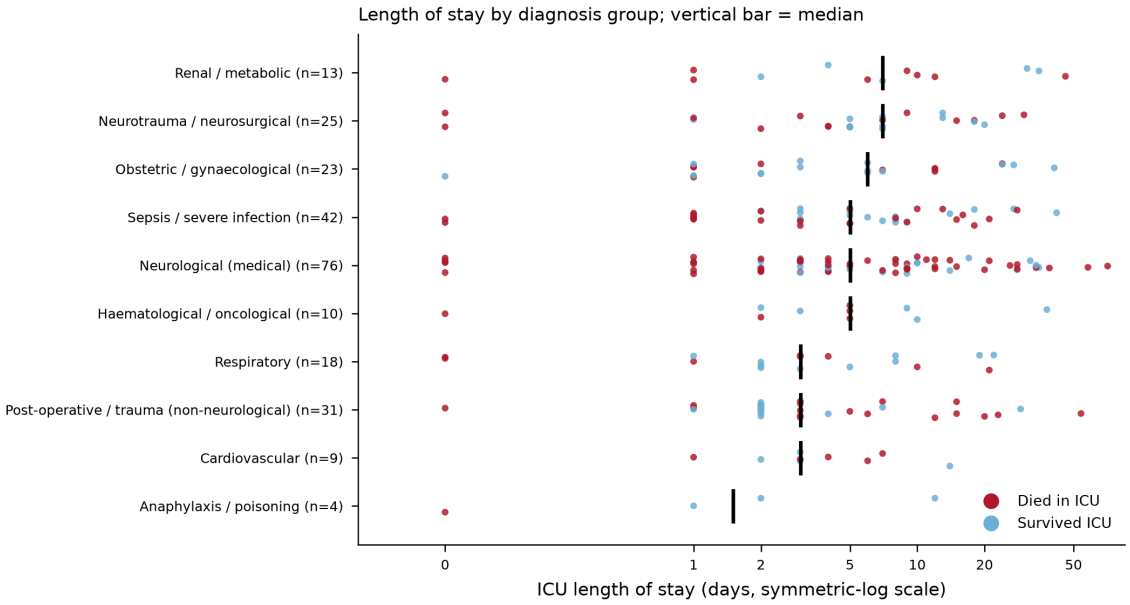
9. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. Lancet. 2007;370(9596):1453–7. doi:10.1016/S0140-6736(07)61602-X

10. Haniffa R, Mukaka M, Munasinghe SB, et al. Simplified prognostic model for critically ill patients in resource limited settings in South Asia. Crit Care. 2017;21(1):250. doi:10.1186/s13054-017-1843-6

Supplementary material



Supplementary Figure S1. Flow of admission records through the analysis.



Supplementary Figure S2. Length of stay by diagnosis group. Each point is one admission, coloured by ICU outcome; the vertical bar marks the group median. The horizontal axis is symmetric-logarithmic.

Supplementary Table S1. Multivariable model including all diagnosis groups (n = 255)

Variable	Adjusted OR (95% CI)	p
Neurological (medical)	2.29 (0.89–5.89)	0.086

Sepsis / severe infection	0.96 (0.34–2.76)	0.95
Neurotrauma / neurosurgical	1.20 (0.38–3.82)	0.76
Obstetric / gynaecological	0.42 (0.12–1.47)	0.18
Respiratory	0.79 (0.21–2.96)	0.73
Other medical groups combined	1.04 (0.36–3.03)	0.95
Age, per 10 years	1.05 (0.91–1.21)	0.52
Male sex	0.87 (0.47–1.62)	0.67
Mechanical ventilation	3.31 (1.81–6.04)	<0.001
Inotropic support	3.08 (1.61–5.87)	<0.001

Reference: post-operative / trauma (non-neurological), n = 31. Other medical groups combined: renal/metabolic, haematological/oncological, cardiovascular, anaphylaxis/poisoning (n = 36).

Supplementary Table S2. Sensitivity analyses: adjusted odds ratios (95% CI) for ICU death

Analysis	**n**	**Deaths (%)**	**Ventilation**	**Inotropes**	**Medical neurological dx**	**Age /10 y**
Primary, all episodes	255	147 (57.6)	3.32 (1.83–6.02)	3.02 (1.61–5.67)	2.47 (1.32–4.63)	1.07 (0.93–1.22)
First admission episode per patient	245	141 (57.6)	3.57 (1.93–6.60)	3.66 (1.90–7.06)	2.83 (1.47–5.43)	1.02 (0.89–1.18)
Adults aged 18 years or over	239	139 (58.2)	4.03 (2.15–7.53)	2.77 (1.44–5.31)	2.47 (1.30–4.67)	1.11 (0.94–1.31)

All models adjusted for age, sex, ventilation, inotropes and medical neurological diagnosis.

Supplementary Table S3. Data completeness and handling

Field	**Issue**	**Records**	**Handling**
Severity-of-illness score	Not recorded	255 (100%)	Mortality unadjusted; principal limitation
Referral-to-admission interval	Not recorded	255 (100%)	Not analysed; recommended for future collection
Outcome after ICU discharge	Not recorded	108 survivors	ICU mortality used as primary outcome
Procedure	Not documented	243 (95.3%)	Not analysed
Length of stay	Formula error, no outcome date	4	Excluded from length-of-stay analyses
Length of stay	Blank, both dates present	2	Derived from admission and outcome dates
Length of stay	Disagrees with date interval	5	Register value retained
Hospital number	Duplicated	10 numbers	Episodes analysed; first-episode sensitivity
Hospital number	Missing	1	Retained as a distinct patient
Diagnosis	Free text only	255 (100%)	Classified by clinical review (Table S4)

Supplementary Table S4. Classification of free-text admission diagnoses into diagnosis groups

Diagnosis group (n)	Free-text entries as recorded (number of admissions where >1)
Neurological (medical) (78)	Acute left hemispheric CVA + CKD; Acute on chronic CVA; aspiration pneumonitis + stroke; Cardioembolic stroke; Cardioembolic stroke from background arterial fibrillation; Cerebral Hypoxic injury; CVA (2); CVA w/ herniation; CVA w/immunosuppression; CVA+ cerebral edema; Gullian Barre Syndrome (2); Haemorrhagic CVA; Haemorrhagic CVA +aspiration pneumonitis; Hemorrhagic CVA (16); Hemorrhagic CVA + aspiration pnuemonitis; Hemorrhagic CVA + aspiration pnuemonitis; Hemorrhagic CVA +aspiration pnuemonitis; Hemorrhagic CVA +intracerebellar bleed; Hypertensive encephalopathy; Hypoxic ischemic encepalopathy; Intercerebral hemorrhage w/ venticular extension; Intracerebral hemorrhage; Intracranial hemorrhage; Ischaemic CVA; Ischemic CVA in a known hypertension+diabetes mellitus; Ischemic CVA+ AKI; Ischemic stroke +aspiration pnuemonitis; Know diabetes mellitus /hypertension with repeat stroke; Known hypertension+ aspiration pneumonitis+ stroke; Known hypertension+diabetes mellitus pt + status epilecticus; Known hypertension+diabetes mellitus pt + stroke; Left hemispheric CVA (2); Left hemorrhagic stroke; Lt hemispheric CVA + Aspiration Pneumonitis; Massive left intracranial hemorrhage.; Post CVA sepsis; Post stroke sepsis; Post stroke sepsis aspiration pneumonitis; Repeat CVA; Repeat CVA Aspiration pneumonitis Sepsis in a known diabetes mellitus , hypertension & parkison; Repeat CVA + aspiration pneumonitis; Repeat CVA in a known diabetic patient; Repeat CVA, unconsciousness, hypokalemia; Repeat ischaemic CVA; Respiratory distress in a sub acute stroke; Right cerebellar hemorrhagic stroke; Right hemorrhagic CVA; Rpt stroke + sepsis(chest); Rt haemorrhagic stoke; Rt haemorrhagic stroke; SAH +sepsis; Sepsis w/ hemorrhagic CVA; Status epilepticus partialis + post menopausal bleeding; Subarachnoid hemorrhage; Thalamic / basal ganglia CVA; Unconciousness Cause; Unconsciousness (2); Unconsciousness Cause; Unconsciousness, caused by viral encephalitis
Sepsis / severe infection (43)	Acute on CKD precipitated by sepsis; Acute on CKD secondary toondary to sepsis and anaemic heart failure; Acute poisoning DKA, severe malaria; AKI secondary to septic shock; ARDS sepsis chest focus; Biventricular failure secondary toondary to chest infection; Cerebral malaria r/o meninGITis; Cerebral malaria r/o meningitis; DIC and septic shock; Disseminated tb with caecal perforation had ex lap; DKA secondary to sepsis/ acute on chronic kidney disease; Emphyema; HHNS w/ chest infection; Intra abdominal abscess post ex lap; Intraabdominal sepsis with septic shock; Know diabetes mellitus /hypertension with ESRD septic shock; Known hbss, hepatic sequestration, severe sepsis; MODS 2 sepsis; Peritonitis secondary to ruptured viscus; Post op sepsis: peritonitis; Rt-lung atelectasis Rt pleural effusion+ sepsis focus GI r/o AKI; Scalp injury with necrotising fascitis; Sepsis (4); Sepsis Chest focus; Sepsis + CKD; Sepsis AKI bckground hypertension & BPH; Sepsis with MODS, dementia; Sepsis, post cardiac arrest x 3; Septic secondary to anterior neck triangle fascitis complicated by acute kidney injury; Septic shock; Septic shock Chest focus; Septic shock +AKI; Septic shock / DIC; Septic shock(chest focus) AKI r/o uti brochopneumonitis (community acquired) +hepatitis b+; Septicemia complicated by ARDS; Severe sepsis (3); Severe sepsis form infected vp shunt; Tetanus

Post-operative / trauma (non-neurological) (31)	BKA o/a left diabetes mellitus foot syndrome iv; Distal femur fracture w/ background CCF; Endoscopy cythoscoplaxy converted to open laparascopy o/a of vesicolithiasis; Endoscopy cythoscoplaxy converted to open laparoscopy o/a of vesicolithiasis; Ex-lap intestinal obstruction; GIT perforation; Gunshot injury to the pelvis; Hypovolemic shock 2 intra abdominal hemorrhage; Inhalation injury; Intestinal ostruction w/ MODS; L joint disarticulation; Left diabetes mellitus foot syndrome + knee amputation; Left hemiarthroplasty; Left hip dis-articulation ll gangrene; Post op: exploratory laparotomy secondary to intestinal obstruction + post cardiac arrest care; Post operative monitoring (6); Post operative monitoring: intussuseption; Repeat ORIF + bone graft; Rt posterolateral lobectomy; Suspected postoperative femoral bleeding; Thoracotomy for PDA; Unconsciousness (post orif of radius and ulna) under ga; Upper GI bleeding + post cardiac arrest care; Upper GIT bleeding; Urinary tract trauma / post op cardiac arrest; Vascular embolectomy
Neurotrauma / neurosurgical (26)	5th Cervical Spine corpectomy; C2/C3 laminectomy and tumor resecondary totion; Chronic subdural haematoma; Craniotomy + subdural haematoma 2 raised ICP; Degenerative lumbar canal stenosis; Head injury---craniotomy; Left posterior parietal craniotomy with evacuation of haematoma; Multiple injured patient: severe TBI; Poly trauma, severe TBI; Polytraumatized patient with blunt abdominal injury, chest injury with mild traumatic brain injury; Polytraumatized patient with TBI and blunt chest trauma (2); Post op craniotomy for airway management; SDH: parietal craniostomy; Severe TBI; Severe TBI 2 RTA; Severe TBI with intracerebral hemorrhage; Severe traumatic brain injury; Severe traumatic brain injury (TBI) (2); Severe traumatic brain injury secondary to RTA; Subdural hematoma; TBI; TBI, sepsis+ling contusion; Traumatic brain injury (2)
Obstetric / gynaecological (23)	AKI post myomectomy; Eclampsia; Eclampsia CVA in an unconscious pt, as; Emergency cs + bilateral tubal ligation o/a aph 2 type iv placenta praevia; Emergency cs + desaturation; Emergency cs for twin gestation with severe pre eclampsia + unfavorable cervix in known hbss; Emlscs; Ex lap+sah, bso +repair of rectal enterotomy; Hemorrhagic shock secondary to ectopic pregnancy; Hypovolemia 2 antepartum hemorrhage; Massive blood loss secondary to Postpartum Hemorrhage; Peripartum cardiomyopathy; Peuperal psychosis, eclampsia; Post myomectomy: AKI +ARDS; Post op ex lap secondary to ruptured ectopic pregnancy; Post operative DIC +AKI; Post operative MODS; Post operative sepsis + MODS; Post partum sepsis + pre eclampsia; PPH complicated by sepsis & DIC; Pulmonary edema 2 preclampsia; Severe preeclampsia on chronic hypertension; Unconsciousness, due to myomectomy Pulmonary embolism + RVD
Respiratory (18)	Acute pulmonary embolism / fat embolism; Acute Respiratory Distress Syndrome + Pulmonary Edema secondary to acute transfusion reaction; Acute respiratory failure w/ unconciousness; ARDS; Atrial fibrillation w/ pulmonary embolism; CAP + background hypertension; Cap background hypertension; CCF+COA+community acruired pneumonia; Diabetes mellitus fs wager grade+ organophosphate Resolving aspiration pneumonitis; Emphysema + lung collapse; Hospital acquired pneumonia; Pulmonary embolism (5); Pulmonary embolism + uncontrolled hypertension; Pulmonary embolism+ brain stem dx

Renal / metabolic (13)	AKI on CKD; Aspirational pnuemonitis and hyperglycemic crisis; CKD r/o HIVAN; Desaturation known CKD+hypertension+ unconsciouness; ESRD + prostrate ca; ESRD secondary to multiple myeloma; HIVAN; Hypotensive+ prostate dx+ CKD; Known hypertension with prostate ca & CKD; Known hypertension+diabetes mellitus +hyperthyroidism; Known hypertension/diabetes mellitus; Loss of conciousness secondary to to hhs; Unconsciousness, Uraemic Encephalopathy + ESRD
Haematological / oncological (10)	Acute chest syndrome HBSS; Advanced prostrate ca w/ boo; Hematologic malignancy; Post excision of alveolar soft part sarcoma on the lf thigh with brain & lung metastasis; Rectal cancer; Respiratory compromise in severe anaemia in known hbss; Right lung mass; TTP r/o Disseminated Intravascular Coagulopathy/ MODS; Upper oesophageal cancer with stricture; Vaso-occulsive & hemorrhagic crisis in a sickled cell
Cardiovascular (9)	Acute heart failure secondary to DCM; Acute on chronic heart failure; Acute pulmonary edema; Biventricular heart failure secondary to thyrotoxicosis precipitated by atrial fibrillation; Cardiogenic shock; Heart failure Aortic dissecondary totion, hypotension; Heart failure secondary to rheumatic heart disease + pulmonary hypertension; Post cardiac arrest; Pulmonary edema
Anaphylaxis / poisoning (4)	Anaphylaxis; Anaphylaxis with bronchospasm; Angioedema; Organophosphate poisoning following a sucidal attempt

Entries reproduced as recorded, including original spelling and abbreviations.

Supplementary Table S5. STROBE checklist for cohort studies

STROBE item	No.	Where reported
Title and abstract	1	Title page; Abstract
Background / rationale	2	Introduction 1–2
Objectives	3	Introduction 3
Study design	4	Methods: Design and setting
Setting	5	Methods: Design and setting
Participants	6	Methods: Participants; Fig S1
Variables	7	Methods: Variables
Data sources / measurement	8	Methods: Variables
Bias	9	Methods; Limitations
Study size	10	Methods: Participants
Quantitative variables	11	Methods: Statistical analysis
Statistical methods	12	Methods: Statistical analysis; Table S2
Participants (results)	13	Results: Cohort; Fig S1
Descriptive data	14	Table 1; Fig 1; Table S3
Outcome data	15	Table 2
Main results	16	Table 3; Fig 3
Other analyses	17	Tables S1, S2
Key results	18	Discussion 1

Limitations	19	Limitations
Interpretation	20	Discussion 2–5
Generalisability	21	Limitations
Funding	22	Declarations