Predicting short-term and long-term mortality in elderly emergency patients admitted for intensive care

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ABSTRACT

Objective: The long-term outcomes of intensive care for the growing elderly cohort are not well defined. We explored the predictive factors for 12-month mortality in elderly patients who were admitted to an intensive care unit within 24 hours of emergency department (ED) presentation.

Design, setting and participants: A retrospective cohort study of 506 patients aged 80 years and over who were admitted to the Royal Melbourne Hospital ICU within 24 hours of presentation to the ED, between 1 January 2005 and 1 December 2010.

Main outcome measures and results: After multivariate regression analysis, independent risk factors for mortality 12 months after hospital discharge were the need for mechanical ventilation (odds ratio [OR], 5.16; 95% CI, 3.00–8.86), presence of acute renal failure (OR, 4.71; 95% CI, 2.04–10.84), age (OR, 1.07; 95% CI, 1.01–1.14), Glasgow coma score (GCS) (OR, 0.89; 95% CI, 0.84–0.93) and serum urea level (OR, 1.05; 95% CI, 1.02–1.07). Independent predictors for mortality in the ICU were the presence of acute renal failure (OR, 14.96; 95% CI, 6.50–34.44), the need for mechanical ventilation (OR, 8.13; 95% CI, 2.77–23.89), and GCS (OR, 0.85; 95% CI, 0.79–0.90). Mortality in the ICU was 16.6%, and 12 months after hospital discharge was 46.3%.

Conclusions: Physiological parameters present on admission to the ICU including acute renal failure, the need for mechanical ventilation, a low GCS and high serum urea level, as well as age, have independent predictive value for 12-month mortality, but comorbidities were not predictive. This may help clinicians with decisions about who will benefit most from intensive care treatment.

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The proportion of the population over 80 years old is increasing, and so are their demands on the health care system.[1,2] In particular, the demand for intensive care unit admission from the over-80s cohort in Australia and New Zealand has been increasing by 5.6% annually and has been projected to increase by as much as 76.4% over the 10 years from 2006 to 2015.[1]

Given this predicted increase in demand for ICU admission from this very elderly cohort, it is helpful for clinicians to have accurate prognostic factors to help inform decision making when contemplating an ICU admission for elderly patients. These decisions are frequently made in the emergency department (ED), as the ED is the primary source of referral for non-elective ICU admissions, though both ED and ICU staff are reluctant to refer and admit elderly patients to the ICU.[3-5]

Significant effort has already been dedicated to investigating outcomes for elderly patients admitted to the ICU.[1,3,6-16] However, these studies have largely encompassed predictive factors for short-term outcomes such as survival to ICU or hospital discharge.[1,6-11,14,17-23] Predictive factors for longer term outcomes have been studied, but these studies are heterogeneous in the demographics of patients studied and the period of follow-up, thus limiting their applicability.[3,6-8,11,13,15,24,25] A review of the existing literature, by Minne in 2011, found there is no current predictive model adequate for clinical application in the elderly cohort, especially for long-term outcomes. This is despite multiple attempts to create and evaluate predictive models for elderly patients.[26]

Our primary objective was to explore the predictive factors for 12-month mortality in patients over the age of 80 years who were admitted to an ICU within 24 hours of presentation at an ED.

Methods

A retrospective cohort study of prospectively collected data of elderly patients (aged 80 years and over) who were admitted to the ICU of the Royal Melbourne Hospital (RMH) within 24 hours of presentation to the RMH ED between 1 January 2005 and 1 December 2010. The RMH is a Melbourne tertiary referral and university-associated hospital, and one of two state adult major trauma centres. The ED sees over 60 000 presentations per year, of which 40% are admitted. The ICU is a 24-bed, level 3, mixed medical and surgical facility with about 2000 admissions annually. About 40% of all ICU admissions are admitted within 24 hours of ED presentation.

The inclusion criteria for this study were any patient aged over 80 years on the day of ICU admission and admission to ICU within 24 hours of ED presentation, including those

Table 1. Patient demographics, admission type and source, intensive care unit mortality and illness severity

Characteristics	All patients (n = 506*)	Dead 12 months after hospital discharge (n = 234*)	Alive 12 months after hospital discharge (n = 265*)
Median age (years) (IQR)	83.7 (81.8–86.1)	84.1 (82.0–87.1)	83.6 (81.7–85.6)
Female (%) (95% CI)	46.8% (42.5–51.2)	44.4% (40.2–48.8)	49.1% (44.9–53.6)
Admission type (%) (95% CI)			
Medical	72.5% (68.5–76.2)	70.9% (64.8–76.4)	74.3% (68.8–79.2)
Surgical	27.5% (23.8–31.5)	29.1% (23.6–35.2)	25.7% (20.8–31.2)
Admission source (%) (95% CI)			
ED to ICU	69.2% (65.2–73.2)	67.1% (61.1–73.1)	71.3% (65.9–76.8)
ED to ward to ICU	4.5% (2.7–6.3)	5.6% (2.7–8.6)	3.8% (1.5–6.1)
ED to operating theatre to ICU	26.3% (22.5–30.1)	27.3% (21.7–33.1)	24.9% (19.7–30.1)
ICU mortality (%) (95% CI)	16.6% (13.6–20.1)	36.3% (30.4–42.7)	0%
Illness severity score median (IQR)			
APACHE III	70 (55–88)	81 (67–108)	62 (49–75)
APACHE II	19 (14–24)	22 (18–27)	16 (13–21)
SAPS II	46 (37–58)	54 (44–66)	41 (34–48)
Overall (%) (95% CI)	100%	46.3% (42.0–50.6)	52.4% (47.9–56.6)

IQR = interquartile range. ED = emergency department. APACHE = Acute Physiology and Chronic Health Evaluation. SAPS = Simplified Acute Physiology Score. * Numbers do not add to 506 because the life status of seven patients could not be confirmed and these patients were not included in the regression analysis.

who were initially admitted to the general ward or the operating room.

Data collection

Data were collected during the patient admission and recorded in the RMH Australian Outcomes Research Tool for Intensive Care (AORTIC) database,[27] which is a prospectively collected dataset submitted to the Australia and New Zealand Intensive Care Society (ANZICS) as part of the RMH ICU's ongoing quality assurance activities.

The following demographic data were extracted from the AORTIC database: age, sex, place of residence and admission and discharge dates. Clinical variables from the database were also extracted and these included comorbidities present at admission, use of mechanical ventilation, Glasgow coma score (GCS) at admission, urine output on day of admission, presence of acute renal failure, serum urea and creatinine levels and diagnosis at admission. The severity of illness was measured using Acute Physiology and Chronic Health Evaluation (APACHE) II and III and Simplified Acute Physiology Score (SAPS) II scores. We also collected data on length of stay and ICU and inhospital mortality.

One-year mortality was determined via interrogation of the Victorian Registry of Births, Deaths and Marriages by matching patients' names and birth dates with their death records. Patients' names and dates of birth, as recorded in the AORTIC database, were matched with records in the Registry via their first name, middle name, surname and date of birth. When hospital records did not include a middle name, but the death registry records did, these patients were considered to be the same person.

For our study, comorbidities and diagnoses were defined according to the ANZICS adult patient database data dictionary and the APACHE III classification system.[28,29] In particular, chronic cardiovascular disease was defined by the presence of New York Heart Association class IV symptoms, and acute renal failure was defined as a serum creatinine level greater than 133 μmol/L and urine output less than 410 mL in the first 24 hours in patients who had not received peritoneal dialysis or haemodialysis before their hospital stay. Urea was recorded as the highest level measured, in mmol/L, for each patient within the first 24 hours.

Outcome measures

The primary outcome was to determine the factors present at ICU admission that were independently associated with 1-year mortality. The secondary outcome was to identify independent factors associated with mortality within the ICU.

Statistical analysis

The ICU admits about 800 patients per year from the ED but only about 10%–15% were expected to be in the very elderly cohort. The study was planned to include about 20 variables. Allowing for 15 patients per variable, a sample

Table 2. Univariate analysis of factors associated with intensive care unit and 12-month mortality

Factor	ICU mortality odds ratio (95% CI)	Mortality 12 months after hospital discharge (*P*)	Odds ratio (95% CI)	*P*
Age	0.99 (0.92–1.06)	0.78	1.07 (1.02–1.13)	0.11
Sex	0.72 (0.45–1.15)	0.17	0.83 (0.58–1.18)	0.30
Hospital admission source	1.03 (0.93–1.15)	0.53	1.02 (0.94–1.11)	0.56
Time to transfer from ED to ICU	0.93 (0.89–0.98)	0.007	0.97 (0.94–1.00)	0.04
ICU admission source	1.21 (0.86–1.71)	0.26	1.16 (0.88–1.55)	0.28
Physiological parameter				
Acute renal failure	6.98 (3.78–12.89)	< 0.001	5.26 (2.57–10.78)	< 0.001
Glasgow coma score	0.82 (0.77–0.86)	< 0.001	0.85 (0.81–0.89)	< 0.001
Urea level	1.02 (1.00–1.04)	0.07	1.03 (1.01–1.05)	0.002
Creatinine level	1.00 (1.000–1.004)	0.03	1.00 (1.001–1.004)	0.004
Mechanical ventilation	10.52 (4.17–26.51)	< 0.001	5.21 (3.40–7.97)	< 0.001
Comorbidity				
Immunosuppression	1.50 (0.40–5.58)	0.54	0.97 (0.32–2.93)	0.96
Immune disease	5.00 (0.31–80.73)	0.26	1.13 (0.07–18.21)	0.93
Leukaemia or myeloma	1.66 (0.17–16.14)	0.66	2.28 (0.21–25.26)	0.50
Insulin-dependent diabetes mellitus	0.90 (0.20–4.13)	0.89	0.97 (0.32–2.93)	0.96
Chronic respiratory disease	1.44 (0.46–4.47)	0.53	1.43 (0.56–3.70)	0.46
Chronic cardiovascular disease	3.81 (0.84–17.36)	0.08	0.85 (0.19–3.83)	0.83
Metastatic disease	Perfect prediction	–	1.13 (0.16–8.11)	0.90
Liver cirrhosis	Perfect prediction	–	Perfect prediction	–
Hepatic failure	Perfect prediction	–	Perfect prediction	–
Chronic renal failure	Perfect prediction	–	Perfect prediction	–
HIV	Collinearity	–	Collinearity	–
Severity of illness score				
SAPS 2	1.11 (1.08–1.13)	< 0.001	1.08 (1.06–1.09)	< 0.001
APACHE II	1.24 (1.18–1.29)	< 0.001	1.14 (1.10–1.18)	< 0.001
APACHE III	1.06 (1.04–1.07)	< 0.001	1.04 (1.03–1.05)	< 0.001

ED = emergency department. SAPS = Simplified Acute Physiology Score. APACHE = Acute Physiology and Chronic Health Evaluation.

size of 300 would be required. Thus we estimated that 4 years' data would be required to ensure a sample of at least 300. As this hypothesis has not been tested elsewhere and obtaining the data does not expose patients to harm, the sampling period was increased by 50% to 6 years to ensure adequate power. The data in this study were analysed using Intercooled Stata, version 10 (StataCorp).

All demographic and pathophysiological variables were analysed for association with mortality at 1 year and at ICU discharge. The severity-of-illness scores (APACHE III, II and SAPS II) were also included. Analysis was undertaken using logistic regression for single variables. This is presented as the odds ratio (OR) for death and the 95% confidence interval. All variables that were significant to $P < 0.1$ were included in a backwards stepwise regression analysis. Age was also initially included as it is believed to be a clinically important factor. Stepwise regression occurred until the model held only independently significant variables.

No variable was dichotomised, so ordinal variables such as GCS, age and urea are presented as the OR for each unit change in that variable. The severity-of-illness scores were not included in the regression model as they are composite scores that contain the factors being assessed, and are not available on triage of the patient. The study was approved by the RMH human ethics and research committee as a quality assurance activity.

Results

Over the period 1 January 2005 to 1 December 2010 there were 506 elderly patients admitted to the ICU within 24 hours of arrival in the ED. Of these 506 patients, 422

Table 3. Factors independently associated with mortality 12 months after hospital discharge, using multivariate analysis

Factor	Odds ratio (95% CI)	*Z*-score	*P*
Mechanical ventilation	5.16 (3.00–8.86)	5.94	< 0.001
Acute renal failure	4.71 (2.04–10.84)	3.64	< 0.001
Age	1.07 (1.01–1.14)	2.13	0.033
Urea level	1.05 (1.02–1.07)	3.76	< 0.001
Glasgow coma score	0.89 (0.84–0.93)	–4.69	< 0.001

Table 4. Factors independently associated with intensive care unit mortality, using multivariate analysis

Factor	Odds ratio (95% CI)	*Z*-score	*P*
Acute renal failure	14.96 (6.50–34.44)	6.36	< 0.001
Mechanical ventilation	8.13 (2.77–23.89)	3.81	< 0.001
Chronic cardiovascular disease	6.33 (0.96–41.84)	1.92	0.055
Glasgow coma score	0.85 (0.79–0.90)	–5.33	< 0.001

survived to ICU discharge (ICU mortality rate, 16.6%; 95% CI, 13.6–20.1). At 1 year, 265 of the 506 admitted to the ICU were alive (52.4%), and 234 were confirmed dead (46.3%; 95% CI, 42.0–50.6) (Table 1). The life status of seven patients could not be confirmed (1.4%), and these patients were not included in the regression analysis.

On univariate analysis of mortality 12 months after hospital discharge, factors independently associated with mortality were acute renal failure, GCS, serum urea level, serum creatinine level, the need for mechanical ventilation, and illness severity scores. On univariate analysis, age was not significantly associated with mortality, but was included in our multivariate analysis as it had previously been determined to be a clinically important variable (Table 2).

On univariate analysis, several variables were associated with mortality during ICU admission. These were time taken to transfer from arrival in ED to the ICU, the presence of acute renal failure, GCS on admission, serum urea and creatinine levels, the need for mechanical ventilation, and severity-of-illness scores (Table 2).

Multivariate regression analysis showed that at 12 months after hospital discharge, the need for mechanical ventilation (OR, 5.16) and the presence of acute renal failure (OR, 4.71) were the strongest predictors of mortality. Age (OR, 1.07) was an incremental risk factor for long-term mortality for each extra year of age, as was GCS (OR, 0.89) for every single point increase, and urea (OR, 1.05) for each mmol/L increase (Table 3).

On multivariate regression analysis for ICU mortality, the strongest independent risk factors for mortality were the presence of acute renal failure (OR, 14.96) and the need for mechanical ventilation (OR, 8.13). GCS was an incremental independent risk factor (OR, 0.85) for every point increase in GCS score (Table 4).

ICU and 12-month mortality rates for non-operative (medical) admissions were 17.2% and 45.2% respectively, and for those undergoing operative intervention, ICU mortality was 15.2% and 12-month mortality was 48.9% (Table 5). The admission diagnoses associated with the greatest mortality 12 months after hospital discharge in non-operative patients were intracerebral haemorrhage (100%, 7/7), cardiogenic shock (83.3%, 5/6) and subarachnoid haemorrhage (80%, 8/10). Other conditions associated with a high 12-month mortality were congestive heart failure (71.4%, 5/7) and cardiac arrest (68.2%, 30/44). In patients who underwent surgery, those with the greatest 1-year mortality were the ones who had had a subarachnoid haemorrhage (87.5%, 7/8) (see Appendix for complete data). The 1-year mortality rates in diagnostic categories with five or fewer patients are not presented.

Discussion

Our study examined predictive factors for 12-month mortality in a group of elderly patients who presented initially to

Table 5. Intensive care unit mortality and mortality 12 months after hospital discharge, by admission diagnosis

Diagnosis at admission	Total patients (*n*)	Mortality at discharge from ICU (*n*) (%)	Mortality at 12 months (*n*) (%)
All patients	506	84 (16.6%)	234 (46.3%)
Non-operative	367	63 (17.2%)	166 (45.2%)
Cardiac	87	29 (33.3%)	43 (49.4%)
Respiratory	46	5 (10.9%)	21 (45.7%)
Gastrointestinal	27	1 (3.7%)	7 (25.9%)
Neurological	65	10 (15.4%)	41 (63.1%)
Sepsis	42	10 (23.8%)	19 (45.2%)
Trauma	69	7 (10.1%)	25 (36.2%)
Other	31	1 (3.2%)	10 (32.2%)
Operative	139	21 (15.2%)	68 (48.9%)
Cardiovascular	23	4 (17.4%)	5 (21.7%)
Gastrointestinal	35	5 (14.3%)	18 (51.4%)
Neurosurgical	43	7 (16.3%)	28 (65.1%)
Trauma	31	4 (12.9%)	14 (45.2%)
Other	7	1 (14.3%)	3 (42.9%)

the ED and were admitted to the ICU within 24 hours. We found that, 12 months after discharge, it was initial physiological derangement which was most closely associated with mortality. Our data show in particular that elderly patients with acute renal failure and the need for mechanical ventilation are in an unfavourable prognostic group.

Our findings are concordant with comparable studies of elderly patients showing several measures of acute physiological derangement correlating with ICU and/or 12-month mortality, such as the need for mechanical ventilation,[1,2,10,30] the presence of acute renal failure[2,8,9] and a reduced GCS.[8,10,15] Physiological derangement during admission has previously been found to be a strong predictor of short-term but not necessarily of long-term mortality in the elderly.[10,31] The presence of acute renal failure has been reported by multiple investigators to be an independent predictor of mortality in all adult ICU patients,[32-34] and the addition of respiratory failure further worsens prognosis.[35-37] Few studies have specifically examined the elderly critically ill cohort, especially for predictors of long-term mortality. Existing studies have often focused on mechanically ventilated patients only or those from various subgroups.[24,25,38] One study completed in 2012 has examined the elderly ED cohort considered for ICU admission but, in contrast to this study, did not include parameters of acute physiological derangement in their data collection, apart from an illness severity score.[5]

In relation to comorbidities, we found that chronic cardiovascular disease almost reached statistical significance as a predictor of short-term mortality. The presence of comorbidity has previously been reported to predict short-term mortality in the elderly.[1,5,9,39,40] We did not find a correlation between the presence of comorbidity and long-term outcome in this age group, although others have.[5]

We did find that age was an independent predictor of long-term mortality, as has been well recognised by previous reports.[10,38] Rosenthal et al, in a large multicentre study, and other investigators found that risk of inhospital death increased incrementally with age, independent of severity of illness and other prognostic factors.[17,20,41]

Nutritional, functional and cognitive status have been reported as independent predictors of outcome and warrant inclusion in prognostication for the elderly cohort.[5,6,10,13,39,42] In this age group, mortality has also been reported to be related to admission diagnosis, illness severity, APACHE II score, polypharmacy and the patient's sex.[8,10-13,25,38]

On univariate analysis, our findings support previous reports that illness severity scores are reasonably accurate for prognostication and thus are valuable tools after the first 24 hours of an ICU admission.[8,11,12,15,25] Rosenthal et al and other researchers have concluded that although illness severity scores were useful predictors in all age groups, their discrimination decreased with age. Rosenthal et al hypothesised that other factors such as functional status, patient preferences and the practices of the doctor become more important in older patients.[17,43] Boumendil et al opined that illness severity is less important and that information on functional, mental and nutritional status, comorbidities and quality of life should be gathered to predict long-term outcome.[31]

The decision to admit an elderly patient to the ICU occurs in the ED on 40% of occasions in the RMH. This figure does not include patients who may have been considered and then rejected for ICU admission for various reasons by an ED or ICU doctor. Referrals from the ED represent most cases; up to 70% in other hospitals.[3,5] Garrouste-Orgeas et al developed ICU admission criteria for the elderly, and found that only 31% of elderly patients meeting the criteria were referred to the ICU and, of those, only 52% were actually admitted.[4] The challenge is to identify the patients who will benefit most from an ICU admission.

Our finding that physiological parameters present on admission are useful in prognosticating long-term outcome is reassuring, since the decision to admit a patient to ICU is increasingly being made with only a couple of hours to evaluate the patient.

Admission decisions should be evidence-based, but doctors often rely on their clinical impressions of outcomes for this group of patients, which have been found of little use in prognostication.[44] Study of the process of admission to ICU has been limited but has reported the evaluation of factors other than physiological variables. Factors associated with no referral to the ICU were age, active cancer, unknown hospitalisation status, unknown living arrangements, regular use of psychotropic medications, low illness severity at referral and a low activities of daily living score.[4] Factors independently associated with refusal for ICU admission included non-surgical status, age older than 85 years, dependent status and a full ICU.[3]

Our data show that 12 months after hospital discharge, more than 50% of the elderly patients admitted to our ICU are still alive. This may provide some comfort to those who recommend intensive care for elderly Australians.

In Australia and New Zealand, overall ICU mortality for patients over 80 years is reported as 12%, which is predictably higher than the 8.2% mortality reported for all patients.[1] The ICU mortality rate of 16.6% for our cohort should be interpreted in the context of our exclusion of patients who underwent planned elective surgery, who would be expected to have a lower mortality.

Our non-operative and operative ICU mortality and 12-month mortality rates are low compared with those in Italy and the Netherlands, which have ICU mortality rates of between 14% and 37%, and 12-month mortality rates of between 61% and 76% for similar patient groups.[8,45]

Interestingly, Boumendil et al, in 2012, found that ICU admission for the critically ill elderly did not influence short-term or mid-term vital or functional outcome, although this could be because, of all eligible patients, only 12.4% were admitted, with large numbers rejected because they were considered either too sick or too well.[5]

Limitations

Our study is limited in that the data collection has been conducted at a single site only. The data have been analysed retrospectively — although they were collected prospectively in a standardised database with international acceptance. It is not possible to determine whether the data recorded for patients differed between survivors and non-survivors. However, as patient outcome was unknown at the time of collection, it was felt that any bias would be small.

We were not able to analyse all variables that have previously been found to be significant in the elderly cohort, such as functional, cognitive and nutritional status on admission. These variables have prognostic value, could be available at ICU triage, and warrant further evaluation.

We assumed that all patients who did not have a death certificate filed with the Victorian Registry of Births, Deaths and Marriages 12 months after their hospital discharge were alive, and it is therefore possible we have overestimated the 12-month survival rate. This study has also not shown the outcomes of elderly patients who may have had a critical illness but who were not admitted to the ICU, nor have we been able to assess the differences in care received by the elderly compared with younger patients.

Finally, the quality of life of those discharged from the ICU is important but has not been evaluated in our study.

Clinical implications

We found that the presence of acute renal impairment, the need for mechanical ventilation, a decreased GCS, a raised serum urea level and age may help clinicians make decisions about which elderly patients may benefit most from intensive care treatment.

Conclusions

For an elderly cohort admitted to the RMH ICU via the ED in the 6-year period from 2005 to 2010, although age is an incremental risk factor for long-term mortality, it is physiological parameters, including the presence of acute renal failure, the need for mechanical ventilation, a low GCS and a raised serum urea level, that have independent predictive value for 12-month mortality. Patient comorbidities had little predictive value for mortality.

Further study is needed, particularly prospective cohort studies that include the decision-making process for admission to the ICU and comparative short-term and long-term outcomes, and that examine more variables such as functional, cognitive and nutritional status at admission for both short-term and long-term outcomes.

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Competing interests

None declared.

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Appendix. Mortality outcomes for intensive care unit admission and 12 months after hospital discharge, nonoperative diagnoses

Non-operative diagnosis	Total patients (*n*)	Mortality at ICU discharge (*n*)	Mortality at 1 year (*n*)
Cardiac	87	29	43
Cardiogenic shock	6	4	5
Cardiac arrest	44	23	30
Aortic aneurysm	3	0	0
Congestive heart failure	7	0	5
Peripheral vascular disease	1	0	0
Rhythm disturbance	6	0	1
Acute myocardial infarction	14	2	2
Other cardiovascular disease	4	0	0
Unstable angina	2	0	0
Respiratory	46	5	21
Aspiration pneumonia	1	0	1
Respiratory neoplasm including larynx	2	0	1
Respiratory arrest	1	0	0
Pulmonary oedema (non-cardiac)	5	0	1
Bacterial or viral pneumonia	1	0	0
Chronic obstructive pulmonary disease	7	0	4
Pulmonary embolism	1	0	0
Mechanical airway obstruction	2	0	0
Asthma	2	1	1
Other respiratory diseases	3	0	3
Bacterial pneumonia	21	4	10
Gastrointestinal (GI)	27	1	7
Inflammatory disease	1	0	0
Bleeding (ulcer or laceration)	5	0	3
Bleeding (diverticulosis)	2	0	0
Other GI disease	4	0	0
Perforation	2	0	1
Obstruction	1	0	1
Vascular insufficiency	1	0	1
Pancreatitis	5	1	1
Other GI inflammatory	6	0	0
Neurological	65	10	41
Intracerebral haemorrhage	7	1	7
Subarachnoid haemorrhage	10	2	8
Stroke	28	7	18
Neoplasm	1	0	0
Seizure	8	0	3
Epidural haematoma	7	0	3
Coma	4	0	2
Sepsis	42	10	19
Other than of urinary tract (UT) origin	10	1	5
Of UT origin	3	0	1
Other than of UT origin with shock	23	8	12
Of UT origin with shock	6	1	1
Trauma	69	7	25
Head trauma +/– multitrauma	31	4	14
Multitrauma excluding head trauma	32	1	8
Multitrauma and spinal injury	5	2	2
Isolated cervical spine injury	1	0	1

Non-operative diagnosis	Total patients (*n*)	Mortality at ICU discharge (*n*)	Mortality at 1 year (*n*)
Other non-operative diagnosis			
Metabolic coma	2	0	2
Diabetic ketoacidosis	5	0	0
Drug overdose	6	0	0
Other metabolic disorder	4	1	3
Renal disorders	12	0	5
Musculoskeletal or skin disease	2	0	0

Operative diagnosis	Total patients (*n*)	Mortality at ICU discharge (*n*)	Mortality at 1 year (*n*)
Cardiovascular	23	4	5
Dissecting or ruptured aorta	2	1	1
Valvular heart surgery	1	0	0
Coronary artery bypass graft	3	0	1
Other cardiovascular disease	3	0	0
Dissecting aortic aneurysm	9	3	3
Ruptured aortic aneurysm	5	0	0
Respiratory neoplasm of mouth, larynx or trachea	1	0	1
Gastrointestinal (GI)	35	5	18
Perforation or rupture (not peritonitis)	8	1	4
Bleeding	4	0	3
Obstruction	5	0	3
Neoplasm	1	1	1
Cholecystitis/cholangitis	2	0	0
Other GI diseases	4	1	2
Vascular ischaemic resection	7	1	4
Peritonitis	3	1	1
Other GI inflammatory disease	1	0	0
Neurosurgical	43	7	28
Intracerebral haemorrhage	4	1	3
Subdural or epidural haematoma	30	4	18
Subarachnoid haemorrhage	8	2	7
Laminectomy or spinal cord surgery	1	0	0
Trauma	31	4	14
Head trauma +/– multitrauma	17	3	9
Multiple trauma excluding head trauma	14	1	5
Other operative diagnosis			
Other renal diseases	1	0	1
Orthopaedic surgery	4	1	1
Cellulitis or soft tissue infection	1	0	0