Triage decisions and outcomes for patients with Triage Priority 3 on the Society of Critical Care Medicine scale

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ABSTRACT

Objective: To identify factors associated with the triage decision for patients classified as Society of Critical Care Medicine (SCCM) Triage Priority 3, and their outcomes.

Design: Single-centre, prospective, observational cohort study.

Setting: General intensive care unit in a tertiary regional hospital, over the 9 months January to September 2007.

Patients: SCCM Triage Priority 3 patients.

Results: All patients were followed up for at least 6 months. Among the 1346 triaged patients, 250 were classified as SCCM Triage Priority 3. Fewer than a third of these (76, 30.4%) were admitted to the ICU. Medical patients were more likely to be rejected than surgical or neurosurgical patients. Those with a poorer physician-predicted chance of long-term survival were more likely to be rejected than those with a better predicted prognosis. The $MPMII_0$-predicted mortality was higher for those denied ICU admission. Non-postoperative status (odds ratio [OR], 26.3) and physician-predicted risk > 50% of death within 1 month (OR, 11.8) were independently correlated with denial of ICU admission in a multiple logistic regression analysis. Cox regression analysis showed that independent risk factors for mortality were denial of ICU admission (hazard ratio [HR], 2.80), higher $MPMII_0$-predicted mortality (HR, 1.12 for every 10% increment) and the presence of renal disease as an admission diagnosis (HR, 2.28).

Conclusions: For SCCM Triage Priority 3 patients, postoperative status and better physician-predicted prognosis correlated with ICU admission. Patients had lower medium-term survival if they were denied ICU admission, or had higher $MPMII_0$-predicted mortality, or renal disease as the admission diagnosis.

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The demand for intensive care unit beds often exceeds the supply.[1] The ratio of ICU beds per 100 000 population varies widely between countries; ratios reported in 2006 ranged from 2 per 100 000 in the United Kingdom,[2] to 3.5 in Hong Kong,[3,4] 9.4 in Australia,[5] 13.7 in France,[2] and 29 in the United States.[6] Refusal rates for ICU admission of 22%–43% have been reported; this refusal was found to be inversely related to bed availability.[7-9] To maximise the utility and cost effectiveness of these scarce resources, ICU beds should generally be reserved for patients with reversible medical conditions who have a "reasonable prospect of substantial recovery".[10] The guidelines published by the European Society of Intensive Care Medicine also suggest that patients with no chance of recovering a reasonable quality of life should not be admitted to an ICU.[11] In addition, as invasive monitoring and advanced life support therapies carry risks, inappropriate ICU admissions might inflict unnecessary harm on patients.[12]

In 1999, the Society of Critical Care Medicine (SCCM) issued guidelines for ICU admission, triage and discharge, which classify patients into four triage prioritisation groups.[13] Priority 3 patients — "unstable patients who are critically ill, but have a reduced likelihood of recovery because of underlying disease or nature of their acute illness" — present a dilemma. ICU admission might improve survival in some, but might prolong suffering with no long-term benefit in others. The challenge of triaging this group increases in ageing populations, as they commonly have multiple comorbidities. Yet, the appropriateness of triage decisions and outcomes of this group of patients are rarely reported.

The aim of this study was to identify factors that may affect the triage decision for SCCM Priority 3 patients and to investigate their outcomes.

Methods

The study was a prospective, observational study conducted at the Pamela Youde Nethersole Eastern Hospital, Hong Kong, over 9 months, 1 January 2007 to 30 September 2007. The hospital is a 2300-bed acute care tertiary hospital that provides comprehensive care, with the exception of cardiothoracic surgery, transplant surgery and burn care. The ICU is a 20-bed mixed medical–surgical unit with an average admission of 1100 patients per year. The median Acute Physiology and Chronic Health Evaluation (APACHE) II and IV scores are 18.5 and 64, respectively, with average ICU mortality around 13%. The ICU is "closed", and run by a dedicated team of four ICU specialists, four critical care trainees and four rotating residents.

Table 1. Baseline characteristics of patients who had a consultation for ICU care, by SCCM triage priority*

Variable	All patients (*n* = 1346)	SCCM triage priority			
		P1 (*n* = 472)	P2 (*n* = 399)	P3 (*n* = 250)	P4 (*n* = 225)
Age (years), mean ±SD	65.7 ±17.8	62.3 ±18.2	63.0 ±17.1	74.9 ±13.3	67.3 ±18.6
Sex, male	802 (59.6%)	286 (60.6%)	242 (60.7%)	143 (57.2%)	131 (58.2%)
Time of consultation					
Weekday office hours	402 (29.9%)	153 (32.4%)	125 (31.3%)	68 (27.2%)	56 (24.9%)
Weekday non-office hours	586 (43.5%)	199 (42.2%)	167 (41.9%)	112 (44.8%)	108 (48.0%)
Weekend/public holiday	358 (26.6%)	120 (25.4%)	107 (26.8%)	70 (28%)	61 (27.1%)
Type of consultation					
ICU admission	900 (66.9%)	301 (63.8%)	231 (57.9%)	197 (78.8%)	173 (76.9%)
Postoperative care	332 (24.7%)	142 (30.1%)	147 (36.8%)	37 (14.8%)	6 (2.7%)
Resuscitation	51 (3.8%)	16 (3.4%)	3 (0.8%)	16 (6.4%)	16 (7.1%)
Trauma	63 (4.7%)	13 (2.8%)	18 (4.5%)	0	30 (13.3%)
Consultation source					
AED	210 (15.6%)	76 (16.1%)	56 (14.0%)	31 (12.4%)	47 (20.9%)
General ward	837 (62.2%)	257 (54.4%)	214 (53.6%)	190 (76%)	176 (78.2%)
OT or recovery room	281 (20.9%)	127 (26.9%)	126 (31.6%)	26 (10.4%)	2 (0.9%)
Other	18 (1.3%)	12 (2.6%)	3 (0.7%)	3 (1.2%)	0
Consultation specialty					
Medical	647 (48.1%)	237 (50.2%)	152 (38.1%)	154 (61.6%)	104 (46.2%)
Surgical	386 (28.7%)	125 (26.5%)	141 (35.3%)	50 (20.0%)	70 (31.1.%)
Neurosurgical	178 (13.2%)	69 (14.6%)	64 (16.0%)	30 (12.0%)	15 (6.7%)
Other	135 (10.0%)	41 (8.7%)	42 (10.5%)	16 (6.4%)	36 (16.0%)
Diagnosis					
Cardiovascular	81 (6.0%)	33 (7.0%)	11 (2.8%)	20 (8.0%)	17 (7.6%)
Respiratory	283 (21.0%)	94 (19.9%)	70 (17.5%)	66 (26.4%)	53 (23.6%)
Renal	90 (6.7%)	33 (7.0%)	14 (3.5%)	22 (8.8%)	21 (9.3%)
Gastrointestinal, liver	130 (9.7%)	40 (8.5%)	39 (9.8%)	26 (10.4%)	25 (11.1%)
Neurological	107 (7.9%)	29 (6.1%)	24 (6.0%)	33 (13.2%)	21 (9.3%)
Sepsis	107 (7.9%)	37 (7.8%)	23 (5.8%)	27 (10.8%)	20 (8.9%)
Metabolic	93 (6.9%)	33 (7.0%)	32 (8.0%)	14 (5.6%)	14 (6.2%)
Haematological	8 (0.6%)	2 (0.4%)	4 (1.0%)	0	2 (0.9%)
Musculoskeletal	15 (1.1%)	1 (0.2%)	6 (1.5%)	2 (0.8%)	6 (2.7%)
Trauma	61 (4.5%)	13 (2.8%)	18 (4.5%)	0	30 (13.3%)
Other	41 (3.0%)	17 (3.6%)	11 (2.8%)	3 (1.2%)	10 (4.4%)
Postoperative	332 (24.7%)	142 (30.1%)	147 (36.8%)	37 (14.8%)	6 (2.7%)
Walking ability					
Free walker	984 (73.1%)	404 (85.6%)	340 (85.2%)	89 (35.6%)	151 (67.1%)
Walking with aids	218 (16.2%)	58 (12.3%)	50 (12.5%)	79 (31.6%)	31 (13.8%)
Chair or bed-bound	144 (10.7%)	10 (2.1%)	9 (2.3%)	82 (32.8%)	43 (19.1%)
Bathing ability					
Independent	1029 (76.4%)	423 (89.6%)	361 (90.5%)	89 (35.6%)	156 (69.3%)
Needs some help	200 (14.9%)	44 (9.3%)	28 (7.0%)	98 (39.2%)	30 (13.3%)
Totally dependent	117 (8.7%)	5 (1.1%)	10 (2.5%)	63 (25.2%)	39 (17.3%)

SCCM = Society of Critical Care Medicine. P1–4 = triage priority 1–4. AED = accident and emergency department. OT = operating theatre.
* All values are number of patients (%) unless otherwise indicated.

Table 2. Consultation patterns and outcomes of patients who had a consultation for ICU care, by SCCM triage priority

Variable	All patients (n = 1346)	SCCM triage priority			
		P1 (n = 472)	P2 (n = 399)	P3 (n = 250)	P4 (n = 225)
Consultation pattern					
Physician-predicted chance of long-term survival					
> 50% chance of death within 1 month	250 (18.6%)	72 (15.3%)	34 (8.5%)	100 (40.0%)	44 (19.6%)
Death within 5 years	529 (39.3%)	177 (37.5%)	154 (38.6%)	120 (48.0%)	78 (34.7%)
No fatal disease	567 (42.1%)	223 (47.2%)	211 (52.9%)	30 (12.0%)	103 (45.8%)
Physician-expected hospital mortality					
> 70%	199 (14.8%)	58 (12.3%)	28 (7.0%)	69 (27.6%)	44 (19.6%)
30%–70%	357 (26.5%)	131 (27.8%)	78 (19.5%)	109 (43.6%)	39 (17.3%)
5%–30%	435 (32.3%)	179 (37.9%)	147(36.8%)	45 (18%)	64 (28.4%)
< 5%	355 (26.4%)	104 (22.0%)	146 (36.6%)	27 (10.8%)	78 (34.7%)
Bed availability					
⩾ 3 beds	656 (48.7%)	233 (49.4%)	191 (47.9%)	116 (46.4%)	116 (52.6%)
2 beds	502 (37.3%)	179 (37.9%)	147 (36.8%)	97 (38.8%)	79 (35.1%)
1 bed	153 (11.4%)	51 (10.8%)	51 (12.8%)	27 (10.8%)	24 (10.7%)
No bed	35 (2.6%)	9 (1.9%)	10 (2.5%)	10 (4.0%)	6 (2.7%)
Triaging staff seniority					
Junior	830 (61.7%)	249 (52.8%)	268 (67.2%)	162 (64.8%)	151 (67.1%)
Senior	516 (38.3%)	223 (47.2%)	131 (32.8%)	88 (35.2%)	74 (32.9%)
Triage decision					
Admitted	858 (63.7%)	460 (97.5%)	321 (80.5%)	76 (30.4%)	1 (0.4%)
Rejected	451 (33.5%)	0	68 (17.0%)	174 (69.6%)	209 (92.9%)
Failed cardiopulmonary resuscitation	23 (1.7%)	7 (1.5%)	1 (0.3%)	0	15 (6.7%)
Transfer	14 (1.0%)	5 (1.1%)	9 (2.3%)	0	0
$MPMII_0$ predicted mortality, mean ±SD	31.2% ±27.5%	33.3% ±27.6%	21.2% ±21.9%	43.0% ±28.2%	31.3% ±29.5%
Outcomes					
Length of stay (days), mean ±SD (median)	18.3 ±21.6 (11)	21.7 ±25.7 (12)	16.7 ±17.3 (11)	16.3 ±20.5 (9.5)	15.9 ±19.3 (9)
Hospital mortality	367 (27.3%)	129 (27.3%)	64 (16.0%)	122 (48.8%)	52 (23.1%)
Standardised mortality ratio	0.88	0.82	0.75	1.13	0.74
Follow-up duration (days), mean ±SD (median)*	248.1 ±180.2 (295.0)	264.1 ±184.0 (320.5)	291.8 ±158.6 (322.0)	149.5 ±177.3 (22.5)	246.2 ±171.7 (300.0)

MPMII = Mortality Probability Model II. * Follow-up until 31 May 2008 or death.

On initiation of an ICU consultation, a team member assesses the patient and makes a triage decision based on the SCCM ICU admission guideline.[13] In cases where a resident or critical care trainee feels uncomfortable in making the decision, the ICU specialist is involved in the final judgement. Patients' wishes or preferences on ICU admission are taken into consideration, but no such case was encountered during the study period. Training on the ICU triage decision-making protocol, in the form of case scenario discussions, was conducted regularly.

The following data were collected for each ICU consultation: patient demographics, clinical diagnosis at time of referral, pre-admission self-care functionality (walking and bathing ability), date and time of triage decision (weekday office hours, 0800–1700; weekday non-office hours, 1700–0800; or weekend or public holiday), type

of consultation (ICU admission, postoperative care, resuscitation or trauma) and source of consultation, primary team, SCCM triage priority, final triage decision, physician-predicted chance of long-term survival (> 50% chance of death within 1 month; death within 5 years; or no fatal disease), and expected hospital mortality (> 70%; 30%–70%; 5%–30%; or < 5%), ICU bed availability, and seniority of the ICU physicians involved in the final triage decision. Although data were collected for calculating predicted mortality according to the Mortality Probability Model II ($MPMII_0$), the calculation was performed during data analysis and was not available before the triage decision.

Outcome data, including ICU length of stay (LOS), hospital LOS, hospital mortality (defined as death before discharge from the hospital), and medium-term survival (defined as survival at 31 May 2008 with at least 8 months' follow-up) were obtained from the hospital's computer database or by telephone. Acute APACHE II scores for the ICU-treated patients were also obtained.

For patients with recurrent ICU admission requests during the same hospitalisation episode, only the first request was analysed. Consultations involving the same patient during different hospitalisation episodes were treated independently. Data accuracy and quality were verified subsequently by the principal investigator.

The hospital's ethics committee approved the study, and the need for informed consent was waived.

Statistical analysis

Univariate analysis was performed using the Fisher exact test for categorical data and the Mann–Whitney U test for continuous data, as appropriate, to compare Priority 3 patients who were admitted with those denied admission. Parameters with $P \leqslant 0.20$ were entered into a logistic regression model using forward stepwise entry (likelihood ratio) to identify independent factors associated with denial of ICU admission. A $P < 0.05$ was considered significant. The Hosmer–Lemeshow goodness-of-fit test was used to assess the overall fit of the logistic regression models. Patient survival at hospital discharge and on 31 May 2008 was considered "censored status". Among Priority 3 patients, factors associated with patient medium-term survival were identified by Kaplan–Meier univariate analyses. Parameters with a $P \leqslant 0.20$ on log-rank tests were entered into a multivariate Cox regression analysis using forward stepwise entry (likelihood ratio) to identify independent risk factors. A $P < 0.05$ was considered significant. Data were analysed using SPSS for Windows, version 12.0 (SPSS, Chicago, Ill, USA).

Table 3. Patient factors that potentially affected the triage decision for SCCM Priority 3 patients

Variables	Admitted ($n = 76$)	Rejected ($n = 174$)	P
Age (years), mean ±SD	73.6 ± 15.7	75.4 ± 12.2	0.33
Sex, male	36 (47.4%)	107 (61.5%)	0.06
Walking ability			0.80
Free walker	27 (35.5%)	62 (35.6%)	
Walking with aids	26 (34.2%)	53 (30.5%)	
Chair or bed-bound	23 (30.3%)	59 (33.9%)	
Bathing ability			0.47
Independent	31 (40.8%)	58 (33.3%)	
Needs some help	26 (34.2%)	72 (41.4%)	
Totally dependent	19 (25.0%)	44 (25.3%)	
Type of consultation			< 0.001
ICU admission	43 (56.6%)	154 (88.5%)	
Postoperative care	30 (39.5%)	7 (4.0%)	
Resuscitation	3 (3.9%)	13 (7.5%)	
Trauma	0 (0%)	0 (0%)	
Diagnosis*			< 0.001
Cardiovascular	3 (3.9%)	17 (9.8%)	
Respiratory	12 (15.8%)	56 (32.2%)	
Renal	4 (5.3%)	18 (10.3%)	
Gastrointestinal/liver	6 (7.9%)	22 (12.6%)	
Neurological	3 (3.9%)	30 (17.2%)	
Sepsis	9 (11.8%)	18 (10.3%)	
Metabolic	8 (10.5%)	5 (2.9%)	
Musculoskeletal	1 (1.3%)	1 (0.6%)	
Postoperative	30 (39.5%)	7 (4.0%)	
Consultation specialty			< 0.001
Medical	30 (39.5%)	124 (71.3%)	
Surgical	25 (32.9%)	25 (14.4%)	
Neurosurgical	15 (19.7%)	15 (8.6%)	
Others	6 (7.9%)	10 (5.7%)	
Physician-predicted long-term survival			< 0.001
> 50% chance of death within 1 month	7 (9.2%)	93 (53.4%)	
Death within 5 years	51 (67.1%)	69 (39.7%)	
No fatal disease	18 (23.7%)	12 (6.9%)	
Physician-expected hospital mortality			< 0.001
> 70%	7 (9.2%)	62 (35.6%)	
30%–70%	27 (35.5%)	82 (47.1%)	
5%–30%	24 (31.6%)	21 (12.1%)	
< 5%	18 (23.7%)	9 (5.2%)	
$MPMII_0$ predicted mortality, mean ±SD	32.4% ±27.1%	47.6% ±27.5%	< 0.001
Actual hospital mortality	14 (18.4%)	108 (62.1%)	< 0.001

* No patients were classified as haematological, trauma or other.

Results

A total of 1375 consultations were undertaken during the 9-month study period; 29 patients had two consultations, and only the first ICU consultation was analysed. Baseline characteristics of the 1346 patients are shown in Table 1, and consultation patterns and outcomes in Table 2. Patients were classified as: SCCM Triage Priority 1, 472 patients (35.1%); Priority 2, 399 (29.6%); Priority 3, 250 (18.6%); and Priority 4, 225 (16.7%). The consultation led to the patient being admitted to the ICU for further care in 858 cases (63.7%). The mean (APACHE II) score among those admitted to the ICU was 20.2 ±8.5.

Triage process

Among the 250 patients triaged as Priority 3, 76 (30.4%) were admitted. Associations between patient and organisational factors and the ICU triage decision are shown in Table 3 and Table 4, respectively. There were no significant differences in age, sex and functional ability between those admitted and those refused ICU admission. Postoperative patients were more likely to be admitted ($P < 0.001$). Medical patients were more likely to be rejected than surgical or neurosurgical patients ($P < 0.001$). Among the diagnostic categories, respiratory and neurological patients were more likely to be rejected ($P < 0.001$). Those with a poorer physician-predicted chance of long-term survival (> 50% chance of death within 1 month) were more likely to be rejected than those with a better prognosis (no fatal disease) ($P < 0.001$). Physician-predicted hospital mortality was also higher in the group refused ICU admission.

Organisational factors, including consultation time, ICU bed availability and seniority of ICU physicians, were not significantly associated with the triage decision (Table 4).

In the logistic regression analysis (Table 5) (Hosmer–Lemeshow goodness of fit test, $\chi^2 = 0.106$, $df = 2$, $P = 0.95$, area under receiver operating characteristic curve = 0.814), only two factors were significantly associated with denial of ICU admission: non-postoperative status (odds ratio [OR], 26.3; 95% CI, 7.6–90.9; $P < 0.001$) and physician-predicted chance of death in the next 1 month > 50% (OR, 11.8; 95% CI, 4.6–30.5; $P < 0.001$).

Mortality

$MPMII_0$-predicted mortality was higher for SCCM Triage Priority 3 patients than for other patients (43.0% v 28.5%, $P < 0.001$). Their actual hospital mortality was 48.8% (Table 2), and the standardised mortality ratio based on $MPMII_0$ was 1.13. Those refused ICU admission had higher hospital mortality than those admitted (62.1% v 18.4%, $P < 0.001$, Table 3). Figure 1 shows the Kaplan–Meier survival plot stratified by triage decision (log-rank test $P < 0.001$). Cox regression analysis (Hosmer–Lemeshow goodness of fit test $\chi^2 = 5.719$, $df = 8$, $P = 0.68$) indicated that denial of ICU admission, a higher $MPMII_0$-predicted mortality and the presence of renal disease as the admission diagnosis (defined as Chronic Kidney Disease Stage 4 or higher, or creatinine clearance < 30 mL/min/1.73m^2 as calculated by the Cockcroft–Gault formula) were the independent factors associated with medium-term mortality (Table 6).

Table 4. Organisational factors that potentially affected the decision for SCCM Priority 3 patients

Variables	Admitted ($n = 76$)	Rejected ($n = 174$)	*P*
Time of consultation			0.48
Weekday office hours	18 (23.7%)	50 (28.7%)	
Weekday non-office hours	33 (43.45%)	79 (45.4%)	
Weekend/public holiday	25 (32.9%)	5 (25.9%)	
Bed availability			0.50
⩾ 3 beds	36 (47.4%)	80 (46.0%)	
2 beds	31 (40.8%)	66 (37.9%)	
1 bed	5 (6.6%)	22 (12.6%)	
No bed	4 (5.3%)	6 (3.4%)	
Triaging staff seniority			0.47
Junior (trainee/resident)	52 (68.4%)	110 (63.2%)	
Senior (critical care fellow)	24 (31.69%)	64 (36.8%)	

Table 5. Logistic regression analysis for factors that affected the triage decision for SCCM Triage Priority 3 patients

Variables	OR for refusal (95% CI)	*P*
Physician-expected risk of death > 50% in coming 1 month	11.8 (4.6–30.5)	< 0.001
Non-postoperative status	26.3 (7.6–90.9)	< 0.001

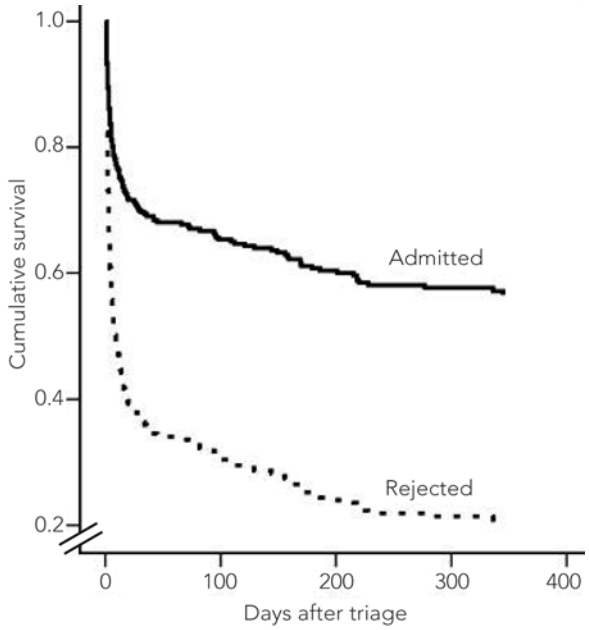
SCCM = Society of Critical Care Medicine. OR = odds ratio.
Factors entered into the model were age, sex, type of consultations, diagnosis, consultation specialty, physician-predicted chance of long-term survival, physician-expected hospital mortality, $MPMII_0$ predicted mortality, staff seniority and bed availability.
Hosmer–Lemeshow goodness of fit test $\chi^2 = 0.106$, $df = 2$, $P = 0.95$.
Area under receiver operating characteristic curve = 0.814.

Discussion

Triage process

Similarly to previous studies, we found that postoperative patients were more likely to be admitted to the ICU than other types of patients.[6-15] This might be related to local hospital practice or policy. In fact, some ICUs admit postop-

Figure 1. Kaplan–Meier survival plot for SCCM Triage Priority 3 patients stratified by triage decision



Log-rank test (admitted v rejected) $P < 0.001$.

erative patients irrespective of the prognosis, and this group of patients is not usually required to undergo any triage process.[8]

Physician-predicted chance of long-term survival is another significant factor affecting the triage decision. Sinuff et al showed that patients who are perceived not to benefit from critical care are more often refused ICU admission.[16] A recent systematic review of 12 observational studies comparing the accuracy of physicians with that of objective scoring systems in predicting the mortality of critically ill adults suggested that ICU physician predictions are more accurate than scoring systems.[17] Although there is the possibility of self-fulfilling prophecies (eg, adopting a less aggressive treatment strategy when a physician believes that a patient is unlikely to survive), physicians' ability to consider the entire clinical scenario should play a significant role in triage decisions.

In a survey of distribution of ICU resources, 88% of critical care professionals believe that the elderly should not be excluded from intensive care.[18] However, in practice, older patients are less likely to be admitted to the ICU.[6-15] In contrast to previous studies, we found that age was not an independent factor affecting triage decision. This discrepancy could be due to differences in the populations studied. Youth may not have had a significant impact on the triage decision for patients with multiple comorbidities or severely impaired functional status. Ryan et al[19] showed that the nature of the admission and the severity of illness but not patient age were determinants of ICU survival. Marik[20] suggested that the decision to admit an elderly patient to an ICU should be based on the patient's comorbidities, acuity of illness, pre-hospital functional status and preferences with regard to life-sustaining treatments.

In contrast to our study, most previous studies have found a strong influence of bed availability on triage decision.[7-9,15] In our ICU, two beds were available 86% of the time, and we could activate interhospital transfer of critically ill patients when the ICU was full. Therefore, bed shortage was not a major reason for ICU refusal. Although previous studies[21-23] have reported that ICU admissions out of office hours are not associated with poorer outcomes, it is possible that the triaging physician may not be able to handle multiple emergency cases simultaneously, and thus may reject consultations more frequently.[9] We had two on-site medical officers who worked closely together and one "easily mobilised" off-site intensivist during non-office hours. With this workforce, the timing of the consultation was unlikely to affect the triage decision.

The effect of physicians' seniority on the triage decision is more complex; Garrouste-Orgeas et al[9] showed that junior physicians are more likely to refuse ICU consultations than senior staff, while another study reported the opposite.[8] Junior physicians may be inexperienced in patient prognostication and may underestimate the severity of underlying illness, thus resulting in a higher refusal rate for ICU admission. On the other hand, senior staff may identify futile cases early and suggest comfort care instead of ICU

Table 6. Cox regression analysis of factors associated with medium-term survival for SCCM Priority 3 patients*

Variable	Hazard ratio of death (95% CI)	*P*
Triage decision		
Admitted	1	
Rejected	2.80 (1.88–4.15)	< 0.001
Renal disease as admission diagnosis	2.28 (1.23–4.24)	0.009
$MPMII_0$ predicted death (for every 10% increment)	1.12 (1.06–1.19)	< 0.001

* Factors entered into the model were age, sex, type of consultations, diagnosis, consultation speciality, physician-predicted chance of long-term survival, physician expected hospital mortality, $MPMII_0$ predicted mortality, staff seniority, bed availability and triage decision.
Medium-term survival was defined as survival at 31 May 2008 after at least 8 months' follow-up.
Hosmer–Lemeshow goodness of fit test $\chi^2 = 5.719$, $df = 8$, $P = 0.68$.

admission. Therefore, the relationship between staff seniority and admission pattern varies. Appropriate pre-study training may dilute this effect.

Mortality

The hazard ratio for mortality of SCCM Priority 3 patients denied ICU admission was 2.80 (95% CI, 1.88–4.15), higher than found in previous studies (hazard ratio, 1.2–2.4).[6,8,9,15,24] Differences in study populations and follow-up duration might account for this discrepancy. $MPMII_0$ is the only objective measure of severity of illness validated for immediate assessment. The discrimination and calibration ability of MPMII for predicting patient survival is similar to that of other scoring systems.[14,25-27] The predicted mortality is least affected by ICU interventions, and therefore the $MPMII_0$ was adopted for this study. A systematic review performed by Ricci et al,[28] involving more than 71 000 patients, clearly demonstrated the importance of renal impairment on patient outcome, with a progressive increase in mortality as kidney function worsened. Our study findings are consistent with this conclusion.

Limitations

This study had a number of limitations. First, as a single-centre study, the results reflect our own hospital's performance and might not be generalisable to others. Secondly, this study included only patients referred to the ICU team. There may have been others requiring ICU care who were not referred by their primary team. Thirdly, there is no clear-cut definition for the respective SCCM categories of triage priority in the SCCM guidelines,[13] and interpretation of different clinical scenarios was at the discretion of the attending physicians. To minimise variation between physicians, the principal investigator provided regular training to all triaging physicians, and the triage decision was discussed regularly during rounds. Fourthly, similar to some previous studies, only the first consultation was analysed in patients who were readmitted to the ICU.[9,15] Another study chose to analyse the last consultation in the belief it would better reflect the final outcome of the patient.[29] Although the most common reason for repeated ICU consultations is deterioration of the patient's condition, pressure from patients, their relatives or the attending clinicians might also play a role. As we did not record the reasons for re-consultation, we chose to analyse the first ICU consultation to avoid any potential bias. Given that there were only 29 re-admissions among 1375 consultations, the impact on the final conclusion of the study would be insignificant. Finally, the application of the $MPMII_0$ to patients not receiving ICU care may be erroneous, as the original development and validation of the MPMII was based only on patients treated in the ICU.

Triage can never be perfect. Social expectations, departmental policy and even personal beliefs may confound our decisions. Medical futility is not absolute, but is subject to personal experience, resource availability and cultural beliefs. This is especially true for clinically "marginal" cases, such as SCCM Triage Priority 3 patients, whose benefits from ICU care remain uncertain. Further prospective studies are needed on these patients, including their longer-term functional status and quality of life after ICU discharge, as well as the cost-effectiveness of patient care.

Conclusions

This study provides important outcome information about unstable patients who were critically ill but had a reduced likelihood of recovery because of underlying disease or the nature of their acute illness (SCCM Triage Priority 3 patients). We found that non-postoperative status and poor physician-predicted chance of long-term survival correlated with the triage decision to deny ICU admission. Patients had lower medium-term survival if they were denied ICU admission, had higher $MPMII_0$-predicted patient mortality, or had renal disease as the admission diagnosis. Although this study appeared to show a significant survival benefit of ICU admission for SCCM Triage Priority 3 patients, such benefit can be confirmed only with a prospective randomised study, if such a study were ethically possible.

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