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BRIEF REPORT

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Intensive care admission decisions for a patient with limited survival prospects: a questionnaire and database analysis

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Abstract *Objective:* To explore the concept of futility by asking clinicians for estimates of survival and admission decisions for an intensive care unit patient with little chance of survival, and to compare these estimates with results from an intensive care database. *Design:* Questionnaire based on the presenting features of a genuine patient. It asked for estimated hospital survival, decision on intensive care admission, resuscitation status and importance of family views. Analysis of a regional intensive care database. *Setting:* Physicians working in British intensive care units *Participants:* We received 169 replies, 146 from consultants. *Measurements and results:* Median estimated hospital survival was 5%; 60% of consultants and 76% of trainees would have admitted the patient, with 9% and 14%, respectively, prepared to perform further cardiopulmonary resuscitation. Among those estimating survival probability as less than 1%, 17.2% would have admitted the patient. Family opinions were vital to 4.3% of respondents and unimportant to 9.8%. There were 251 patients in the database with similar physiological derangements. Their observed hospital mortality was 91%. At intensive care admission an admitting physician assessed 111 of these patients as 'expected to die'. Mortality in this group was 99.1% (one survivor). *Conclusions:* Experienced intensivists did not agree on estimated survival. Even when estimates agreed, admission decisions varied. Database analysis suggested that clinical judgement is relevant when assessing the risk of dying. Lack of consensus on survival estimates and admission decisions suggests that it would be difficult to achieve agreement on appropriate use of intensive care resources and on what constitutes futile treatment.

Keywords Critical care · Admission decisions · Futility · Resource utilisation · Survival prediction · Scoring systems

Introduction

The number of available intensive care beds is not limitless. Physicians must make decisions about bed allocation to achieve maximum benefit for individual patients while considering the needs of the population as a whole. Nearly half of the respondents in a recent survey of western European intensive care units (ICUs) felt that ICU admission was affected by bed availability [1]. In spite of this 73% of respondents admitted patients with no hope of survival when only 33% felt they should.

The United Kingdom (UK) is one of the countries most likely to suffer ICU bed shortages. Since October 2000 clinicians in the UK have had to make admission decisions compliant with the Human Rights Act (the incorporation into UK law of the European Convention on Human Rights), specifically, Articles 2, 3 and 8—the rights to life, freedom from inhumane treatment and

respect for private and family life. The introduction of this Act has been followed by publications from statutory and advisory bodies providing guidance for physicians making end-of-life decisions [2, 3, 4].

Most patients assessed for emergency ICU admission cannot express opinions, and therefore a decision must be made in their best interests. In these situations, the General Medical Council [2] suggests that time be taken to establish a consensus between clinicians and family, treatment which may benefit the patient should start pending review of its appropriateness and, when appropriate, a second opinion sought. The British Medical Association (BMA) [3] states that, "Doctors... have an obligation to ensure that the most reliable and accurate data are used to make the decision...." Their guidance and that in the joint statement [4] highlight the potential role of the family in the decision process.

For ICU clinicians in the acute situation there is a dilemma. Initiating treatment and establishing a consensus take time. With limited ICU beds the delay may expose other critically ill patients to the risks of early discharge from, or delayed admission to the ICU [5, 6, 7]. Sprung demonstrated that the chance of admission to ICU diminishes when all the beds are occupied [8]. Physicians' predictions of an ICU patient's outcome may be inaccurate [9, 10], and families often misunderstand their relative's wishes concerning treatment [11]. Scoring systems such as the Acute Physiology and Chronic Health Evaluation II (APACHE II) [12] were not designed to predict an individual's survival and should be used in reference to individuals only with caution, if at all [13, 14].

There is little consensus as to when treatment or care becomes 'futile', with more than one possible definition [3, 14, 15]. However, to make consistent and reliable decisions about the fair and clinically appropriate distribution of limited resources there must be agreement between physicians on the likely survival of a patient and, following from that, on the appropriate management of an individual case. To explore these issues we developed a questionnaire based on the ICU admission of a patient with limited survival prospects. Analysis of our regional intensive care database provided information on the observed outcome of similar patients.

Method

A questionnaire (see Appendix) was derived from the presenting history, observations and initial laboratory investigations of a genuine patient aged 88 years who arrested in the Accident and Emergency Department (A&E) while receiving treatment for exacerbation of chronic obstructive pulmonary disease.

Respondents were asked to estimate the patient's chance of survival, whether they would admit the patient to ICU, and whether further cardiopulmonary resuscitation (CPR) was appropriate. They were also asked the importance of the family's wishes in influencing their decisions. The questionnaire was distributed electronically through the 78 UK Intensive Care Society Linkmen. This was done anonymously, preventing the follow-up of non-responders; however, a return deadline was set, and participants were invited to enter a prize draw to encourage reply.

Survival estimates given as a range were treated as the midpoint (5–10%=7.5%); those equal to or less than a value were treated as equal to the value (≤5%=5%). Replies were excluded if they did not estimate survival, although other partially completed questionnaires were analysed. Geographical data was derived from information supplied by those entering the prize draw. We also analysed our regional ICU database to establish the actual outcomes of comparable ICU admissions. Statistical analysis was performed using GraphPad Prism version 4.00 for Windows (GraphPad Software, San Diego Calif., USA).

Results

We received 169 replies, 166 of which could be analysed. Where incomplete questionnaires affected the denominator, this is indicated by 'd='. Entries to the prize draw (n=125) came from 48 towns and cities across the UK, five of which were in Scotland and one in Wales. The respondents included 143 consultants (86%), 21 trainees (13%) and two staff grade physicians. Thirty-six percent of respondents completing the questionnaire worked in a university/teaching hospital (d=160, including 7/20 trainees). Consultants' mean experience was 11.72±6.17 years; 13 (9%) had up to 4 years' experience in intensive care, 55 (40%) had 5–10 years, 57 (41%) had 11–20 years, and 14 (10%) had over 20 years experience (d=139).

Median estimated survival by the consultant group was 5% (range 0–95%, interquartile range 2–10%). Among trainees, the median estimate was also 5%, (range 0–40% interquartile range 5–10%). A total of 102 respondents (62.2%, d=164) would have admitted the patient, 84/141 consultants (59.6%), 16/21 trainees (76.2%), p=0.16, Fisher's exact test).

Among the 30 who estimated survival probability as less than 1%, 5 (17.2%, d=29) would still have admitted the patient, although none would have initiated further CPR. None of the trainees estimated survival as 0%. Only a minority of respondents would perform further CPR: 3 of 21 trainees (14.3%) and 13 of 142 consultants (9.2%; p=0.44, Fisher's exact test). The majority (90.4%) of respondents felt that the view of the family was at least 'of some importance' (Fig. 1). Table 1 shows the responses according to grouped survival estimate. A significant difference in the admission decision was found as the estimated survival increased (p<0.0001, χ^2 for trend).

Ninety-six respondents (59.3%, d=162) requested additional information before deciding on admission. Sixty-seven (67/94, 71.3%) would have admitted the patient. Ninety-five respondents provided details. Forty-seven (49.5%) required clinical information only, 18.9%

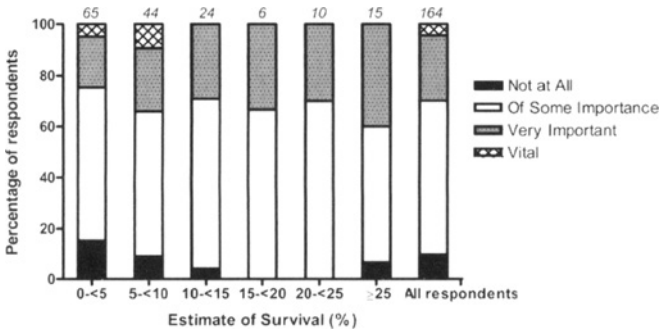

Fig. 1 Answers to question 4: wishes of the patient's family in the decision. Results displayed as percentage of estimated survival group. *Italics above columns* Total number of respondents in each group

sought clinical information and patient wishes / family views, and the remainder (30/95, 31.6%) required only patient / family wishes to decide. Clinical details sought included myocardial function or arrest details in 32.3% (21/65), arterial blood gases in 16.9% (11/65) and a computerised tomography scan of the brain in 12.3%. Of those requesting patient or family views 60.4% specifically wanted pre-morbid opinions of the patient, while 54.2% (26/48) wanted to know the views of the family. Only four (4.2%, 4/95) wished to discuss the case with the patient's admitting consultant or general practitioner.

The patient in the scenario died after 23 days of active ICU treatment. Her estimated hospital mortality, calculated for the scenario using APACHE II (score 37), was 85%. Our regional database contains details of patients' physiological and demographical details on ICU admission. Data collection is by the admitting ICU physician when the patient first arrives in ICU. The clinician (possibly a trainee) routinely records his/her subjective estimate of the patient's survival a five-point scale from 'expected to live' to 'expected to die'.

From 46,096 admissions over 8 years to 25 ICUs in the database we identified 251 patients with similar or worse physiological values at ICU admission (first admission to ICU from the wards or A&E following CPR with Glasgow Coma Scale on ICU admission of 5 or lower and 2 or more APACHE II points for heart rate, blood pressure and haemoglobin concentration). The observed hospital mortality for these patients (mean APACHE II 37.9±6.5) was 91%. Mortality rose to 99.1% (one survivor) in the subset of 111 patients who the admitting physicians subjectively assessed as 'expected to die' (Table 2). The ICU mortality for the remaining 140 patients (four categories combined) was 75.7%, rising to 85% at hospital discharge. The mortality between the two groups was different both at ICU and hospital discharge ($p<0.0001$, Fisher's exact test, both occasions).

Discussion

Median estimated survival was low, although intensivists did not always agree, giving a wide range of estimates. Nevertheless our database analysis suggests that clinicians can identify patients with a poor outcome after their

Table 1 Summary of questionnaire results by estimated chance of survival

Estimated chance of survival	Number	Number of trainees	Average years experience of consultants[a]	Would admit (% of group)[b]	Would initiate CPR again (% of group)[b]
0–<5%	66 (39.8%)	8	13.2±6.7	21/65 (32.3)	0 (0%)
5–<10%	44 (26.5%)	7	11.4±6.6	34/43 (79.1%)	3 (6.8%)
10–<15%	24 (14.5%)	2	10.0±4.2	17 (70.8%)	3/23 (13.0%)
15–<20%	6 (3.6%)	1	7.6±4.9	5 (83.3%)	3 (50.0%)
20–<25%	10 (6.0%)	1	10.2±4.7	9 (90.0%)	1 (10.0%)
≥25%	16 (9.6%)	2	12.0±6.2	16 (100%)	7/14 (50.0%)
Total number	166 (100%)	21 (12.7%)	11.72±6.17	102/164 (62.2%)	17/163 (10.4%)

[a] One-way analysis of variance with Dunnett's post-test showed no difference ($p>0.05$) when comparing each sub-group with the experience of all consultant respondents (d=139)
[b] Percentages in these columns are row, not column dependent (does not include final row 'total number').
Sub-groups where not all respondents completed all fields are shown with the new denominator in the field. Percentages given use the modified denominator in each case

Table 2 Patients with the same or worse admission APACHE II score in the regional ICU database

	Selected patients (n=251)	'Expected to die' (n=111)
Age (years)	61.1±16.0	60.8±17.0
ICU stay (days)	3.7±5.70	1.9±2.60
Risk of death (APACHE II)	0.91±0.08	0.92±0.07
ICU mortality	215 (86%)	109 (98%)
Hospital mortality	229 (91%)	110 (99%)

admission to ICU. Even when survival was considered unlikely, many would still admit the patient to ICU; however, one respondent who estimated the chance of survival as 20% still felt admission was inappropriate. The low number of respondents prepared to institute further CPR may reflect a willingness to limit therapy, but this was not specifically determined, and it does not resolve the problem regarding initial admission dilemma.

Decisions recorded in questionnaires are not made under the same time pressures inherent in clinical practice, nor does our questionnaire represent the views of those who either chose, or were not given the opportunity, to reply. Anonymous electronic distribution prevented calculation of a response rate but allowed for immediate return following completion. The decision to cascade the questionnaire through local linkmen may have allowed the inclusion of those who practice intensive care medicine but were not registered on a national database of self-selecting physicians. Our questionnaire was distributed only in the UK, and a different population might provide different results; however, the sheer diversity of responses from experienced ICU physicians (51.1% of consultants with more than 10 years experience, similar to the case in Vincent's [1] survey) across the UK illustrates the dilemma facing clinicians dealing with difficult admission decisions.

BMA guidance [3] obliges physicians to use the most accurate information available when making a decisions to withhold therapy. The varied estimates that we report suggest that clinical opinion alone is unlikely to be sufficiently accurate. Different clinicians may attach a different prognostic significance to the same expressed survival estimate. This may be acceptable as families are interested only in absolute outcomes (death/survival) [13]. However, if conversations with different clinicians reveal different estimates, families (or in other situations patients) may have difficulty accepting that clinicians' views agree. This may explain some of the differing estimates given, but it does not explain why a relatively large number of respondents were prepared to admit a patient with such limited survival prospects.

The scenario presumed that an ICU bed was available, but the situation would be more difficult if admission had required the transfer of a patient to another ICU. We did not seek reasons for admission from respondents, but it may be easier to admit a patient and then decide to withdraw therapy than to decide not to admit the patient initially. This uses ICU resources for the duration of that process and exposes the patient to the burden of treatment.

Sprung et al. [8] considered the triage decisions in a surgical intensive care unit and found that 35% of patients (10/29) refused ICU admission because of a poor prognosis survived, while 24% (6/25) who were refused ICU admission because they were thought to have a good prognosis later died. Physicians admitted fewer patients when the ICU was full, and increasing age corresponded with a decreasing likelihood of admission.

Rodriguez [9] reported the inability of both clinicians and a scoring system accurately to predict those medical patients admitted to ICU with a less than 2% chance of survival. Two groups of clinicians (Emergency Department physicians and Critical Care fellows) identified 15 and 13, respectively, of the 55 in-hospital deaths as having a low chance of survival. The scoring system (Mortality Prediction Model) correctly identified only one patient. The physicians (the two groups combined) predicted that 40 patients had a less than 2% chance of either survival or a favourable functional outcome. Nine of these patients left hospital and four were still alive 6 months after discharge. Joynt et al. [10] found that eight patients of 82 refused ICU admission because it was considered 'futile' survived to hospital discharge. Four were still alive a year later. It is inappropriate to use a scoring system derived from population data to predict individual outcome [14]. However, our database analysis suggests that clinical opinion identifies a subgroup of patients with poor outcome within a larger set selected by an objective scoring.

Currently in England, Wales and Northern Ireland families have no legal authority to make treatment decisions for an adult relative, although in the case of incapacity it is encouraged. The situation in Scotland is different and is presently under review in the rest of the UK. Family members have been shown to make the wrong proxy decisions. Seckler et al. [11] found that only 16% of patients discussed resuscitation preferences with a member of their family, although in 87% of cases the patients believed their relatives would accurately represent their wishes.

However, consensus decisions should involve family members; the joint statement from the Resuscitation Council, the BMA and the Royal College of Nursing [4] states that excluding the family of an incompetent patient may breach Article 8 of the Human Rights Act. It is reassuring only 9.6% of our respondents felt the views of the family were unimportant. This differs from the findings by Vincent [1] who reported that the patients or their families were involved in fewer than 50% of terminal care decisions. Considering only UK replies (n=48), 81% would have withheld therapy even if the family wanted 'everything to be done'.

Establishing a consensus, obtaining second opinions, or admitting patients to ICU to start potentially beneficial treatments takes time and consumes precious ICU resources; 24-h care in a UK ICU costs approximately €1,500 [16]. Physicians must also consider the risk of hurriedly discharging one patient or delaying the admission of another to create an ICU bed for a potentially inappropriate admission, as both actions increase mortality [5, 6, 7].

The Society of Critical Care Medicine [14] and Schneiderman [15] suggest different definitions of futility ('treatments that offer no physiological benefit to the patient' vs. a treatment that succeeds less than one time in 100). The BMA notes that treatment unable to produce the desired benefit, either because of a failure to reach its physiological aim or because the burden/benefit ratio is too great "is sometimes called 'futile' treatment". During an acute event, for patients who cannot decide, surviving the episode may be regarded as in their best interest [2] and therefore the immediate physiological aim precipitating ICU admission.

The wide variation in definitions of futility may make such discussion inappropriate when arriving at an admission decision. However, clinicians must judge potential benefits of ICU admission against potential burdens of ICU treatment. It is difficult without involving family and others who know the patient for physicians to decide how much distress an unconscious patient should bear or would want, or even what quality of life would be acceptable. Even though families are poor surrogates of opinion, only two respondents would have discussed the matter with the patient's family physician who may have recorded their wishes.

No guidance on the Human Rights Act compels physicians to initiate a treatment which they believe inappropriate. However, even experienced ICU clinicians vary widely in their survival predictions, and there are important differences in appropriateness of admission decisions with identical survival estimates. In these circumstances it is unclear when an ICU admission is definitely inappropriate. Further debate is required to support and inform intensivists, other clinicians and the public who are faced with, or are involved in, difficult decisions on the appropriateness of ICU admission decisions and the limits of critical care support.

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Appendix: questionnaire

An 88-year-old lady was admitted to A&E with shortness of breath. She had been increasingly unwell for 2 weeks. She had mild COPD but was otherwise independent with a reasonable quality of life. There was nothing focal to be seen on her chest X-ray. While in A&E, 8 hours after hospital admission, she had a cardiorespiratory arrest. She required several cycles of CPR, was intubated without drugs and was asystolic at one stage. At assessment 2 hours later, she was on a ventilator, not on inotropes, and had not received any sedation or analgesia. She was unresponsive (GCS 3), mean arterial blood pressure 65, heart rate 115, and a haemoglobin of 9.5 g/dl.

1. With active management and ICU admission what estimate would you make of her chance of survival? Chance of survival: (%)
2. If you had an ICU bed would you admit this patient (yes/no)?
3. Would you require any other information to arrive at your decision (yes/no)? If yes, what information?
4. When making this decision how important are the wishes of her close relatives (daughter and son-in-law) (not at all/of some importance/very important/vital)?
5. Should she be for further CPR in the event of another cardiac arrest (yes/no)?
6. About your ICU:
   - University/teaching Hospital or DGH?
   - Number of ICU beds (<6/6–10, >10)
7. Finally, what grade are you (consultant/associate specialist/staff grade SpR (years?)/SHO)? I have (x) years experience in intensive care medicine. Trainees count years in which you did an ICU module.

'A+E', accident and emergency department; 'COPD', chronic obstructive pulmonary disease; 'CPR', cardiopulmonary resuscitation; 'GCS', Glasgow Coma Scale; 'ICU', intensive care unit; 'DGH', district general hospital; 'SHO', senior house officer (usual entry grade for training in anaesthesia and critical care); 'SpR'; specialist registrar (years 1–5), intermediate and higher grade trainees.

References

1. Vincent JL (1999) Forgoing life support in western European intensive care units: the results of an ethical questionnaire. Crit Care Med 27:1626–1633
2. General Medical Council (2002) Withholding and withdrawing life-prolonging treatments: good practice in decision-making. GMC, London
3. British Medical Association (2001) Withholding and withdrawing life-prolonging medical treatment, guidance for decision making, 2nd edn. BMA, London
4. British Medical Association, Resuscitation Council, UK, Royal College of Nursing (2001) Decisions relating to cardiopulmonary resuscitation. BMA, London
5. Goldhill DR, McNarry A (2002) The longer the patient is in hospital before ICU admission the higher the mortality. Br J Anaesth 89:356P–357P
6. Goldfrad C, Rowan K (2000) Consequences of discharges from intensive care at night. Lancet 355:1138–1142

7. Daly K, Beale R, Chang RW (2001) Reduction in mortality after inappropriate early discharge from intensive care unit: logistic regression triage model. BMJ 322:1274–1276
8. Spung CL, Geber D, Eidelman LA et al (1999) Evaluation of triage decisions for intensive care admission. Crit Care Med 27:1073–1079
9. Rodriguez RM, Wang NE, Pearl RG (1997) Prediction of poor outcome of intensive care unit patients admitted from the emergency department. Crit Care Med 25:1801–1806
10. Joynt GM, Gomersall CD, Tan P, Lee A, Cheng CAY, Wong EL (2001) Prospective evaluation of patients refused admission to an intensive care unit—triage futility and outcome. Intensive Care Med 27:1459–1465
11. Seckler AB, Meier DE, Mulvihill M, Paris BE (1991) Substituted judgement: how accurate are proxy predictions? Ann Intern Med 115:92–98
12. Knaus WA, Draper EA, Wagner DP, Zimmerman JE (1985) APACHE II: a severity of disease classification system. Crit Care Med 13:818–829
13. Ridley SA (2002) Uncertainty and scoring systems. Anaesthesia 57:761–767
14. Ethics Committee of the Society of Critical Care Medicine (1997) Consensus statement of the Society of Critical Care Medicine's Ethics Committee regarding futile and other possibly inadviseable treatments. Crit Care Med 25:887–891
15. Schneiderman LJ, Jecker NS, Jonsen AR (1991) Medical futility: its meaning and ethical implications. Ann Intern Med 112:949–954
16. Medical Economics and Research Centre (2002) Critical care national cost block programme 2000–2001. MERCS, Sheffield