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The prevalence of perceptions of mismatch between treatment intensity and achievable goals of care in the intensive care unit: a cross-sectional study

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Abstract

Purpose: To describe the prevalence of perceptions of patients receiving a mismatch in treatment intensity, as perceived by intensive care unit (ICU) healthcare providers, and to assess the congruence of perceptions between providers.

Methods: In this cross-sectional, observational study conducted in 21 ICUs in Australia and New Zealand, patient prevalence data was linked to an ICU staff survey to describe the extent to which patient treatment intensity was matched to the perceived prognosis and patient wishes.

Results: Of the 307 study patients, 62 (20.2%) were reported to be receiving a mismatch in treatment intensity by at least one ICU healthcare professional. For reported mismatch, there was consensus amongst staff members for 52/62 (84%) of patients. Patients were significantly more likely to receive mismatched treatments if they were more severely unwell (APACHE II score > 20 vs. ≤ 20), odds ratio OR 2.35, 95% confidence interval (CI) 1.63–3.37, $p < 0.0001$, if they were an emergency admission (OR 3.05, CI 1.18–7.89, $p = 0.0212$) or if they had an advance care directive (OR 3.68, 95% CI 1.66–8.16, $p = 0.0013$).

Conclusions: Being more severely unwell, being an emergency admission or having an advance care directive made patients more likely to be perceived as having a mismatch between the intensity of treatments provided and either the achievable goals of care, expected prognosis or patient's wishes.

Keywords: Decision-making, Patient outcomes, Treatment intensity

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Introduction

Healthcare providers in the intensive care unit (ICU) report that they sometimes provide treatment to patients that is one or more of futile, inappropriate or unnecessary [1–4]. Recent studies suggest that clinicians believe that futile or inappropriate care is commonly delivered to patients admitted to the ICU [5, 6]. However, defining futility is problematic whilst terms such as ‘inappropriate’ and ‘unnecessary’ are based on values that may not be shared [7].

An alternative approach is to explore whether the intensity of treatment being provided matches what is understood of the patient’s expected prognosis and wishes. A mismatch would occur where there was a perceived difference between the treatment intensity and achievable goals of care and could be either too much or too little treatment [8]. By reducing value-laden terms and focusing on treatment intensity in the context of the goals of care, this approach may provide a common language for decision-makers to explore this important area and reduce the potential for conflict [9].

The primary objective of this study was to describe the prevalence of patients receiving a mismatch in treatment intensity, as perceived by ICU healthcare providers. Secondary objectives were to describe the staff factors associated with increased risk of reporting a perceived mismatch in treatment intensity, the causes of treatment intensity mismatch and support for potential strategies to reduce the occurrence of mismatched treatment intensity.

Methods

We conducted a cross-sectional study of hospitals with adult ICUs in Australia and New Zealand through the annual Australian and New Zealand Intensive Care Society’s (ANZICS) Clinical Trials Group (CTG) Point Prevalence Program [10]. Each site collected data on patients currently in the ICU at 10 a.m. on one of two assigned days in late 2014. Data collected from the Point Prevalence Program included information on staffing and individual patient characteristics. A subset of self-selected ICUs also participated in an additional survey of ICU healthcare practitioners, evaluating perceived treatment intensity for individual patients (Fig. 1). The surveys were linked by a unique patient identifier. Institutional approval was obtained from all participating sites prior to study commencement, with additional approval for the sites surveying their ICU staff.

Survey development

The questions within the Point Prevalence Case Report Form related to the structural characteristics of each

Take-home message

One way of determining whether patients are receiving unwarranted treatments is to define it as a mismatch between the intensity of treatments provided and the achievable goals of care, expected prognosis or patient’s wishes. The results of this multicentre cross-sectional Australasian study suggest lower rates of unwarranted treatments than prior European and American studies, and introduces the views of allied health staff for the first time.

ICU and characteristics of patients and is provided in the supplementary appendix. The survey of ICU healthcare practitioners asked individual patient-level questions for ICU doctors, nurses and allied health (physiotherapist, dietitian, pharmacist) on their perceptions of the intensity of treatment received by patients in the ICU for whom they were caring on the point prevalence day, as well as questions about the ICU, work environment and personal characteristics including religious beliefs (see supplementary appendix). The staff instrument was modelled on the Appropicus study, and contextualised for an Australian audience following consultation with a range of senior ICU healthcare professionals [4, 6]. The instrument was subsequently trialled in paper version and adjusted following feedback from a representative group of clinicians at one centre. The staff questionnaire was customized and distributed via SurveyMonkey software (Platinum version).

Statistical analysis

Descriptive statistics were generated for all variables, where means and standard deviations (SD) are presented for continuous variables and counts and percentages are

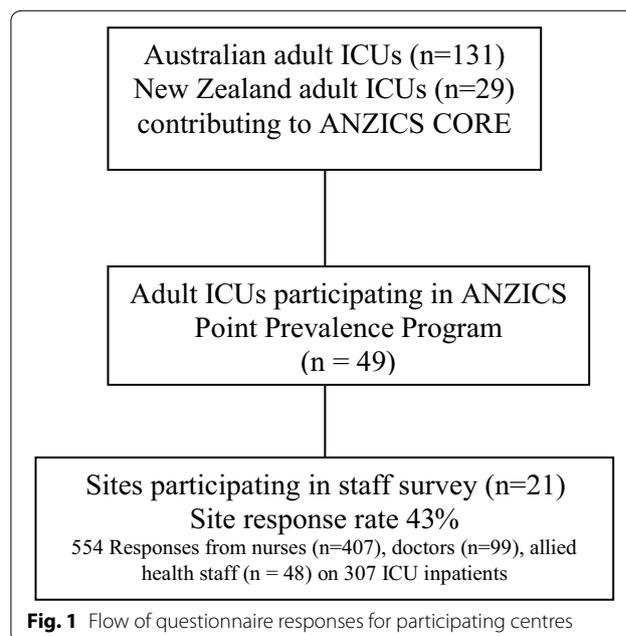


Fig. 1 Flow of questionnaire responses for participating centres

presented for categorical variables. We tested for differences between doctors and nurses using Chi-squared tests (Fisher's exact tests where appropriate) for categorical variables and independent samples *t* tests for continuous variables. Multivariate generalised estimating equations were used to model (1) whether a patient was receiving mismatched treatment where patient characteristics (age, gender, APACHE II score, admission diagnosis, patient origin, whether the patient had mechanical ventilation and whether the patient had an advanced care directive) were considered as fixed factors, and (2) whether a staff member identified a patient as receiving mismatched treatment where staff characteristics (sex, role, number of patients in staff member's care, strength of religious beliefs, experience and staff opinions about

the care delivery environment in their ICU) were considered as fixed factors. Both models used a binomial distribution and a logit link function and hospital was fitted as a random effect. Backward model selection was carried out, where variables significant at the 5% level were retained for the final model. Odds ratios (OR) and 95% confidence intervals (CI) are provided. To account for multiple comparisons all *p* values were adjusted using the false discovery rate, and only these adjusted *p* values are presented. Data were analysed using the R environment for statistical computing (R Core Team 2017).

Results

Of the 49 hospitals participating in the Point Prevalence Program on September 24th 2014, 21 sites participated

Table 1 Characteristics of the participating sites and survey respondents

Characteristic	Participating N (%)
Hospital characteristics (n = 21)	
Hospital size	
100–199 beds	1 (4.8%)
200–500 beds	6 (28.6%)
500+ beds	14 (66.7%)
Type of hospital	
Tertiary	11 (52.4%)
Metropolitan	3 (14.3%)
Rural	7 (33.3%)
ICU size	
Median (IQR) [range]	18 [8–58]
< 13 beds	4/15 (26.7%)
> 13	11/15 (73.3%)
Region	
Australia	12 (57.1%)
New Zealand	9 (42.9%)
Availability of a palliative care service in ICU	20 (95.2%)
Availability of an ethics service in ICU	8 (38.1%)
ICU staff characteristics (n = 554)	
Female respondents	395/546 (72.3%)
Professional role in the ICU	
Nurse	407/554 (73.5%)
Allied health staff	48/554 (8.6%)
Doctor	99/554 (17.9%)
ICU specialist	36/99 (36.4%)
Trainee	22/99 (22.2%)
Other	41/99 (41.4%)
Religion is important to them	164/531 (30.9%)
ICU experience in this ICU (mean ± SD years)	5.5 ± 6.2
Received formal training in talking with patients and families about end-of-life decisions	145/539 (26.9%)
Involved in any medico-legal claim, regardless of outcome (doctors only)	6/98 (6.1%)

ICU intensive care unit

in the staff survey. Survey responses were received from 554 ICU staff for 307 patients (Fig. 1). The response rate of ICU staff for the survey was 59.5% overall, 78.1% for doctors and nurses, 17% for allied health staff (pharmacists, physiotherapists, dietitian, social workers). All 307 patients were assessed in the survey responses. The characteristics of the participating sites are outlined in Table 1.

Prevalence and characteristics of patients receiving mismatched treatment intensity

Of the 307 patients, 62 (20.2%) were reported to be receiving a mismatch in treatment intensity by at least one ICU healthcare professional ($n=92$) on the day of the survey. Forty-four patients were identified by one staff member, 10 patients were identified by two staff members and 8 patients were identified by three or more staff members. The mismatch was too much treatment for 36/62 (58.1%), too little treatment for 1/62 (1.6%), and disagreement between staff for 10/62 (16.1%) patients. Five patients were identified by at least two clinicians as receiving too much treatment. The remaining 15 patients (24.2%) were thought to have been initially treated at the appropriate intensity at admission, but that now the duration of treatment was too long (of whom three of these

patients were identified by at least two clinicians). In 8 of the 10 patients about whom disagreement occurred, one staff member reported this patient as receiving too much and another rated the patient as receiving appropriate treatment.

The characteristics of the patients with at least one healthcare respondent reporting treatment mismatch is provided in Table 2. Of 62 patients reported to be receiving a mismatch in treatment intensity 50 (80.6%) were living independently at home prior to their ICU admission, only 12 (19.4%) had an advance directive and 18 (29%) were discharged home.

Patients were significantly more likely to receive mismatched treatments if their APACHE II score was 20 or greater (20+ vs. <20: OR 2.35, 95% CI 1.63–3.57, $p<0.0001$), if they were admitted to the ICU for emergency reasons (OR 3.05, CI 1.18–7.89, $p=0.0212$) or if they had an advance care directive (OR 3.68, 95% CI 1.66–8.16, $p=0.0013$; Table 3).

Prevalence and characteristics of staff reporting mismatched treatment intensity

Of the 554 staff, 92 (16.6%) reported being involved in the care of at least one patient for whom there was a perception of mismatch in treatment intensity on the

Table 2 Counts and percentages (unless otherwise stated) for patient characteristics

	No mismatch (N = 245)	Mismatch (N = 62)	Overall (N = 307)
Sex			
Male	157 (64.08%)	34 (54.84%)	191 (62.21%)
Age (years)			
Mean (SD)	60.02 (16.19)	61.05 (19.09)	60.23 (16.78)
APACHE II score			
20+	78 (31.84%)	36 (58.06%)	114 (37.13%)
Patient origin			
Elective surgery	80 (32.65%)	5 (8.06%)	85 (27.69%)
Post-operative admission			
No	128 (52.24%)	49 (79.03%)	177 (57.65%)
Admission diagnosis			
Cardiac	67 (27.35%)	10 (16.13%)	77 (25.08%)
Gastro	33 (13.47%)	10 (16.13%)	43 (14.01%)
Neuro	40 (16.33%)	12 (19.35%)	52 (16.94%)
Other	89 (36.33%)	25 (40.32%)	114 (37.13%)
Trauma	16 (6.53%)	5 (8.06%)	21 (6.84%)
Mechanical ventilation			
No	156 (63.67%)	24 (38.71%)	180 (58.63%)
Advanced care directive			
No/unknown	233 (95.10%)	50 (80.65%)	283 (92.18%)
Alive at hospital discharge			
Yes ^a	217 (91.9%)	36 (64.3%)	253 (86.6%)

^a Missing data: for non-mismatched patients nine had missing hospital mortality, for mismatched six were missing

Table 3 Patient and staff factors that are significantly associated with perceptions of mismatched treatment intensity

	OR	95% CI	<i>p</i> value
Patient factors			
APACHE II			
20+ vs. <20	2.35	1.63–3.37	<0.0001
Patient origin			
Emergency surgery/other vs. elective surgery	3.05	1.18–7.89	0.0212
Advanced care directive			
Yes. vs. no/unknown	3.68	1.66–8.16	0.0013
Staff factors			
Staff sex			
Male vs. female	1.64	1.25–2.15	0.0001
Number of patients in staff member's care			
For a one-patient increase	1.07	1.03–1.10	0.0003

Emergency surgery/other category refers to patients admitted via the emergency department, ward, operating room after emergency surgery or from another hospital

OR odds ratio, CI confidence interval, ICU intensive care unit

day of the survey. Compared with nurses, more doctors reported a perception of mismatch in treatment intensity (13.0% allied health versus 18.8% nurses vs. 37.9% doctors); however, on average, doctors were caring for a larger number of patients than nurses (doctors: mean 9.4; nurses: mean = 2.9, $p < 0.0001$). Staff factors significantly associated with an increased perception of mismatched treatment intensity were male gender (OR 1.64, 95% CI 1.25–2.15, $p = 0.0001$) and an increasing number of patients in that staff member's care (for an increase of one patient: OR 1.07, 95% CI 1.03–1.10, $p = 0.0003$) (Table 3).

Staff opinions and influences

Table 4 displays summaries of staff member's reasons for perceived treatment mismatch. The most common reason provided for the perceived mismatched treatment intensity was that the intensity was appropriate at the time of admission to ICU, but was no longer appropriate (80.5%) at the time of reporting. For 65/87 staff (74.7%), these mismatched treatment intensity situations were perceived to be not at all or only a little distressing. However, many staff did not believe that they had the ability to influence or change these situations [73.9% overall, doctors 58.1% ($n = 31$), specialists 25% ($n = 13$), nurses 84.6% ($n = 52$), allied health staff 60% ($n = 5$)].

A table of the opinions and influences of the ICU staff (not confined to those who identified a mismatched patient) are provided in the supplementary appendix. It

was uncommon for doctors to have been involved in a prior medico-legal case (6/98, 6%), and there was a low level of concern about being sued (17/94, 18%).

The current provision of, and support for, possible solutions to reduce treatment mismatch is provided in Table 5. Currently none of the measures are widespread (19.5% of ICUs had routine family meetings at 72 h, and only 26.9% of providers had received communication training).

Discussion

In our survey involving 554 respondents from 21 ICUs, a significant proportion of patients (62/307, 20.2%) were perceived by clinical staff as having a mismatch between the intensity of treatment and the achievable goals of care. Similarly, a significant proportion of clinical staff (92/554, 16.6%) perceived a mismatch between the intensity of treatment relative to the patient's wishes or expected prognosis.

Similar to other studies, the number of patients receiving "too little care" was low [4, 6]. Whether reporting bias influences perceived treatment mismatch, due to cognitive dissonance or other factors, was not assessed in this study.

Studies from Europe and the USA report between 27% and 38% of ICU staff providing mismatched treatment intensity, compared with only 16.6% in our study [4, 6]. The reasons are likely to be multifactorial, including differences in the study methodology, triage decisions related to differences in ICU beds per capita, patient acuity, geographical differences in the number of patients cared for by each healthcare provider and open versus closed ICU admission policies [11, 12]. In our study, 80.7% of the patients were able to care for themselves at home prior to ICU admission compared with 32.3% in one US study [4]. The most common reported reason for mismatch was that the intensity was appropriate initially but had then changed. These findings suggest that admission decisions and perhaps early discussions of time-limited trials may be important in reducing treatment intensity mismatch.

Although the proportion of patients identified as receiving a mismatch in intensity of treatment and goals of care appears high, the proportion is substantially lower when only patients identified by two or more ICU staff are included. Furthermore, 10/62 patients reported as receiving "mismatched treatments" had differing opinions on the direction of mismatch. These findings outline the difficulties of both prognostication and perception of benefit. Previous studies have shown that the opinions of nurses and doctors differ and their perceptions may not reflect the actual outcome [13, 14]. Indeed, 18 (29%) of our mismatched patients were discharged home. For

Table 4 Prevalence of and providers' reasons for perceived treatment imbalance in the intensive care unit

	Overall numerator/denominator (%) ^a	Doctors	Nurses/AHP	p value ^b
Prevalence of perceived inappropriate care				
Number of patients in staff member's care (N, median, IQR) ^c	N = 529, median = 2, IQR = 1–6	N = 95, median = 9, IQR = 6–11	N = 434, median = 1, IQR = 1–2	< 0.0001
Has there been a family meeting? (Yes) ^d	73/80 (91.3%)	27/30 (90.0%)	46/50 (92.0%)	1
Staff members perception of prognosis				
Uncertain	10/92 (10.9%)	2/32 (6.3%)	8/60 (13.3%)	1
Likely to improve	16/92 (17.4%)	3/32 (9.4%)	13/60 (21.7%)	
Unlikely to survive	45/92 (48.9%)	18/32 (56.3%)	27/60 (45.0%)	
Likely to be left severely disabled	21/92 (22.8%)	9/32 (28.1%)	12/60 (20.0%)	
Reasons for treatment imbalance				
The intensity of treatment patient receiving is too much	56/92 (60.9%)	26/32 (81.3%)	30/60 (50.0%)	0.0952
Intensity of treatment was appropriate at admission, but is no longer appropriate	62/77 (80.5%)	20/26 (76.9%)	4/51 (82.4%)	1
Amount of care inconsistent with expected survival	49/72 (68.1%)	24/28 (85.7%)	25/44 (56.8%)	0.2912
Amount of care inconsistent with expected quality of life	49/68 (72.1%)	24/28 (85.7%)	25/40 (62.5%)	1
Patient wishes are unknown	25/60 (41.7%)	8/23 (34.8%)	17/37 (46.0%)	1
Family has been unable to reach a consensus regarding direction of care	21/63 (33.3%)	11/27 (40.7%)	10/36 (27.8%)	1
Caregivers have been unable to reach a consensus regarding direction of care	18/65 (27.7%)	8/28 (28.6%)	10/37 (27.0%)	1
Patient is dying and a more dignified death could be provided elsewhere	34/80 (42.5%)	12/29 (41.4%)	22/51 (43.1%)	1
Patient is too well for ICU	9/87 (10.3%)	1/30 (3.3%)	8/57 (14.0%)	1
Consequences to ICU staff				
Providers reporting that the treatment imbalance perceived is distressing to provider ^e	22/87 (25.3%)	10/31 (32.3%)	12/56 (21.4%)	1
Providers who did not believe they had the ability to influence or change these situations ^f	65/88 (73.9%)	18/31 (58.1%)	47/57 (82.5%)	0.3612

Each provider gave answers on only one patient, even if they had identified more than one receiving inappropriate care

AHP allied health practitioners

^a All data are shown as no./total no. (%). Denominators may differ because of missing data (respondents chose not to answer)

^b p values are adjusted using the false recovery rate to account for multiple comparisons

^c Response was log transformed

^d Indicates a Fisher's exact test was performed

^e Distressing was the grouping of the options "quite", "very" or "extremely distressing"

^f No influence was the grouping of "not at all" or only "slightly influential"

Table 5 Providers' endorsement of proposed solutions to reduce 'mismatched treatments' in the ICU

Proposed strategy ^a	Respondent support for strategy (%) ^b	Already doing ^c
Routine family meetings at 72 h with the intensivist and primary team	327/371 (88.1%)	92/471 (19.5%)
Use 'triggers' at hospital admission to ensure advance directives are known	349/380 (91.8%)	81/469 (17.3%)
Formal training for physicians/nurses in talking to families about end-of-life decisions	375/395 (94.9%)	145/539 (26.9%) ^d
For patients with multiple co-morbidities/poor pre-morbid state, offer a limited trial of ICU level treatments	287/364 (78.8%)	119/470 (25.3%)

^a Respondents were asked whether the solutions listed would have a major, minor or no positive or negative impact on inappropriate care situations. Positive impact is the combination of major or minor positive impact

^b Denominators list the number of staff members who responded to each question and their hospital was not already doing the proposed solution

^c Respondents were asked whether these initiatives currently occur in their ICU

^d Taken from an earlier question about communication training

the 18 patients identified by at least two staff members, 8 (44%) were alive at hospital discharge. Our findings reinforce previous studies and published guidelines suggesting that congruence of opinion is an important consideration [15].

A novel aspect of our study was the inclusion of the perceptions of allied health staff. Potentially as they are less involved in communicating treatment decisions with patients and families, they were less likely to perceive patients receiving mismatched treatments (6/46, 13.0%), and felt that they had low levels of distress in these situations.

We found that having an advance care directive was associated with an increased risk of patients perceived to be receiving mismatched treatment intensity. Uptake of advance directives remains low in Australia, even in the critically ill [16, 17]. It may be that an advanced care directive identified a group of patients at high risk of adverse outcome irrespective of the specific intensity of treatment, or that the treatment directives were not nuanced enough to differentiate between levels of ICU treatment intensity, or that providers felt that patients with an advance directive were unlikely to benefit from any intensity of ICU treatment [18]. We did not have information about the content within these advance care directives, but believe that having an advance care directive acts as a signal against the usual default to “do everything”. Given the importance placed on advanced care directives in goals of care planning, these findings require further examination in future studies.

In contrast to the studies from Europe and the USA, in our study, the majority of respondents identifying treatment imbalance did not report being distressed by it. It is not clear why there is a lower level of distress experienced. This may partially be explained by the higher levels of job satisfaction, less feelings of being overworked and fewer instances of having previously been involved in a medico-legal claim. A high degree of collaboration between nurses and doctors may reflect a positive ethical climate in the ICUs and may have also influenced our findings [15]. Alternatively, the relatively low number of patients identified by two or more ICU staff may represent an environment that is less stressful than that identified in other settings [15, 19].

Shared decision-making is becoming the preferred approach for determining the best option for care for patients. In the ICU, patients receive treatments of varying intensity that correlate with risk, burden, complexity and outcome. Discussions with decision-makers around treatment goals should not be just about whether to initiate cardiopulmonary resuscitation in the event of cardiac arrest but rather the appropriate intensity of treatment for a patient [20, 21]. This is a departure from the idea

of futility as being “burdens outweighing benefits, symptom reduction, and length and quality of life” from the patient point of view [22]. Minimising treatment imbalance is more likely if there is shared decision-making between patient/family and healthcare professionals [23]. ‘Treatment mismatch’ may be a more appropriate and useful term for undertaking a shared decision-making approach. To allow this to occur, healthcare professionals may need either a priori triggers or regular prompts to have conversations with patients and families, which can be initiated through regular family meetings [24–26]. This is supported by our findings of strong agreement with the need for formal communication training and routine family meetings. However, communication training and mandatory meeting alone may be insufficient. For example, 58% of doctors who perceived a treatment mismatch in a patient felt that they did not have the ability to influence or change these situations (even though 91% of these patients had had a family meeting), and they felt the patient would be unlikely to survive with a good quality of life. Part of the contribution appears to be coming from inability to reach a consensus with family or treating teams. It may be that another contribution arises from the underlying unit dynamics and leadership that facilitate decision-making [15, 27]. While one possible culprit could be a degree of “learned helplessness” amongst staff, it may be that a culture of prioritising patient (and by extension next of kin) autonomy sets up potential conflicts with staff [28].

Our study has several limitations. Our study design may have resulted in an over-representation of patients with reported mismatch compared with an incidence study. While we identified the patient for those perceived to be receiving mismatched treatments, we did not record the identification number for all the patients being cared for, thus preventing us from measuring agreement between staff members for every patient. The response rate from staff members and ICUs introduces the risk of selection bias. The findings from allied health staff may not be generalisable because of the low response rate. Outcome measures of 6 months mortality and quality of life measures would have been better endpoints. Finally, we used staff perceptions, and not explicit criteria, to judge whether treatment imbalance occurred, although this was anchored by reflections on actual, concurrent patients.

Conclusion

This study showed that a substantial proportion of healthcare providers in Australian and New Zealand ICUs report a mismatch between the intensity of treatment delivered to their patients and either the achievable

goals of care, expected prognosis or patient's wishes. Evidence-based strategies to reduce mismatch were supported by the majority of ICU healthcare workers but currently reported to be implemented in only a minority.

Electronic supplementary material

The online version of this article (<https://doi.org/10.1007/s00134-019-05543-y>) contains supplementary material, which is available to authorized users.

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Compliance with ethical standards

Conflicts of interest

The authors declare that they have no conflict of interest.

Ethical approval

Institutional approval was obtained from all participating sites prior to study commencement, with additional approval for the sites surveying their ICU staff.

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