

Decision-making in intensive care medicine – A review

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Abstract

Decision-making by intensivists around accepting patients to intensive care units is a complex area, with often high-stakes, difficult, emotive decisions being made with limited patient information, high uncertainty about outcomes and extreme pressure to make these decisions quickly. This is exacerbated by a lack of clear guidelines to help guide this difficult decision-making process, with the onus largely relying on clinical experience and judgement. In addition to uncertainty compounding decision-making at the individual clinical level, it is further complicated at the multi-speciality level for the senior doctors and surgeons referring to intensive care units. This is a systematic review of the existing literature about this decision-making process and the factors that help guide these decisions on both sides of the intensive care unit admission dilemma. We found many studies exist assessing the patient factors correlated with intensive care unit admission decisions. Analysing these together suggests that factors consistently found to be correlated with a decision to admit or refuse a patient from intensive care unit are bed availability, severity of illness, initial ward or team referred from, patient choice, do not resuscitate status, age and functional baseline. Less research has been done on the decision-making process itself and the factors that are important to the accepting intensivists; however, similar themes are seen. Even less research exists on referral decision and demonstrates that in addition to the factors correlated with intensive care unit admission decisions, other wider variables are considered by the referring non-intensivists. No studies are available that investigate the decision-making process in referring non-intensivists or the mismatch of processes and pressure between the two sides of the intensive care unit referral dilemma.

Keywords

Decision-making, intensive care units, admission, referral

Background

Intensive care units (ICUs) are specially staffed and equipped, separate and self-contained areas of a hospital dedicated to the management of patients with life-threatening conditions. They provide dedicated facilities for the support and monitoring of vital physiological functions and use the specialist knowledge and skills of medical, nursing and other personnel experienced in the management of these problems. These units are widely recognised to reduce mortality rates in critical illness and do so in a cost-effective manner.^{1,2} However, the number of beds is a limited resource, with far more referrals made than available bed numbers. This problem is only expected to worsen over the coming years with the rise in demand for intensive care bed days estimated to likely be in the order of 4% per annum.³ It is also acknowledged that not all patients benefit from admission to the ICU, with evidence that certain patient factors (e.g., comorbidities, such as chronic obstructive pulmonary disease and end-stage liver cirrhosis, and

conditions such as multi-organ failure) are associated with better or worse outcomes from referral to ICUs than others.³

With this mismatch of supply and demand, it is the job of senior intensivists to decide how to allocate this resource. These are often high-stakes, difficult, emotive decisions being made with limited patient information, high uncertainty about outcomes and extreme pressure to make these decisions quickly. This is exacerbated by a lack of clear guidelines to help guide this difficult decision-making process, with the onus largely relying on clinical experience and judgement. A recent report by a task force of the world federation of societies of intensivists that explored issues of triage and guidelines stated that

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‘Although algorithms can be useful they can never supplant the role of skilled intensivists’.⁴ However, a lack of guidelines, when working in ambiguous, pressurised and risky contexts, can derail decision-making due to the tendency to rely on psychological biases and faulty heuristics that override more rational processing. For example, using ‘representative heuristics’ to label a patient as ‘unlikely to do well’ on ICU based on prototypical knowledge about that patient type, instead of more rational consideration of the specific qualities of that patient, an issue that is often exacerbated by time pressure to make these decisions quickly.

This uncertainty, compounding decision-making at the individual clinical level, is further complicated at the multi-speciality level for the senior doctors and surgeons *referring* to ICUs. The lack of consensus around what constitutes an intensive care patient at the unit level can risk further ambiguity for those referring to the unit. Furthermore, these decisions mirror the challenges of those faced by intensivists, also being; difficult, high-stakes, emotive decisions made with lack of time and often without a full understanding of what intensive care can offer these patients. This decision also lacks any clear guidelines or algorithms to help guide it.

This is a systematic review of the existing literature about this decision-making process and the factors that help guide these decisions on both sides of the ICU admission dilemma.

Method

PubMed literature search

Terms: ‘intensive care unit’, ‘referral’, ‘admission’, ‘accepting’, ‘refusal’. Forty-one papers were identified and a further three identified from manual searching of references. Abstract assessment for relevance led to 17 papers being discarded as not relevant due to being either not primary research or due to studying intensive care factors not to do with admission or referral factors. Further content analysis of the remaining 26 papers led to them being allocated into four categories:

1. Objective factors correlated with admission decisions by intensivists
2. Factors identified in clinical scenario-based studies investigated intensive care decision-making
3. Qualitative investigation of decision-making in ICU admission decisions by intensivists
4. Factors identified in referring to ICU decision-making by non-intensivists

Papers were analysed and results presented within these categories, with some papers fulfilling criteria to be analysed under multiple categories (see Figure 1).

Results

Objective factors correlated with admission decisions by intensivists

From the 18 observational prospective studies analysing factors that correlated with ICU admission or rejection, some common themes were seen (see Table 1 for a breakdown of these studies).

Factors identified as important varied between studies. The most commonly identified factors were bed availability ($n=8$), severity (normally as quantified by APACHE-II score) ($n=10$) and the initial ward or team that the patient was referred from ($n=8$). However, there was some discordance with a couple of studies identifying that there was no association between bed availability. Other factors identified as associated with ICU admission were do not resuscitate (DNR) status, patient choice, functional baseline, level of referring doctor, level of accepting doctor, a history of active cancer, and admission during daytime hours. The main factor not identified as not associated with ICU admission or rejection was gender ($n=4$). Age was an interesting factor with equal number of studies finding an association ($n=4$), with higher age being associated with higher levels of ICU rejection, and finding no association ($n=4$). See Table 2 for the breakdown of associated factors.

Factors identified in clinical scenario-based studies investigated intensive care decision-making

Five studies investigated intensive care decision-making using clinical vignette scenario-based studies (see Table 3 for a breakdown of these studies).

Two of these used general scenarios to a population of intensivists to identify important factors. These studies identified similar factors to the above category of studies, including age, bed space and patient choice. Interestingly, the most important finding in each of these studies was the low agreement in decision-making amongst the intensivists, with very weak correlations between decisions to admit.

One of the studies used scenarios to assess the difference in admitting decisions between Australian and New Zealand intensivists. Although it did find that New Zealand intensivists had more selective views of what constitutes an appropriate admission to intensive care, it also found that views vary massively within each group.

One study used a scenario-based design to assess decision-making around patient age and ICU admission decisions. When the vignette differed only by age of the patient, the vast majority picked to admit the younger patient; however, following the provision of more detailed medical and social information skewed in the favour of the older patient, this levelled out to half the participants picking the younger

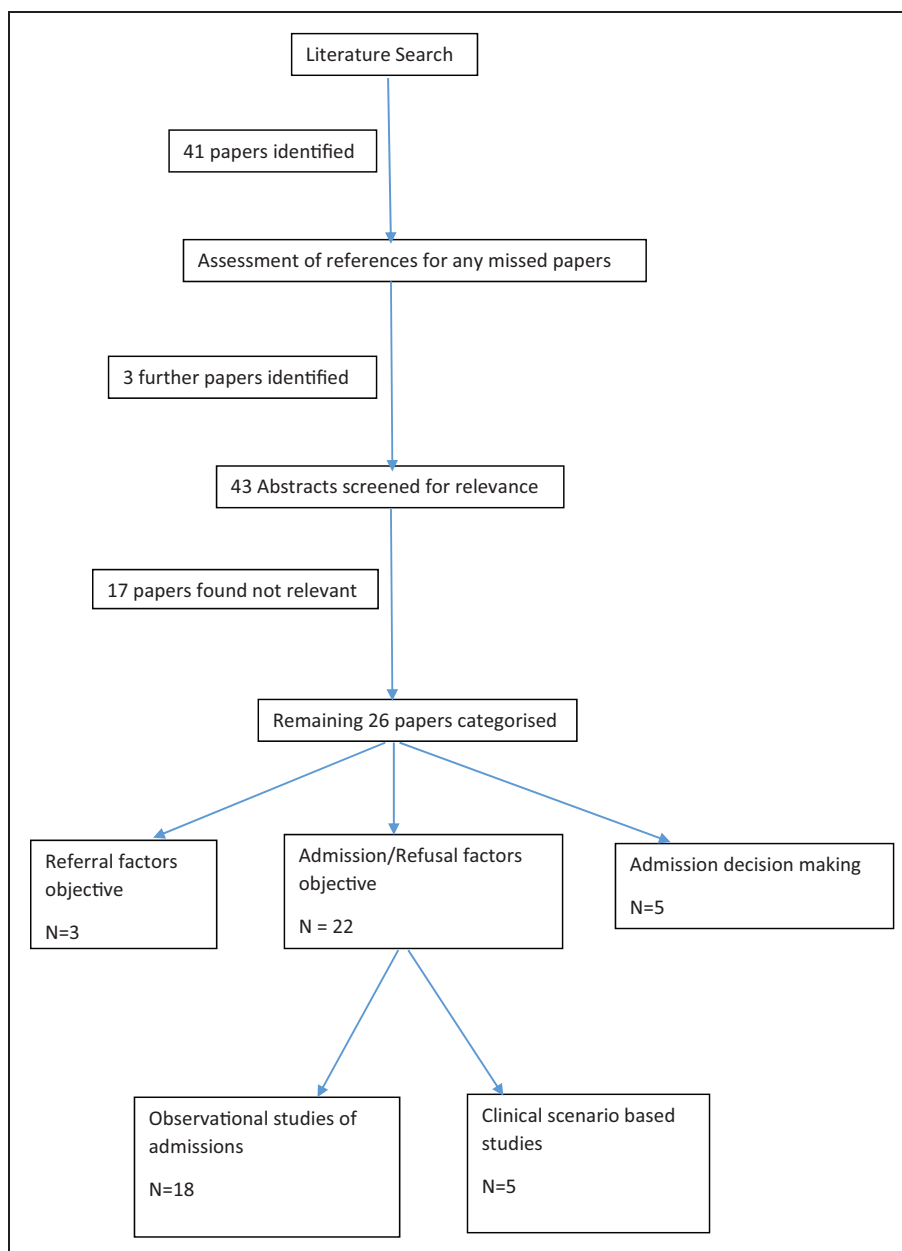


Figure 1. Systematic literature search methodology.

patient. This study again showed big differences in the decisions made between intensivists within the group of intensivists making decisions.

The final scenario-based study aimed to investigate the differences in opinion over the benefit of ICU admission from intensivists and non-intensivists. They found that there was no difference in assessments of ICU admission benefit between intensivists and non-intensivists; however, a statistically significant difference in levels of care assignments, such as treatment limitations and DNCR decisions, was found between them. Again the most striking finding was the significant disagreement amongst individuals in each group regarding admission decisions.

Qualitative investigation of decision-making in ICU admission decisions by intensivists

Five studies investigated the decision-making process by use of surveys or interviews (see Table 4 for a breakdown of these studies).

The use of ranking importance of factors highlighted the importance of many of the factors identified by objective correlation of factors in decision-making or real cases such as severity of illness, patient wishes, DNR status, age and bed availability. A new factor was also identified as playing a role in admission decision-making which was not shown in the objective factor correlation

Table 1. Observational prospective studies analysing factors associated with ICU admission or rejection.

Paper	Type of research	Study population	Aims	Outcomes	Limitations	Category
5	Prospective, observational cohort study of lung cancer inpatients with organ failure	140 Lung cancer patients with organ failure	To investigate factors associated with ITU admission in this population	Factors independently associated with ICU referral were performance status, nonprogressive malignancy and no explicit refusal of ICU admission by the patient and/or family. Factors independently associated with ICU admission were the initial ward being other than the lung cancer unit and an available medical ICU bed.	American	Referral and admission criteria objective
6	A single-centre, prospective, observational study was conducted among consecutive patients in whom an evaluation for ICU admission was requested during times of ICU overcrowding	95 Patients were evaluated for possible ICU admission during the study period	To investigate characteristics of patients accepted and declined for ITU admission in periods of overcrowding	Triage decisions were not related to the number of available beds in ICU, age or gender: A linear correlation was observed between severity of illness, expressed by APACHE-II scores and the likelihood of being admitted to ICU	American	Admission criteria objective
7	A single-centre, prospective, observational study of 165 consecutive triage evaluations	165 Consecutive triage evaluations	To assess factor in admission to ITU	Age, gender and number of ICU beds available at the time of evaluation were not associated with triage decisions		Admission criteria objective
8	Observational simulation study of physician decisions in patients' admissions	100 Physicians given simulated patient cases	To assess decision making in admitting patients to ITU	Low agreement in decision-making, varies greatly for bed space availability and patient choices		Admission criteria objective
9	A single-centre, prospective, observational study of 572 consultations for ITU admission and decisions	572 ITU admission consultations were recorded	To assess the main factors in the decision to admit to ITU	Patients were less likely to be admitted if their functional baseline was poor and if a DNR was in place. Patients' age, insurance, ethnicity, severity of illness, presence of malignancy or whether patient's primary physician was on staff were not independently associated with admission	American, single centre	Admission criteria objective
10	An observational, prospective study over a six-month period of all adult patients triaged for admission to a medical ICU	398 Patients requested for ITU admission were assessed	To assess the factors associated with decisions to admit to ITU	Refusal of ICU admission was correlated with the severity of acute illness, lack of ICU beds and reasons for admission request	Moroccan, single centre	Admission criteria objective
11	Observational, prospective single-centre study of 100 referral to ITU decisions	100 Patients referred for ITU admission were assessed	To assess factors associated with decisions to admit to ITU and outcomes in those admitted versus not	Patients most likely to receive triage decisions were medical inpatients who had expressed wishes about end-of-life care, who were functionally limited with comorbid conditions or referred by junior doctor: Age, gender, race, diagnostic category, bed status and reason for referral did not	Single centre	Admission criteria objective

(continued)

Table 1. Continued

Paper	Type of research	Study population	Aims	Outcomes	Limitations	Category
12	Observational, prospective, multinational, multicentre study	8616 Patients referred for ITU admission were assessed	To assess factors associated with decisions to admit to ITU and outcomes in those admitted versus not	<p>impact on admission or triage decisions</p> <p>Variables positively associated with probability of being admitted to ICU included ventilators in ward; bed availability; Karnofsky score; absence of comorbidity; presence of haematological malignancy; emergency surgery and elective surgery (versus medical treatment); trauma, vascular involvement and liver involvement and acute physiological score II</p>		Admission criteria objective
13	Cohort prospective study in a tertiary hospital	359 Patients referred for ITU admission were assessed	To assess factors associated with decisions to admit to ITU and outcomes in those admitted vs. not	Age, score system and organ dysfunction were greater in priority groups 3 and 4, and these were related with refusal from the ICU		Admission criteria objective
14	Observational, prospective, single-centre study	250 Patients classified as triage priority 3 when referred for ITU admission were assessed	To identify factors associated with the triage decision for patients classified as Society of Critical Care Medicine (SCCM) Triage Priority 3	For triage 3 priority patients, 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	Single centre	Admission criteria objective
15	Prospective, observational, single-centre study of factors influencing decisions in ITU admission	Data were collected on 179 patients referred for ITU admission	To assess factors associated with decisions to admit to ITU	The only factor that influenced MICU admission was the presence of DNR order. There was no difference between the age, APACHE II scores or functional status between admitted or refused		Admission criteria objective
16	Prospective, observational study in the medical ICU in a tertiary nonuniversity hospital	Cohort of 180 patients aged 80 years or over who were triaged for admission to ITU	To assess factors relating to admission to ITU in patients aged over 80 referred	Factors independently associated with refusal were nonsurgical status, age older than 85 years and full unit		Admission criteria objective age
17	Prospective, observational study of admission decisions for patients referred for ITU admission	356 Patients referred for ITU admission in University Hospital of the West Indies	To assess factors relating to admission to ITU in patients referred	The APACHE II score was the strongest predictor of ICU admission, with admission more likely as the score decreased. Of 311 requests considered suitable for admission, 26 (8%) were refused admission due to resource limitations	West Indies, single centre	Admission criteria objective

(continued)

Table 1. Continued

Paper	Type of research	Study population	Aims	Outcomes	Limitations	Category
18	Observational, prospective, multiple-centre study	To identify factors associated with granting or refusing ICU admission	574 Patients from four university hospitals and seven primary-care hospitals in France	The reasons for refusal were too-well-to-benefit, too-sick-to-benefit, unit too busy and refusal by the family. Two patient-related factors were associated with ICU refusal: dependency and metastatic cancer. Other risk factors were organizational, namely, full unit, phone admission and daytime admission	French	Admission criteria objective and reasons given
19	National questionnaire survey using eight clinical vignettes involving hypothetical patients	To assess what factors influence doctors' decisions about admission to ICU	232 Swiss doctors specialising in intensive care	Most rated as important or very important the prognosis of the underlying disease and of the acute illness and the patients' wishes. Few considered important the socioeconomic circumstances of the patients' religious beliefs and emotional state. In the vignettes factors associated with admission were patients' wishes, 'upbeat' personality, younger age and a greater number of beds		Admission criteria objective and subjective
20	Prospective, observational study to assess factors influencing admission decisions, single-centre study	To assess the appropriateness of ICU triage decisions	334 patient admission decisions were assessed	Reasons for refusal were being too-sick-to-benefit and too-well-to-benefit. Factors independently associated with refusal were patient location, ICU physician seniority, bed availability, patient age, underlying diseases and disability	Single centre	Admission criteria objective and reasons given
21	Prospective, descriptive evaluation in a multi-disciplinary ICU, university referral hospital	To evaluate factors associated with decisions to refuse ICU admission	624 patient admission decisions were assessed	Refusal was associated with older age, diagnostic group and severity of illness	Single centre	Refusal criteria objective
22	Prospective, descriptive, single-centre study	To assess physician decision-making in triage for intensive care	382 patient admission decisions were assessed	Intensive care admission correlated with APACHE II score, age, a full unit, surgical status and diagnoses	Single centre	admission criteria objective

DNR: do not resuscitate; ICU: intensive care unit; MICU: medical intensive care unit; ITU: intensive therapy unit.

Table 2. Factors associated with ICU admission or rejection.

Factor	Studies that identified an association between factor and ITU acceptance/rejection	Studies that identified no association between factor and ITU acceptance/rejection
Severity	10	2
Bed availability	8	2
Initial ward/team	8	0
Functional baseline	4	1
Age	4	4
Patient choice	4	0
DNR status	3	0
Level of referring doctor	1	0
Level of accepting doctor	1	0
Active cancer	0	1
Day time admission	1	0
Gender	0	4

DNR: do not resuscitate; ITU: intensive therapy unit.

studies – patient’s personality, with an ‘upbeat’ patient personality favouring a decision to admit to ICU.

One study using a survey to investigate intensivists’ perceptions and attitudes regarding inappropriate admissions and resource allocation found that the vast majority admitted to having made inappropriate admission decisions. The reasons behind these included clinical doubt, limited decision time, assessment error, pressure from superiors or referring clinician or family, threat of legal action and in economically advantageous patient groups.

One study used an ethnographic approach of combined observation and interviews to qualitatively investigate the decision-making process and concluded that patient, physician and contextual factors strongly shaped the decision to transfer the patient to intensive care. There were no absolute patient indications or contraindications for transfer to intensive care. Instead, sets of relative indications and contraindications for admission were ‘summed’, with the overall balance swaying the eventual outcome. It also identified a very experientially led decision-making process.

Factors identified in referring to ICU decision-making by non-intensivists

Only three studies investigated decision-making by the referring non-intensivists (see Table 5 for the breakdown of these studies).

One of these studies looked at factors associated with ICU referral. Some of these factors match those identified in factors associated with ICU admission, such as age, severity of illness and functional

baseline. Some factors were seen to influence referral decision-making which have not been identified in the studies investigating accepting decision-making, such as active cancer status, unknown living arrangements and regular psychotropic medication use, all of which were correlated with a decision not to refer the patient to ICU.

One, which has already discussed in the scenario-based study section, showed that there was no difference in assessments of ICU admission benefit or accuracy in outcome prediction between intensivists and non-intensivists, but there was a statistically significant difference in level of care assignments. A significant disagreement amongst individuals in each group was found.

One study investigated the difference in factors correlated with both ICU referral and admission in a specific subpopulation of patients – those with lung cancer. They found that factors associated with ICU acceptance were similar to those outlined in the above for the general patient population of: bed space and initial ward they were referred from. Interestingly, here the most important factor for admission acceptance was being from a ward other than the lung cancer ward. Factors correlated with ICU referral were performance status, nonprogressive malignancy and no explicit refusal of ICU admission by the patient and/or family.

Discussion

This review had analysed many different study designs and approaches investigating decision-making in ICU referral and admission decisions. A wealth of information in the form of many, large, well-designed, prospective, observational studies exists assessing the

Table 3. Clinical vignette based studies of ICU decision making.

Paper	Type of research	Study population	Aims	Outcomes	Limitations	Category
23	Vignette-based questionnaire survey to intensivists and non-intensivists	21 intensivists and 22 internists completed five vignettes	Opinions over benefit of ICU admissions of critically ill medical inpatients differed based on physician specialty, namely intensivists and internists	Physician specialty base did not affect assessments of ICU admission benefit or accuracy in outcome prediction but resulted in a statistically significant difference in level of care assignments. A significant disagreement amongst individuals in each group was found	Canadian, small sample, single centre, ?clear cut vignettes	Scenario-based study
8	Observational, simulation study of physician decisions in patients' admissions	100 physicians given simulated patient cases	To assess decision-making in admitting patients to ITU	Low agreement in decision-making, varies greatly for bed space availability and patient choices		Scenario-based study
24	Scenario-based survey of differences between Australian CrCU doctors and New Zealand CrCU doctors	Scenario-based survey of 238 Australian/New Zealand doctors	To assess differences in admission policies	New Zealand doctors have more selective views of what constitutes an appropriate admission to intensive care. But views vary massively within each group	Australian/New Zealand no generalised applicability	Scenario-based study
19	National questionnaire survey using eight clinical vignettes involving hypothetical patients	To assess what factors influence doctors' decisions about admission to intensive care	232 Swiss doctors specialising in intensive care	In the vignettes factors associated with admission were patients' wishes, 'upbeat' personality, younger age and a greater number of beds. Correlations between decisions on admission were very weak	Swiss	Decision-making in admission, scenario-based study
25	Hypothetical case scenario-based questionnaire	To assess the importance of age as a factor in admission decisions		When age was the only difference between two patients in a hypothetical case scenario, 80.7% of respondents chose the younger patient (age 56 years) for admission and 13.2% chose the older patient (age 82 years). Following the provision of more detailed medical and social information, however, only 53.5% chose the younger patient and 41.2% chose the older patient.		Decision-making in admission, scenario-based study

CrCU: critical care unit; DNR: do not resuscitate; ITU: intensive therapy unit.

Table 4. Survey or interview based studies of ICU decision making.

Paper	Type of research	Study population	Aims	Outcomes	Limitations	Category
26	Combined observation and interviews with critical care physicians	30 Critical care doctors managing 71 referrals and conducted 10 interviews with senior decision-makers in a UK hospital	Explore the themes in accepting intensivists' decision-making	Patient, physician and contextual factors strongly shaped the decision to transfer the patient to critical care. There were no absolute patient indications or contraindications for transfer to critical care. Instead, sets of relative indications and contraindications for admission were 'summed', with the overall balance swaying the eventual outcome	Qualitative research	Accepting admission decision-making
27	Survey-based study of ITU doctors in 20 ITUs in Milan	225 Doctors from 20 ITUs in Milan responded to the survey	To assess physicians' perceptions and attitudes regarding inappropriate admissions and resource allocation in the intensive care setting	Inappropriate admissions were acknowledged by 86% of respondents. The reasons given were clinical doubt (33%); limited decision time (32%); assessment error (25%); pressure from superiors (13%), referring clinician (11%) or family (5%); threat of legal action (5%) and an economically advantageous 'Diagnosis Related Group' (1%)	Italian	Decision-making admission
19	National questionnaire survey using eight clinical vignettes involving hypothetical patients	To assess what factors influence doctors' decisions about admission to intensive care	232 Swiss doctors specialising in intensive care	Most rated as important or very important the prognosis of the underlying disease and of the acute illness and the patients' wishes. Few considered important the socioeconomic circumstances of the patients' religious beliefs and emotional state		Admission criteria objective and subjective
25	Hypothetical case scenario-based questionnaire	To assess the importance of age as a factor in admission decisions		In a ranking of several admission factors, age was found to be of less importance than severity of presenting illness, previous medical history and DNR status but of more importance than patient motivation, ability to contribute to society, family support and ability to pay for care		Age questionnaire

DNR: do not resuscitate; ITU: intensive therapy unit.

Table 5. Studies investigating decision making by referring non intensivists.

Paper	Type of research	Study population	Aims	Outcomes	Limitations	Category
23	Vignette-based questionnaire survey to intensivists and non-intensivists	21 intensivists and 22 internists completed five vignettes	Opinions over benefit of ICU admissions of critically ill medical inpatients differed based on physician specialty, namely intensivists and internists	Physician specialty base did not affect assessments of ICU admission benefit or accuracy in outcome prediction but resulted in a statistically significant difference in level of care assignments. A significant disagreement amongst individuals in each group was found	Canadian, small sample, single centre, 7 clear cut vignettes	Referring and accepting
5	Prospective, observational cohort study of lung cancer inpatients with organ failure	140 Lung cancer patients with organ failure	To investigate factors associated with ITU admission in this population	Factors independently associated with ICU referral were performance status, nonprogressive malignancy and no explicit refusal of ICU admission by the patient and/or family. Factors independently associated with ICU admission were the initial ward being other than the lung cancer unit and an available medical ICU bed		Referral and admission criteria objective
28	Prospective, observational cohort study of patients aged ≥ 80 years who were triaged in the emergency room, with at least one independent criteria suggesting ITU admission could be useful	Decisions for ITU admission for a total of 2646 Patients aged ≥ 80 years with at least one criterion in French hospitals	To describe ICU referral decisions by emergency room physicians in patients aged ≥ 80 years	Factors associated independently with no ICU referral were age, active cancer, unknown hospitalization status, unknown living arrangements, regular psychotropic medications, low severity, low activity in daily living score, emergency and ICU physicians were extremely reluctant to consider ICU admission of patients aged >80 years, despite the presence of criteria indicating that ICU admission was certainly appropriate.	French	Referral admission criteria objective, age

DNR: do not resuscitate; ICU: intensive care unit; ITU: intensive therapy unit.

patient factors that correlated with ICU admission decisions. Analysing these together suggests that the factors consistently found to be correlated with a decision to admit or refuse a patient from ICU are bed availability, severity of illness, initial ward or team referred from, patient choice, DNR status and functional baseline. These factors identified by this study type were also identified using clinical scenario-based studies to investigate factors associated with ICU admission decisions.

Some factors are not surprising including DNR status, patient choice and functional baseline, whilst others may be due to the varying health economics of the studies (for example, limited bed capacity or the severity of illness of patients accepted to a unit).

Age as a factor has been found to be associated with ICU admission decision and not associated with ICU admission decision in equal numbers of studies. Several survey studies done with intensivists themselves have shown that the majority of intensivists think that age is an important factor. Even amongst the dearth of information that exists on decision-making in referring non-intensivists, it has been shown that age is a factor that correlates with the decision to refer to ICU. Further investigation of this complex variable by way of clinical scenarios adjusted by age shows that age is an important variable when all other patient factors are matched, but when further patient information is available in favour of the older patient, it become less important. We suspect that this is because age may be clinically used as a surrogate for comorbidity and frailty.

Much less research has been done on the decision-making process itself and the factors that are important to the accepting intensivists when they make these decisions. The few small studies that exist show that in general the factors which objectively correlate to admission decisions are subjectively considered by intensivists too, with other factors such as patient personality, which may be harder to capture in an observation objective study design. The only study that exists looking qualitatively at the decision-making process by an interview-based study design gives an overview on how these patient factors added to physician and contextual factors to shape the decision to transfer the patient to ICU, with sets of relative indications and contraindications being 'summed', with the overall balance swaying the eventual outcome.²⁶ It has also been shown that intensivists are under a lot of pressure during these decisions and that the vast majority are aware of making the wrong decision at times due to external stressors influencing their decision-making such as clinical doubt, limited decision time, assessment error, pressure from superiors or referring clinician or family or threat of legal action.²⁷

Even less research exists on referral decision, with only a small study investigating factors that are

correlated with ICU referral and demonstrating that as well as the factors correlated with ICU admission decisions, other wider variables are considered by the referring non-intensivists such as active cancer status, unknown living arrangements and regular psychotropic medication use, perhaps suggesting a more holistic patient assessment.²⁸ No studies are available that investigate decision-making process in referring non-intensivists or the mismatch of processes and pressure between the two sides of the ICU referral dilemma.

Conclusion

Many prospective observational studies and clinical scenario-based studies exist assessing the patient factors correlated with ICU admission decisions. Analysing these together suggests that the factors consistently found to be correlated with a decision to admit or refuse a patient from ICU are bed availability, severity of illness, initial ward or team referred from, patient choice, DNR status, age and functional baseline. There has been very limited investigation of the actual decision-making process and the factors that are important to the accepting intensivists. The few small-scale studies that exist show that in general the factors which objectively correlate to admission decisions are subjectively considered by intensivists too, with other factors such as patient personality, which may be harder to capture in an observation objective study design. Even less research exists on referral decision, with only one small study investigating factors that are correlated with ICU referral and demonstrating that as well as the factors correlated with ICU admission decisions, other wider variables are considered by the referring non-intensivists. No studies are available that investigate decision-making process in referring non-intensivists or the mismatch of processes and pressure between the two sides of the ICU referral dilemma.

Further research should be focussed on factors relating to referral to ICU and how these may differ from those related to ICU admission. In particular, investigating these differences and how they arise from the decision-making process by referring and accepting clinicians may facilitate the referral process and allocation of limited resources in a more efficient manner. We would also recommend further investigation of how the international variation of health economics impacts on clinical decision-making. Finally, it would also be of benefit to analyse the complex factor of age in relation to ICU admission and how it appears to be clinically used as a surrogate for other factors.

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