Resource allocation in ICU: ethical considerations

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Purpose of review
Increasing scarcity of resources on the background of ever improving medical care and prolonged life expectancy has placed a burden on all aspects of health care. In this article we examine the current problems with resource allocation in intensive care and question whether we can find guidance on appropriate resource allocation through ethical models.

Recent findings
The problem of fair and ethical resource allocation has perpetually plagued health care. Recent work has looked at value for money, benefits of therapies and how we define futility, but these still fall victim to the same problems that classical schools of ethical thought have tried to tackle.

Summary
Many ethical principles provide a framework on which to allocate resources to certain cohorts of patients, however, most appear too rigid to be fully and primarily utilized for intensive care admission. We suggest a collaboration of principles be applied to achieve a moral, ethical and common sense approach to this issue. Over resourcing and under resourcing is also suggested to be problematic for patients and healthcare workers alike.

Keywords
ethics, intensive care, resource allocation

INTRODUCTION

The ICU has been an integral part of acute hospitals for over 50 years and is a mainstay in modern medicine. An ICU offers specialized equipment, medical and nursing care to allow enhanced organ support and monitoring [1]. The content and staffing of an ICU varies in each country and therefore must be taken into consideration when comparing finances, number of beds and outcomes [2].

The financial cost of ICU is difficult to quantify but was estimated to average £1932 per night in 2012 [3]. This compares favourably to average costs in the Netherlands (€1911) but exceeds that of Germany and Italy, €1225 and €1472, respectively [4]. This difference can be partly explained by workforce costs in the United Kingdom compared to European counterparts [5].

There is a three-fold difference in the number of hospital beds per 100 000 in the United Kingdom compared to Germany (257.54 vs. 806.26) [6] and a seven-fold difference in the number of critical care beds (3.3 vs. 24.0) [7]. Despite the low bed numbers in the United Kingdom, 77% of patients survive an ICU admission to be discharged from hospital [8▪]. It has been shown that increasing the number of available ICU beds has a positive impact on mortality [2] but the relatively high survival rate in the United Kingdom despite limited resources suggests appropriate allocation of current resources.

PROBLEMS OF RESOURCING IN ICU

Although it may seem an under resourced critical care facility affects patient morbidity and mortality, this is far too simplistic a view. A study by Singer *et al.* [9] following a 55% drop in ICU bed availability because of nursing shortages demonstrated no increase in overall mortality. The study concluded 'physicians can respond to moderate resource limitations by more efficient use of intensive-care resources'. Although less patients were admitted during this study period, the overall number of days where more than one bed was available dropped from 40 to 55%. It is also difficult to determine whether this study translates to modern practice

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Curr Opin Anesthesiol 2019, 32:190–194

DOI:10.1097/ACO.0000000000000688

KEY POINTS

- There is a large disparity between ICU funding and resource between different countries.
- Both over resource and under resource of ICUs can lead to staff burnout and dissatisfaction.
- There are many different ethical models for resource allocation and though they each have merits, none is perfect.
- QALYs and similar welfare maximization methods of resource allocation are better suited to deciding between treatments for an individual patient rather than deciding which patients will receive a resource.
- Deciding whether a treatment is futile is difficult as 'futility' itself is poorly defined.

with increasingly complex surgical operations being undertaken and many patients with multiple co-morbidities presenting with acute illnesses.

In contrast, an 'over resourced' ICU may seem initially attractive as the facilities and staffing will always be available when required; however, this has been shown to increase admissions of those patients too sick or too well to benefit from intensive care [10]. Taking patients from both classifications can lead to reduced job satisfaction and leads to unnecessary expenditure in the provision of care.

An under resourced intensive care or an over resourced intensive care taking patients who are too unwell to benefit from intensive care can lead to physician or nursing burnout. This is a 'psychological state resulting from prolonged exposure to job stressors' [11]. It is particularly prevalent in critical care workers with a gradual onset of stress and negative feelings toward work, this leads to difficulty adapting to new challenges and diminished relationships with patients and colleagues [12]. The three typical symptoms are exhaustion, depersonalization and reduced personal accomplishment [12].

HOW COULD WE ALLOCATE RESOURCES?

There are many different ways in which ICU resource could be allocated, though many have flaws (and some are subjectively repellent).

A private healthcare system could be utilized, where people with the appropriate insurance are able to access all intensive care resources regardless of overall benefit. This leads to health inequality and appropriate treatment becomes a financial burden without the correct insurance. The choice of personal or financial health on these occasions creates unnecessary psychological morbidity for patients and their families. Running intensive care in this manner also creates ethical and moral dilemmas with regards to over investigation and treatment of problems for pecuniary interest.

Resources could also be allocated because of an individual's net worth to society. A high earner who contributes to society through taxation and spending would be eligible for all aspects of intensive care compared with a person who is a low earner or unemployed. This would create an elitist culture within health care and would not account for future earnings or a person's overall contribution to society. For example, a person in a low paid job who volunteers in many community projects may actually have a greater impact on society than a high earner who utilizes professionals to limit their tax burden. A related version would be to limit resources based on 'moral' choices that the individual has made such as smoking, alcohol consumption, promiscuous behaviour or other lifestyle choices. Ignoring that certain vices may in part fund some healthcare systems (with monies raised through the taxation of cigarettes and alcohol), it is as Glover [13] points out '... highly unlikely that doctors would have enough information to make a judgement on someone's whole life...'. That is not to say, that the presence of an addiction that will affect the outcome of the intervention (such as continued alcohol use and liver transplantation) should not be considered and factored into the decision process. This should however be done solely on the basis of how it will affect the success of the treatment and not through any lens of societal worth or moral judgement and even then, the perceived wisdom may be at odds with the emergent evidence [14].

The ICU is often described to the general public as the place the sickest people in the hospital go. It would therefore seem intuitive to allocate all resources to this unfortunate cohort. Yet within this group, we may encounter difficulties. If we define our goal in simple terms of 'saving the most lives', we will quickly realise that a subset of these 'sickest' patients will die regardless of our intervention. Either overmastered by their acute disease or without the reserve to survive the stresses of critical care interventions, we merely end up postponing death, rather than saving a life. Though this in itself raises questions as to what a suitable survival time for a given critical care intervention is (something we will deal with later).

Taking a semi-reciprocal stance and allocating ICU resources to those we think will survive may also be inappropriate because of the difficulty in prognosticating patients admitted to ICU. Acute physiology and chronic health evaluation II (APACHE II) and sequential organ failure assessment

(SOFA) scores can only be achieved after 24 h of ICU care. Patients with a poor prognosis on admission occasional improve enough to be discharged from hospital. Consider an isolated head injury with an intracranial haemorrhage, if no neurosurgical input is possible, patients typically receive 48 h of neuroprotective care before reassessment. Many of these patients fail to improve, however, occasionally some patients have a degree of neurological recovery. Another version of this resource allocation could look at prioritizing those more likely to improve the quickest. With a limited resource, more individuals would therefore have access to it. If allocating ICU resources based on likelihood of survival would (as in the former example) see some patients missed, then this model of resource allocation would only exacerbate this, with survivable conditions being denied resource for 'the easy turn-around'.

It must also be noted that in our previous examples we have targeted simply survival as our goal, with no comment on the quality or duration of post-ICU existence. With a recognition that survival (at all cost) in itself may not be either a societal or patient-centred outcome, attempts have been made to incorporate other considerations into resource allocation. One solution to this was the quality-associated life year (QALY).

QALYs adjust length of life in years to reflect the overall quality of life of a patient [15]. It is a scale from 0 to 1, 1 indicates perfect health, whereas 0 indicates death [16]. QALYs allow us not only to consider whether a particular treatment or intervention can be successful in preventing death but also in estimating what limitations in current quality of life will be derived as a result. Particular conditions or states that are considered worse than death can be accounted for using a negative value. This is especially important in intensive care when discussing limitations and end points of treatment as patients or relatives are often aware of certain states that they would not have a quality of life. A QALY can be used in two ways:

(1) To decide between rival treatments for a particular patient.
(2) To decide which patient will receive scarce resources.

Although the former represents a simple and more patient-centred way of deciding between rival treatments, it is the latter which is more controversial. There is an inherent assumption that a given individual would favour a shorter life of more comfort than a longer one of suffering. Moreover, even if a person were to agree to a shorter life, it does not translate that they would wish no life at all in favour of extending someone else's. The fact that duration of life extended figures into the calculation also means that by their nature, QALYs will discriminate against older patients [17].

Given all the inherent difficulties, some have suggested that all things being equal resource should be allocated by lottery [18]. Although this may absolve to some extent medical professionals from difficult decisions, it pays no attention to any patient autonomy and may cause greater moral anguish to both doctors who see otherwise salvageable patients die and patients themselves who's lives may be ended for no reason beyond the chance roll of a dice.

ETHICAL THOUGHTS ON RESOURCE ALLOCATION

Most medical practitioners are well versed in the four principles of Beauchamp and Childress [19] in medical ethics, but can this be applied to ICU resource allocation? Patients with capacity have autonomy to accept or reject any medical treatment following an informed consent process; however, many patients are referred to intensive care acutely incapacitated or under anaesthesia in the postoperative period. If, however, we are acting to limit a treatment we will be required to base our decision-making on their other principles of beneficence, nonmaleficence and justice. We will consider justice as a separate section. To act under the auspices of beneficence and nonmaleficence requires a degree a paternalism and a belief that the treatment will be futile. Futility itself is a problematic term [20], Beauchamp and Childress [19] themselves identify four different scenarios as to when an intervention could be considered futile:

(1) That the patients biological condition precludes the procedure from being performed.
(2) That the procedure cannot produce the intended physiological effect.
(3) That the procedure cannot produce the benefit which is sought.
(4) That the procedure's burdens, harms (and costs) will outweigh its intended benefits.

Although points 1 and 2 give us an ethical (and common sense) rational for not directing resources into these endeavours, they still require a degree of medical certainty as to the outcomes of the intervention. Points 3 and 4 acknowledge that good outcome cannot merely be determined by survival alone and we are increasingly aware of postintensive care syndrome affecting mental and physical health [21]. Although this is an important consideration, when contemplated without paying attention to the

wishes and autonomy of the patient (and trying to maximize what autonomy they have), we are allocating resources based on paternalistic grounds. This may be what we would want at this time, but whether it is what we would want were we in the position of the patient or more importantly what the patient themselves would wish remains unknown. Although Foot [22] felt that our most important obligation was not to harm, all medical intervention is a balance of harms and benefits and when the consequence of nonintervention is death, then that balance may be shifted substantially.

Deontology refers to the morality of an action rather than the consequences themselves [23]. With regards to application of this principle within resource allocation, it seems too rigid to be used clinically. The principle describes doing the 'right thing' regardless of a negative result. However, medical practice is so abstract and diverse that it would be impossible to have a consensus on what the correct action is in allocating ICU resources to many patients. As a doctrine, deontology places autonomy central. Kant [24] (the father of deontology) felt that autonomy was sacrosanct, arguing that you must 'act in such a way that you treat humanity, whether in your own person or in the person of any other, never simply as a means but always at the same time as an end'. Although this may be useful in defining more patient-centred outcomes upon which undesired or unpalatable treatment can be avoided and resource preserved, it is unhelpful when the demands of two patients compete for a resource. Mill [25] (who admittedly was looking at this from a utilitarian perspective) championed autonomy, but acknowledged that it had to be limited when to respect it would harm others.

Virtue ethics centres on a decision-making framework based on the actions a good and moral person would make [26]. In its original form, however, it is too indistinct to offer us much help as it is the character of the actor (that they are showing courage, wisdom and other ideals) rather than the act itself which defines whether something is just and correct. As diametric decisions could be justified solely on the basis that the operators are acting in a virtuous way, it is of help only in telling us how we should do things rather than what we should actually do. Attempts have been made to update this into a guide as to how a doctor should act by Pellegrino [26], focusing on the virtues of fidelity, benevolence, intellectual honesty, prudence, justice, compassion and self-effacement, but do not help us ultimately solve our resource problem (merely telling us how we should act while we attempt to do so).

We have already briefly mentioned utilitarianism which weighs the values of right and wrong decisions against the consequences of making that decision. Although it may guide some policy, it is limited when considering the application in resource allocation because of the retrospective nature of determining a correct decision. Prognostication tools would help to indicate an overall outcome but lack individual specificity. An impersonal theory, utilitarianism also detracts from what should be a patient-centred decision and in its unrefined forms, can justify the removal of liberties and rights under the whims of the masses. As discussed previously, attempts such as QALYs may appear utilitarian but may end up discriminating against vulnerable members of society [17,27]. Considered modern versions can fall victim to a silo fallacy in which resource has been limited through the area to which it has been allocated; that a resource is not available not because there is no more money, but rather that money has been used in another budget (silo) outside of health. People may decide that money should go to treatment A rather than B when evaluated within the limits of a fixed healthcare budget, but not decide that they may wish to offer treatment A and B at the expense of a nonhealthcare item (such as defence or nuclear deterrents).

Although both Pellegrino and Beauchamp and Childress [19] consider the concept of distributive justice within their frameworks, it has always been the most difficult to reconcile with the other aspects of their (very patent centred) models. The most comprehensive work done to reconcile deontological and utilitarian dogmas was by John Rawls. Rawls theory of justice [28] is governed by two main principles. The liberty principle states that everyone is entitled to an equal and extensive set of civil liberties. The difference principle states that when inequalities exist they must only exist when they provide the greatest opportunity to the people who are worst off in society. This would mean that everyone would be eligible for intensive care but may not be eligible for all aspects of care. Although on the surface it may seem like the fairest system, the problem with Rawls theory of justice is that it creates a 'black hole' with demand for ICU resources far outstripping supply.

CONCLUSION

From evaluating all of the above, we can conclude that there is no absolute ethical or moral framework in which to govern resource allocation. Gillon [29] summarized this eloquently when he relayed a conversation he had with his 8-year-old daughter on deciding who should get a lifesaving treatment:

> *'Well', she told me, sparing a minute or two from her television programme, 'you could give it to the*

youngest because she'll live the longer (welfare maximisation), or you could give it to the illest because she needs it the most (medical need), or you could give it to the kindest because kind people deserve to be treated nicely (merit). No you couldn't give it to the one you liked best (partiality), that wouldn't be fair.' Nor, she decided, would 'eenie, meenie, minee mo' (lottery) be fair because the one who needed it most, or the youngest, or the kindest might not get it. Nor did she (much to my surprise) think that the Queen should get it in preference to the poor man (social worth) – 'because she's got so much already and the poor man hasn't.' Of all the methods, her preferred one was to choose the illest because he needed it most – but, not surprisingly, she could not say why that was a better option than the others.

Regardless of the healthcare system governing overall financial control of the hospital, intensive care is a limited but valuable resource. It has an ever-expanding role in both acute outreach and long-term psychological follow-up. Over resourcing and under resourcing can cause harm to patients and practitioners, both physically and mentally. Although ICU provides care to the critically unwell, it can also offer dignity and palliation in death. Though we can become focused on survival, a good death can be a success and worthwhile use of resources in itself. With scarcity, it is important that we allocate resources in a fair and moral manner, aware of the various ethical principles. We must ask ourselves at each occasion which of these principles best applies to the situation we find ourselves in and not allow ourselves to be rigidly and dispassionately governed by one alone. Above all though, we must never allow our own prejudices or biases to factor into our decision-making and never make choices to benefit our own situation at the compromise of others.

Acknowledgements

None.

Financial support and sponsorship

P.C.M. is the past chair of the scientific ethics committee for the ESA.

Conflicts of interest

There are no conflicts of interest.

REFERENCES AND RECOMMENDED READING

Papers of particular interest, published within the annual period of review, have been highlighted as:

- ■ of special interest
- ■■ of outstanding interest

1. Marshall JC, Bosco L, Adhikari NK, *et al.* What is an intensive care unit? A report of the task force of the World Federation of Societies of Intensive and Critical Care Medicine Journal Critical Care 2017; 37:270–276.
2. Prin M, Wunsch H. International comparisons of intensive care: informing outcomes and improving standards. Curr Opin Crit Care 2012; 18:700–706.
3. Welsh Government. Together for Health – A Delivery Plan for the Critically Ill. A Delivery Plan up to 2016 for NHS. http://www.wales.nhs.uk/documents/delivery-plan-for-the-critically-ill.pdf. [Accessed 31 October 2018]
4. Tan SS. Microcosting study of ICU costs in three European Countries. Crit Care 2008; 12(Suppl 2):526.
5. Negrini D, Sheppard L, Mills GH, *et al.* International Programme for Resource Use in Critical Care (IPOC): a methodology and initial results of cost and provision in four European countries. Acta Anaesthesiology Scand 2006; 50:72–79.
6. Eurostat healthcare comparison. http://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do. [Accessed 31 October 2018]
7. Wunsch H, Angus DC, Harrison DA. Variation in critical care services across North America and Western Europe. Crit Care Med 2008; 36:2787–2793; e1-9.
8. Khan I, Ridley S. Intensive care: who benefits? JICS 2014; 15:297–303.

■ An excellent overview of patients which may present to ICU and how successful treatment may be.

9. Singer DE, Carr PL, Mulley AG, Thibault GE. Rationing intensive care: physician responses to a resource shortage. N Engl J Med 1983; 309:1155–1160.
10. Robert R, Coudroy R, Ragot S, *et al.* Influence of ICU-bed availability on ICU admission decisions. Ann Intensive Care 2015; 5:55.
11. Embriaco N, Papazian L, Kentish-Barnes N, *et al.* Burnout syndrome among critical care healthcare workers. Curr Opin Crit Care 2007; 13:482–488.
12. ESICM. Burnout syndrome in ICU https://www.esicm.org/article-review-burnout-syndrome-ejrc-may-2017/. [Accessed 31 October 2018]
13. Jonathan Glover. Causing death and saving lives Chapter 17 ISBN: 978-0-14-194973-4
14. Pageaux GP, Michel J, Coste V, *et al.* Alcoholic cirrhosis is a good indication for liver transplantation, even in cases of recidivism. Gut 1999; 45:421–426.
15. NICE definition of QALY. https://www.nice.org.uk/glossary?letter=q. [Accessed 31 October 2018]
16. Whitehead SJ, Ali S. Health outcomes in economic evaluation: the QALY and utilities. Br Med Bull 2010; 96:5–21.
17. Harris J. QALYfying the value of life. J Med Ethics 1987; 13:117–123.
18. Darren Shickle, Ruth Chadwick (Ed.) Resource Allocation Encyclopaedia of Applied Ethics Vol 3 p870
19. Beauchamp TL Childress JF. Principles of Biomedical Ethics 5th Edition ISBN: 0-19-514332-9
20. MacFadyen R, McConnell P. Ethics in practice: is it futile to talk about futility. Eur J Anaesthesiol 2016; 33:473–474.
21. Rawal G, Sanklap Y, Kumar RJ. Post ICU syndrome: an overview. Transl Int Med 2017; 5:90–92.
22. Foot P The problem of abortion and the doctrine of double effect Steinbook B (ed) Killing and Letting Die
23. Broad CD. Five Types of Ethical Theory. New York: Harcourt, Brace and Co; 1930.
24. Immanuel Kant, Groundwork of the metaphysics of morals 1785
25. Mill JS, On Liberty 1859
26. David Carr, Jan Steutel (eds.), Virtue Ethics and Moral Education, Routledge, 1999, p. 22
27. Singer P, McKie J, Kuhse H, Richardson J. Double jeopardy and the use of QALYs in healthcare allocation. J Med Ethics 1995; 21:144–150.
28. Jonathan Wolff on John Rawls: http://philosophybites.com/2010/02/jonathan-wolff-on-john-rawls-a-theory-of-justice.html. [Accessed 31 October 2018]
29. Raanan Gillon; Philosophical medical ethics page 95 ISBN: 0-471-91222-0f QALYs