



Maurizia Capuzzo  
Andrew Rhodes

## Should cost considerations be included in medical decisions? Not so sure...

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M. Capuzzo (✉)  
Section of Anaesthesia and Intensive Care, Department of  
Morphology, Surgery and Experimental Medicine, S. Anna  
Hospital, University of Ferrara, Via Aldo Moro 8, 44124 Cona,  
Ferrara, Italy  
e-mail: [cpm@unife.it](mailto:cpm@unife.it)  
Tel.: +39.0532.236306

M. Capuzzo  
Ethics Committee of the Province of Ferrara, c/o Azienda  
Ospedaliero-Universitaria S. Anna, Cona, Ferrara, Italy

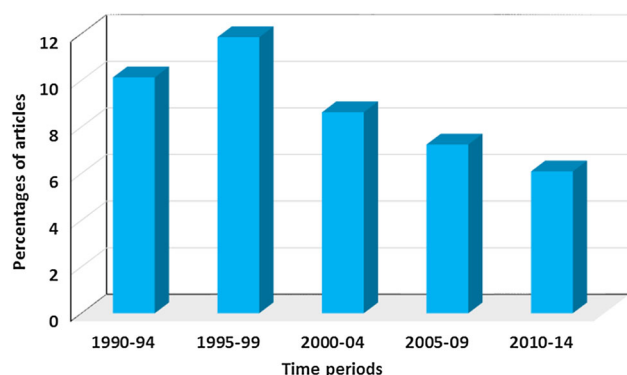
A. Rhodes  
Department of Critical Care, St George's University Hospitals NHS  
Foundation Trust, London, UK

Most western healthcare systems are experiencing significant increases in costs that can be attributed to a growing and ageing population that has ever more frequent chronic diseases, and advances in costly healthcare technologies and interventions. These driving factors for increasing costs resonate strongly for intensive care unit (ICU) physicians who see the need for their service grow steadily each year to cope with the rising demands placed upon them. The UK National Health Service (NHS) has required spending increases in real terms of 3.8 % per year throughout its history [1]. This growth is much higher than underlying increases in gross domestic product for the country, with the implication that the status quo is not sustainable in the longer term. This scenario is not unique to the UK and the trend can be seen in many similar western countries.

In the current austere economic climate, the direct consequence of increasing healthcare expenditure to ICU managers and clinicians is stark and obvious. Flat-lining (or reducing) budgets with a simultaneous increase in demand means choices need to be made and choosing based upon cost is difficult. Difficult because clinicians often have neither the training nor the knowledge to base such decisions upon, but also because it forces controversial ethical discussions to be had, sometimes with perverse consequences. However, to contain the costs of care, physicians need to know the costs and indications of each of the investigations/drugs that they order.

Unfortunately, physicians' awareness of the cost of drug prescriptions (or investigations) is generally very poor [2]. A systematic review of 24 articles, the latest being published in 2005, showed an accuracy in cost estimation of 29 % for the articles with the highest quality and of 38 % for those with lowest [2]. A recent multi-centre French study published in *Intensive Care Medicine* by Hernu et al. [3] compared the costs of drugs, blood products, imaging modalities and laboratory tests estimated by a wide sample of ICU physicians with the true costs. Correct estimation was defined as an estimate within 50 % of the true cost. Drug costs were underestimated and, among drugs, the costs of those exceeding 10 € were all underestimated [3]. We suspect that the same physicians who do not know the costs of the most expensive drugs, the ones that they underestimate the most, will carefully consider a difference of 50 % in prices when they buy a new car! Hernu et al. [3] report results similar to those found in other European countries [4, 5]. They also present two clinical situations (septic and haemorrhagic shock) showing how relevant the differences can be between estimated and true costs at ICU, regional, and national level.

The lack of any improvement in physicians' awareness of the costs of drugs over time [2, 3] agrees with the slow and continuous decrease in the percentage of articles in



**Fig. 1** Percentages of articles mentioned in PubMed (1990–2015) according to a search conducted using the following words: “intensive care unit or critical care unit” and “cost or economic” (numerator), and “intensive care unit or critical care unit” (denominator)

the ICU field considering economic aspects (Fig. 1). Both demonstrate the **lack of interest of physicians for the topic**. The main reason for this could be that medical education prioritizes medical aspects of care over and above the costs of diagnosis and therapy. This may explain why junior physicians have a lower level of knowledge than senior physicians [3], who may receive at times cost reports by hospital pharmacy, transfusion service, and imaging and laboratory services. Unfortunately, Hernu et al. [3] did not collect information about hospital reports received by the study participants.

Guidet and Beale [6] suggest that physicians should include cost considerations in medical decision-making and that they should be motivated by benefits for ICU in exchange for savings. The benefits mentioned are all expensive, so a very large amount of money should be saved to have a net cost reduction. Moreover, the suggested restriction of ordering of high cost tests and drugs to senior clinicians [6] may reduce some costs, but can be done only when these are not time-critical interventions. Health information systems could improve knowledge on value for money [7]. Nevertheless, a **computerized provider order entry system displaying fees** for inpatient medical prescriptions **showed only a small decrease in the** rate of ordered tests (0.32 per patient-day) [8].

Du and Kahn [9] emphasize that **cost-conscious clinical decision-making rarely saves money** (because **most of ICU costs are fixed**), while they can **potentially cause harm (with increased costs!)**. They suggest that the **way to reduce ICU costs is to prevent ICU admissions**. Nevertheless, in an ICU with a **fixed number of staffed beds**, **reducing the number of ICU admissions is a waste of resources** because the **fixed costs remain unchanged** and no low-risk patients benefit from the higher level of care of ICU. On the other hand, a reduction of ICU beds may be feasible only in countries where there are many [10], and/or should assume a rather high level of the care given by intermediate units and wards in the hospital.

The **key point is not cost reduction, but wise use of money through cost-effectiveness** [6, 9]. Avoiding ordering inappropriate and unnecessary investigations will reduce the amount of resources expended on any patient and could prevent harm occurring through the inappropriate use of the test or the information it delivers. To control healthcare spending clinical practice guidelines need to take into account cost-effectiveness when making recommendations. The recommendation assessing demand for routine chest X-rays in the ICU [6] is a good example of a cost-conscious guideline.

The Institute of Medicine (USA) defines **six domains of quality** in healthcare: **safe, effective, patient-centred, timely, efficient and equitable** [11]. Running a quality service that reduces unnecessary waste and maintains resource for the patients who most need it is a requirement of many of these domains. Finance and quality cannot be dissociated and when they are can lead to disastrous consequences. Clinicians are committed to guarantee quality at the lowest cost. All citizens who pay and benefit from health systems are economic decision-makers in the health sector through their electoral choices, and can address the politicians through these.

#### Compliance with ethical standards

**Conflicts of interest** The authors declare that they have no competing interests.

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Bin Du  
Jeremy M. Kahn

## Should cost considerations be included in medical decisions? No

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B. Du  
Medical ICU, Peking Union Medical College Hospital,  
1 Shuai Fu Yuan, Beijing 100730, People's Republic of China  
e-mail: dubin98@gmail.com

J. M. Kahn (✉)  
CRISMA Center, Department of Critical Care Medicine,  
University of Pittsburgh School of Medicine, Scaife Hall,  
Room 602-B, Pittsburgh, PA 15221, USA  
e-mail: kahnjm@upmc.edu  
Tel.: 1.412.596.4170

In a recent article in *Intensive Care Medicine*, Hernu and colleagues report the results of a survey in which they asked intensivists to estimate the costs of common intensive care unit (ICU) drugs and treatments, and then compared those estimates to actual costs [1]. Somewhat depressingly, they found that over two-thirds of estimates were wildly off the mark, with many estimates coming either well below or well above the actual values. On the basis of these results the authors call for efforts to better educate intensivists about the cost of critical care so that we can incorporate cost-control into daily practice. However, this recommendation begs a larger question: should cost considerations be included in medical decisions in the ICU?

In this commentary, part of an invited pro-con debate on the topic of cost containment, we argue “no”. We do not take this position out of opposition to cost-containment in critical care, which all would agree is important

given rising healthcare costs worldwide [2]. Instead, we make the case that the potential savings to be had through cost-conscious decision-making are very small, while the potential risks, both to patient outcomes and the patient-physician relationship, are large. Additionally, we argue that there are other, better ways to reduce ICU spending without emphasizing cost-cutting measures at the bedside.

### Small potential benefits

The idea that intensivists should practice cost-conscious decision-making assumes that doing so could save a meaningful amount of money. However, the opposite is true—the spending over which intensivists exert control is relatively small and is dwarfed by the total spending during an ICU stay. About 80 % of ICU costs are fixed, meaning that they are attributable to staffing and overheads rather than direct patient care, and are therefore unaffected by day-to-day medical decisions [3]. Only a small minority of costs are actually due to discretionary spending, most of which is not truly discretionary since many tests and treatments will always be necessary.

For example, in this study the entire discretionary spending for a hypothetical patient with sepsis was 2223 €. Comparatively, for the same hypothetical patient the total ICU costs would be around 10,000 € [4]. Viewed in this context, cutting costs by avoiding some optional blood tests (at around 9 € per test) or cutting back on chest X-rays (at 38 € per film) would have little impact.

### Significant potential for harm

Conversely, cost-conscious decision-making could lead to important harms. For example, cutting costs at the bedside could paradoxically increase the total cost of treatment by

increasing downstream costs. For example, in this study a dose of omeprazole for stress ulcer prophylaxis cost only 1 €. Yet the true costs of omeprazole are much different: if it prevents an episode of gastrointestinal bleeding the cost savings could be substantial, while if it causes an episode of *Clostridium difficile* colitis it would be extremely costly. The true costs of tests and treatments are more strongly related to their clinical impact rather than their upfront line item costs. Without accurate estimates of these downstream costs, which are hard to come by, efforts to cut costs are as likely to increase spending as they are decrease spending.

Additionally, cost-conscious decision-making neglects that fact that costs are only one part of the value equation. Cost-effectiveness, or the ratio of cost to quality, is the true number of interest [5]. Just because one drug is cheaper than another does not mean it is preferred. Rather, costs must be weighed against the value of the health produced. This complex calculus cannot be done at the bedside. Ultimately, cheap drugs like amphotericin B and low molecular weight heparin can be markedly less cost-effective than their more expensive alternatives [6, 7]. Decisions based purely on costs could therefore deprive patients of highly effective, and cost-effective, care.

Perhaps most importantly, incorporating cost considerations at the bedside might compromise physicians' duty to act in the best interest of the patient in front of us [8]. When we make decisions based purely on costs we put the needs of society before the needs of our patients, failing to live up to this requirement and altering the patient-physician relationship in potentially profound ways. As the intensivist and medical journalist Lora Goitein writes, "When patients are sick and helpless, do they really want their physicians to be influenced by costs?" [9].

### So we can order any test we want, whenever we want?

On the contrary, opposition to cost-conscious decision-making does not mean that physicians can provide any

care any time. Rather, efforts to reduce unnecessary testing and low value treatments, such as the Choosing Wisely campaign in the USA, are extremely important [10]. However, the justification for eliminating low value care is not that it is costly but that it is non-beneficial. We need not be cost-conscious decision-makers to be value-conscious decision-makers. Treatments that do not help patients should be avoided independent of costs.

### Moving forward: how to save money in the ICU

Although we argue that costs should not be factored into medical decision-making in the ICU, this does not mean that we should not strive toward healthcare cost reduction in other ways. One strategy is to devise systems of care that prevent unnecessary or unwanted ICU admissions—given the small amount of ICU care that is due to discretionary spending, the only real way to reduce ICU costs is to prevent ICU admissions in the first place [11]. Another strategy is to support programs that encourage society-wide decisions about healthcare utilization based on careful cost-effectiveness analyses, such as the UK's National Institute for Health and Clinical Excellence [12]. These programs limit use of treatments that are not cost-effective, taking cost decisions out of the hands of physicians and putting them where they belong: in the hands of society at large.

Together, these efforts will lead to lower healthcare spending while maintaining quality, without putting undo burden on physicians at the bedside. Intensive care is hard enough. Cost-conscious medical decision-making will make intensive care harder, will not save a meaningful amount of money, and will open the door to potential harms. We will achieve real ICU savings only by encouraging a society committed to system-based reforms.

**Compliance with ethical standards**

**Conflicts of interest** None.

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B. Guidet  
R. Beale

## Should cost considerations be included in medical decisions? Yes

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B. Guidet (✉)  
Service de Réanimation Médicale, Assistance Publique-Hôpitaux de Paris, Hôpital Saint-Antoine, 75012 Paris, France  
e-mail: [bertrand.guidet@sat.aphp.fr](mailto:bertrand.guidet@sat.aphp.fr)

B. Guidet  
Sorbonne Universités, UPMC Univ Paris 06, UMR\_S 1136, Institut Pierre Louis d'Epidémiologie et de Santé Publique, 75013 Paris, France

B. Guidet  
INSERM, UMR\_S 1136, Institut Pierre Louis d'Epidémiologie et de Santé Publique, 75013 Paris, France

R. Beale  
Division of Asthma, Allergy and Lung Biology, King's College, London SE1 5RT, UK

R. Beale  
Perioperative, Critical Care and Pain Services, Guy's and St Thomas' NHS Foundation Trust, London SE1 7EH, UK

The inexorable rise in healthcare costs as a proportion of national wealth is a trend that is increasingly recognized as being unsustainable [1]. Healthcare leaders have a critical role if this problem is to be addressed. At first glance, linking healthcare quality improvement to payment appears straightforward. Improve the care that one provides to one's patients and one is rewarded financially, but this strategy assumes that clinicians and administrators possess the necessary tools and knowledge, and that

the delivery system has the necessary levers. In fact, as stated by Cohen et al. [2], “although health-care workers and hospitals are publically committed to reducing inappropriate care, improving patient safety, achieving better health outcomes, and holding down costs, many are unsure how to do this effectively”. Moreover, this approach can underestimate healthcare system complexity and, in extreme circumstances, contribute to unintended and very harmful adverse outcomes through misaligned incentives, as occurred in the Mid Staffordshire Hospitals in the UK in the early 2000s [3].

Who might be interested in hospital spending reduction? Certainly governments and other healthcare payers, and hospital managers, but what about ICU physicians? The ICU director physicians might be motivated if cost reduction translates into rewards for the ICU: more nurses or research personnel, new equipment, funding for education, or other tangible benefits. Whether this can actually work depends crucially on the organizational model that exists within a hospital. In many institutions the effort required for cost containment does not translate into any reward for the unit and staff. The “pay for performance approach” and hospital incentives are either ineffective or do not benefit the ICU budget, or any gains are lost within the wider hospital finances. Moreover, hospital systems can be very cumbersome when it comes to displaying performance indicators. In this environment it is not surprising if ICU physicians are poorly motivated to consider cost in their decision-making. This is particularly true for young doctors who underestimate the true cost of expensive procedures or drugs [4].

One of us (RB) works in an alternative model where the multidisciplinary clinical leadership team of the ICU are directly responsible for the whole of the ICU budget, and where there is relatively sophisticated understanding of the difference between budget and cost, and transparency about income, activity, and expenditure. In such a system, where the clinical leadership is empowered to

take spending decisions, but is also directly accountable for both clinical and financial performance, there are powerful incentives for physicians to become much more involved in controlling costs by using clinical insight to improve quality and therefore reduce waste. Good financial performance then becomes an important performance and quality metric. This approach also encourages the development of clinically led management structures that are able to drive standardization through shared decision-making about (for instance) formulary content and drug policies, especially if aided by modern electronic record systems. This also encourages some clinicians to become more involved in clinical management, and to develop an understanding about the ICU's place within the broader hospital environment, and how it can contribute to overall financial success. Decisions about cost and value can then be taken across a whole patient pathway, rather than considering component budgets in an isolated and artificial fashion.

Medical resources are finite in all countries and inevitably generate tensions in our duty to respect autonomy, beneficence, and social justice, and rationing does occur [5]. From that perspective, reduction of spending by reducing unnecessary laboratory tests, imaging or by choosing cheaper drugs with equivalent efficacy must surely help. In most countries, public hospitals are funded through the diagnosis-related group (DRG) system [6], which does not consider individual procedures or specific drugs so there is often inadequate internal control. However, most ICU directors would like to have access to a detailed description of income and spending [7], suggesting that ICU leaders are willing to integrate cost constraints into daily practice when the system makes it practicable.

How does one reduce unnecessary or expensive prescriptions? For high-cost medications and specific antibiotics, in some countries a senior prescription is mandatory, with specific justification required before drug dispensing. For laboratory tests, electronic ordering systems can help in reducing redundant investigations and indicating true cost. A medico-economic approach with estimation of cost per year of saved life might also be educational [8]. The example of albumin is illustrative. The cost estimate for 100 mL of 20 % human albumin was 143 € while the true cost is 39 € in the study by Hernu et al. [4] so the cost-effectiveness assessment is largely overestimated [9]. This lack of knowledge of the true cost might explain the reluctance to use human albumin. An example of the opposite phenomenon was the estimation of the cost of recombinant activated factor VII at 1723 € while the true cost was 4574 €. This might explain prescription of that drug outside accepted guidelines. Moreover, to maximize return on effort, we should probably focus our attention on the 20 % of drugs accounting for 80 % of spending. Unfortunately, Hernu's paper does not provide information on the volume of prescription of the 46 selected prescriptions and so does not inform priorities for implementing corrective action.

Is it possible to reduce radiology examinations without impairing quality of care? There is no consensus for several situations [10]. Until 2011, US guidelines recommended routine daily chest radiographs (CXRs) for mechanically ventilated patients in ICUs. However, on the basis of a multicenter cluster-randomized two-period two-strategies cross-over design, we have shown that on-demand strategies induced a reduction of 32 % of CXR. This CXR reduction did not translate into reduction of numbers of CXRs leading to therapeutic or diagnostic

**Table 1** Recommendation of the American College of Radiology for CXRs in the ICU

Before 2011	Variant 2: Respiratory failure. Patient receiving mechanical ventilation.			
	Radiologic Procedure	Rating	Comments	RRL*
	X-ray chest portable daily	9		Min
	X-ray chest portable clinical indications only	9		Min
	Rating Scale: 1=Least appropriate, 9=Most appropriate			*Relative Radiation Level
Since 2011	Variant 2: Respiratory failure. Patient receiving mechanical ventilation.			
	Radiologic Procedure	Rating	Comments	RRL*
	X-ray chest portable clinical indications only	9		☼
	X-ray chest portable routine daily	3	Some subgroups may benefit from a daily chest radiograph.	☼
	Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Summary: "Routine daily CXR in the ICU is not indicated"



interventions. The two strategies were associated with similar mean durations of mechanical ventilation, ICU stay and ICU mortality rates [11]. Recommendations have changed (Table 1) and recent meta-analyses confirmed that unselective daily routine CXRs can likely be eliminated without increasing adverse outcomes in adult patients in ICU [12].

Uncontrolled and unnecessary spending jeopardizes our ability to apply recommendations with high levels of evidence. The concept of distributive justice applies in situations of cost constraint and physicians generally

understand this reasoning. Every effort should be made to spend the ICU budget wisely, and to make any limitations transparent, since this ensures the widest possible patient benefit and debate. A combination of bottom-up and top-down solutions is required, so that clinicians have the necessary information to aid decision-making when at the bedside, but are also engaged in designing organizational structures and driving standardization so that it becomes easy to do the “right” thing. Generally speaking, high-quality care, where everything is done correctly from the outset, is also more cost-effective care.

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