
ICU Volume 4 - Issue 2 - October 2004 - Cover Story

Economics in ICU: An Initiative to Standardise Cost Measurements

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Summary

This article describes a method of costing Intensive Care on an annual basis. This allows comparison between ICUs, which previously has not been possible.

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Since its inception Intensive Care has been an expensive ward within the hospital. There is a lack of evidence as to the efficacy of intensive care units (ICUs), although there is considerable evidence to support some of the treatments used in ICU. The lack of evidence relating to admission to an ICU is not surprising as it would be unethical to randomly allocate patients to receive or be withheld from Intensive Care, which proof of efficacy would require. Similarly, until recently the issue of costs of intensive care have not been addressed. For 40 years Intensive Care has developed without any real knowledge of the costs consumed by this service, except that they were increasing with new developments in clinical practice and society's increasing expectations.

Introduction

Approximately 10 years ago a publication reviewed our knowledge on the costs of Intensive Care [1] and showed that previous studies had collected costs in different ways and included different types of costs. For example the costs of nursing staff were included in some studies and not in others. During this period in the United Kingdom (UK) the provision of Intensive Care beds was not keeping pace with the demand. There was some reluctance at a national level to increase the numbers of intensive care beds, as it was felt to be too costly.

Consequently a working group of the Intensive Care Society of Great Britain was formed to develop a method of calculating the costs accurately. This group identified that there were two basic methods of collecting costs. The first method was to collect the costs that could be ascribed to an individual patient (the "bottom up" method). Whilst appealing, this was extremely complex and resource consuming and was therefore rejected in favour of the "top down" method, which collects the costs of the Intensive Care Unit (ICU) as a whole.

The Initiative

Over the next three years the working group identified six areas of costs, termed cost blocks:

1. Staff: Costs of all medical and paramedical staff employed to work within the ICU;

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2. Consumables: costs of drugs and disposables used within the ICU;
3. Clinical support services: costs of departments which provide services to the ICU, including physiotherapy, laboratory services and radiology;
4. Estates: cost assessments for building upkeep;
5. Non clinical support services : costs such as porter management and any other costs which could not be ascribed to the ICU;
6. Capital equipment.

The cost block method was tested in two pilot trials from which it became clear that the last three cost blocks were extremely difficult to collect and consistently accounted for only 15% of the total costs [2]. Following this a national system was introduced which collected the costs of the first three cost blocks. Costs for almost 100 ICUs within the UK have now been collected for four years, with constant and careful data validation. The results from the last available year (2001-2002) show that the average number of beds is 10 per ICU, with each unit accepting an average of 586 admissions. Although there is a wide range, the average bed occupancy is 77% which is very close to the Intensive Care Society's guidelines. The average cost is £2,327,000 per ICU and £297,773 per bed. University hospitals cost approximately 20% more per bed than other hospital ICUs.

If we examine the costs more closely, it is clear that staff are by far the most expensive cost block, representing 70% of the total costs, of which 50% of the costs are nursing staff. Consumables (drugs and disposables) account for only 22% of the total costs. The twenty most used drugs within the ICU account for 83% of the total drug costs and ICUs spend 24% of the drug budget on antibiotics and 14% on sedatives. Despite these results, it is interesting to consider that whilst the costs of drugs have been studied extensively, little work has been undertaken on the costs of staff. Although the reasons for this are unclear, one most likely reason is that staff have always been considered to be part of indirect costs or fixed costs. We consider this inaccurate as there are many ways of changing the number of staff or the skill mix. Consequently it seems inappropriate to ignore this important issue, which consumes such a large part of the budget. Sadly there does not appear to be a recognisable source of funding for this sort of research. Considering that the cost of ICU staff exceeds £200 million per year in the United Kingdom, it should definitely be a focus for research in the future.

One such drug that has been extensively studied is an activated protein C compound which reduces the mortality from severe sepsis by 6% [3]. Introduction of this high cost drug caused concern over increased costs in an already expensive Intensive Care service. The methodology required to test its value is called a cost effectiveness study which incorporates both the cost and the effect of the drug. The results are expressed in units such as life-years gained or quality of life years gained (QALYs). Shortly after the drug was launched, two such studies were reported [4, 5] and both concluded that, compared with other interventions, the drug was cost effective.

Testing the efficacy of a new drug or other intervention requires a high number of patients because intensive care patients are a disparate group, with as many as four organs failing and on many different treatment modalities. Consequently patients for the trials need to be recruited from more than one ICU and increasingly from more than one country, if the trial is to be concluded in a reasonable period of time. This introduces more problems because in cost effectiveness trials, accurate costs are an essential component, and for consistency, need to be measured in different ICUs in a consistent way.

These difficulties led to the conclusion that a methodology to collect ICU costs in a comparable manner was crucial, and to the concept of the International Programme for resource use in Critical care (IPOC). The process of developing this methodology comprised three separate stages. The first stage delivered a top down annual questionnaire that was acceptable in all countries. Based on the UK cost block system, the questionnaire was simplified and adapted for use internationally. This was achieved after a series of meetings with representatives of more than 12 countries and refined over a three year period. In some areas both costs and resources were collected. This is because the cost of nursing staff varies hugely between different countries. For example a nurse in Hungary is paid less than 20% per hour of the cost of a nurse in France. Thus direct cost comparisons are important, but may not be as valuable as comparing the number of nurses available for each ICU bed.



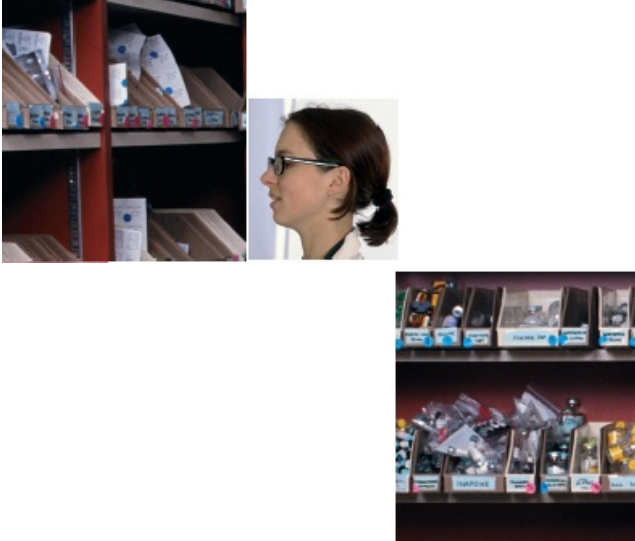
In the second stage, we established a method for converting all the currency to a common unit for comparison purposes. There are significant difficulties in achieving comparability between countries. Administrative systems and data sources differ, and data collection is designed to serve the specific needs of each health system rather than for comparative purposes.

International comparisons are only as good as the data on which they are based. However, standardisation of costing methods will certainly

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improve estimates. Comparative research also needs a common denominator and many methods (Exchange rates, Purchasing Power Parity (PPPs), The Penn World Table, The Big Mac Index) have been developed to convert values of different currencies into a common system. None have gained international acceptance and all present important conceptual and practical problems [6]. However, the most practical concept is that of Purchasing Power Parities which aggregates similar bundles of goods from different countries and uses these prices to calculate a conversion factor. For the purpose of the IPOC methodology, cost data will be converted to international dollars by means of Purchasing Power Parity exchange rates used for WHO's national health accounts estimates (available from the WHOCHOICE website). If data using PPPs rather than, for example, exchange rates are used, the relationship between the wealth of a country and its GDP disappears.

The first IPOC pilot trial studied data from four European countries (study in progress) from which it is clear that there are large differences between different countries in the cost of the ICU. Coupled with this are astonishing differences in ICU provision. For example, the UK and New Zealand provide approximately 4 ICU beds per 100,000 population, Italy 8, Switzerland 11 and the US and Germany between 20 and 25 [7]. The ICU mortality varies dramatically from 20% in Italy and Spain to less than 10% in Switzerland. Whilst it is tempting to ascribe this to differences in practice, it is more likely to be due to the effects of "rationing ICU beds." In countries where only the more severely ill patients are admitted to the ICU, mortality rates will logically be higher.



Conclusions

Vast differences exist between different ICUs in the same country and it is becoming increasingly clear that differences between different countries are even greater. It is imperative that we learn to understand these differences and try to construct the characteristics of the ideal ICU. One of the corner stones of this initiative must be comparative cost measurement, as the demand for ICU care is outstripping the rise in the Gross Domestic Products of most countries. The effect of this will inevitably produce some limitations on the supply.

If we are to endeavour to provide optimal care within the ICU environment and extend this care to as many patients as possible who require it, we must learn what the most efficient methods of providing that care are. This implies undertaking international comparison studies which include measures of ICU costs. Hopefully, the IPOC study will grow over the next few years and enhance our present knowledge.

Published on : Fri, 12 Feb 2010