



## Value: Operations Research and the new health care paradigm

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### ABSTRACT

Despite some differences in ethos and funding mechanisms, health care worldwide is remarkably similar in developed countries and increasingly the preoccupations in both developed and developing countries are converging. The prevailing paradigm in health care can usually be summed up in one word. In the 1970s and 1980s, the word was evidence; in the first decade of the 21st century, the word was quality. Paradigms shift sometimes because of intellectual leadership, but paradigms also change due to external pressures. The economic pressures affecting the global economy are putting value on the agenda of every health service except perhaps those countries whose economies are still expanding and who are starting from a very low base. For these countries, the paradigm is still that “more is better”. In all the countries spending 7% or more of GDP on health care, the paradigm is changing from quality to value. In this article I discuss the shifting paradigms of health care and highlight the key role that Operations Research could play in achieving good value health care.

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### 1. The end of the quality era

In high-income settings, over the last ten years there has been a welcome focus on the quality and safety of health care and, more recently, on its sustainability or carbon footprint. The challenge of designing and implementing safer, cheaper and greener processes for health care whilst delivering high quality services in terms of clinical outcomes and patient experience is one that has been met with partial success. Operations Research (OR) has had a clear role to play in this endeavour. The improvements to be made in patient experience and/or service efficiency through smarter scheduling of outpatient clinics and operating theatres, better location of key resources and a richer understanding of the impact of variability and randomness on the operation of complex systems are well documented, at least in the OR press. However, did OR achieve in the era of quality, safety and sustainability all that it could, and if not, why not? It is important for operations researchers to ask themselves these questions at this time because the paradigm is shifting and much greater challenges lie ahead for health care and for those conducting Operations Research for health care.

### 2. Doing the right things right

Welcome though the trends towards safer, high quality and sustainable health care have been, it is important to remember that doing the *wrong things* better, safer, cheaper and greener is not what our aim should be; we need to do the right things right.

What do we mean by the ‘right things’? Before the quality and safety paradigm emerged, we were in the evidence-based and effectiveness paradigm. Of course, paradigms do not replace one another but fold in on top of and embrace the previous paradigm. The nub of the evidence-based paradigms, the right thing to do, was the intervention for which there was strong evidence that it did more good than harm at affordable cost. This definition did well for both individuals and populations but the simplistic concern that evidence-based medicine was ‘cookbook medicine’ needed to be addressed.

It was addressed by the founders of the evidence-based medicine movement who emphasised the need to take into account the individual characteristics of the patient, and their values.

*‘Evidence-based medicine (EBM) requires the integration of the best research evidence with our clinical expertise and our patient’s unique values and circumstances.’ [1]*

This concept was elaborated to become known as personalised medicine in work led by Peter Rothwell.

*‘This book focuses on the two key questions that are most frequently asked by clinicians about applying the results of randomised controlled trials and systematic reviews to decisions about their individual patients. Is the evidence relevant to my clinical practice? How can I judge whether the probability of benefit from treatment in my current patient is likely to differ substantially from the average probability of benefit reported in the relevant trial or systematic review?’ [2]*

When considering populations, the concept of the right thing to do has to take into account cost-effectiveness and the early work of Operations Researchers that fed into the growing field of health

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**Box I.**

Characteristics of low value interventions in health care

Interventions can be considered low value if:

1. Clear evidence exists that they are ineffective or that they do more harm than good.
2. No evidence exists of effectiveness but they are not being delivered in the context of research that would allow evidence to judge effectiveness to be gathered.
3. Evidence of effectiveness exists but they are being offered to patients whose characteristics are different from those of the patients in the research studies which produced the evidence of effectiveness.
4. Patients are not given unbiased information in such a way that they can understand the probability of both benefit and harm of accepting the offer of treatment.
5. They use resources which would produce a better balance of benefit to harm if invested in some other service.

economics was key here. In the UK, the work of NICE (The National Institute of Health and Clinical Excellence) has greatly clarified and codified what we mean by the ‘right thing to do’ from the perspective of cost-effectiveness.

### 3. The value era

However, when resources are constrained, more important than the concept of cost-effectiveness is the concept of value, defined by Michael Porter as something which embraces efficiency and cost-effectiveness but which is a subjective judgement.

*‘Value in any field must be defined around the customer, not the supplier. Value must also be measured by outputs, not inputs. Hence it is patient health results that matter, not the volume of services delivered. But results are achieved at some cost. Therefore, the proper objective is the value of health care delivery, or the patient health outcomes relative to the total cost (inputs) of attaining those outcomes. Efficiency, then, is subsumed in the concept of value. So are other objectives like safety, which is one aspect of outcomes.’ [3]*

Unlike the term “evidence” or “effectiveness”, the term value has a very similar meaning in every language. The value of a service is assessed by comparing its outcomes with its costs but money is a much less important measure of the resources used than either carbon or opportunity cost, namely, what else could be done with the money, staff time, facilities and equipment. The definition of lower value has been the focus of considerable discussion within the UK NHS for the last two years, and a number of different types of lower value intervention have been identified (Box I).

Perhaps the most difficult type of low value intervention for clinicians to grasp, and they are the only ones who can grasp it, is that where greater value would be derived if resources were switched from one patient group to another. This can be addressed at two levels, either by comparing different systems of care within one programme budget (the allocation of resources to a group of patients defined by diagnosis or need) or by comparing programme budgets.

Because we have little evidence that the money allocated to different programmes is right, a study of the variation of programme budgets in different populations stimulates those who pay for or commission health care to think about opportunity costs, to ask what would happen if they switched resources from

one programme budget to another, because it cannot be assumed that they are at what the health economists call the ‘point of indifference’, the point of Pareto optimality at which it would make no difference to switch money from one programme to another.

Within a single programme budget, respiratory disease or musculoskeletal disease for example, the NHS Atlas has shown even greater variations than the variation in spend, and this raises issues for clinicians. For instance, the fact that an intervention such as knee replacement is effective does not necessarily mean that all knee replacements have the same value, or indeed that they are all of high value, taking into account what else could be done in the musculoskeletal programme budget with those resources. Within the Eyes and Vision Programme budget what would be the effect of reducing the number of cataract operations and switching those resources to diabetic retinopathy treatment or the treatment of macular degeneration?

The choice of which set of cost-effective interventions to invest in within programmes and the allocation of resources across programmes in order to achieve good value health care is a complex, multi-layered problem ripe for Operations Research. Crucially, while it is reasonable to judge the cost-effectiveness of an intervention from a national or international perspective, the decision of what services to invest in has to account for local or regional context, not just in terms of local demographics, patterns of disease and priorities but also the resources, facilities and workforce available. In taking this approach, there is a need to balance the questions of “What do we need in order to deliver good value health care?” and “How do we deliver good value health care with what we have got?”.

These issues have not been addressed before, principally because budgets have been growing, in every country, at four or five percent per year. That era is over. Now is the time for the value paradigm to become paramount [4] and for Operations Research to flourish.

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