

Ten Lessons for Micro Costing in Health Economics

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references.

Summary. I evaluate lesson learned in the context of performing micro costings in neo natal intensive care units in Ireland, and emergency department ultrasonography in the United States. While there are many pitfalls to the micro costing approach to health service evaluation, the benefits of increased precision outweigh the costs, when the potential pitfalls of such a study are taken into account before beginning.

Experience is simply the name we give our mistakes.
—Oscar Wilde

In micro costing, the name of the game is *precision*. Micro costing is a valuation method in health economics, where the unit of analysis is the individual or individual service in panel or time series. The method attempts to measure costs and benefits of service as accurately as possible, by including all fixed and variable costs of care at local prices, given the institutional structure within which care is being given. Micro costing also attempts to account for unobserved costs such as patient time foregone, opportunity costs of relatives' work time lost, etc., using shadow prices or interpolating costs by other means.

The main benefit of micro costing is a high level of precision with regard to a local service or an individual patient or patients, from which highly specific policy prescriptions can be drawn. The method also allows the valuation of new technologies and, in some cases, permits very accurate cross country comparisons (see [1, 2, and 3] for examples). Micro costing allows the researcher to say something quite certain about the cost of a service and the benefits accruing to a patient or group of patients from such a service.

The costs of employing micro costing as a valuation method are: expensive record keeping over time and increased use of database management, combined with an institutional specificity which often makes direct comparisons with other health services quite difficult, if not impossible [3]. Also, the data collection process itself is highly burdensome, and there may be medico-legal issues associated with the collection of the data, for example the reading and transcription of medical chart data may be subject to local confidentiality laws.

My experiences with micro costing come from looking at two areas of medicine: intensive neo-natal health care and ultrasonography in the emergency medicine setting ([4] and [5]). First, two general lesson I've learned in doing these studies.

1. Precision matters. Before beginning the study, try to encapsulate as many aspects of the area

under study as possible, and attempt to gain access to data on each aspect. For example, one might want to value carers' times of transit to and from hospital, which requires a mileage estimate, which is dependent on the size of their car plus their time foregone, which requires their wage rates. Or perhaps you wish to include the cost of transporting the patient from location A to location B. In each case one must aim for maximum precision.

One will not always get precise numbers, because the world is not a precise place, especially when it comes to health care, so lesson two is:

2. Where shortcuts have to be taken or estimates made, these must be carefully noted and justified.

These estimates, their magnitude likely error, and importance to the study more generally, are crucial in gauging the reliability of one's results, so be as thorough as possible in accounting them.

Onto the studies themselves and the lessons taken from them.

Neonatal health care is characterised by large amounts of uncertainty with regard to health outcomes for the patient, and is highly dependent on the time to normal gestation, as well as the facilities available at the care centre. Our study set out to calculate the cost of keeping an extremely low birth weight baby alive from her birth at 24 weeks and five days to her discharge 212 days later. Remarkably, the patient left the hospital in good health, and is now meeting all of her developmental checks.

We compiled a file of every test, procedure, and administered drug given, as well as accounting for fixed costs like physician time and cost per bed day. We included depreciation measures for the unit itself, and calculated the parents' time foregone also. We assigned unit costs to each variable and calculated fixed, variable, and total cost in the standard way. We found the cost of care to be €665,219, with a fixed weekly cost of €26,608 and a weekly variable cost of €5,167 saved for each additional week of gestation.

The lessons I took from this and subsequent exercises were:

3. It is extremely difficult to account for every cost one can think of. Fairly soon, diminishing returns set in to this process. We tracked 179 variables over 212 days, and all for one patient. Discretion is advised when choosing which variables to account for.

4. The legal implications and the structure of the health service and department one is studying all have subtle and non-subtle effects on the quality of one's data. Cooperation with medical personnel is essential to gain good measures of cost.

5. In practice, micro costing becomes a self-limiting exercise where one trades off increased precision for availability of data and time allowed for the study, so defining your remit ahead of time is a must in performing these costings.

6. Without appropriate medical and administrative support, the micro costing will go nowhere. Make sure to collaborate with interested health care professionals in the gathering of this data, or much precision will be lost. As mentioned above, the name of the game is precision.

We have also conducted research costing the effects of widening inclusion criteria for bronchiolitis treatments [4], and our findings, in this case moving chart by chart through thousands of patients over a seven year period. This study emphasizes the burden of attempting a proper large scale micro costing without electronic record keeping, so lesson number seven is

7. If possible, prospectively include a time stamped electronic data gathering device for the study.

I say 'prospectively' because one almost never gets the precise data one needs in digital format retrospectively. New studies should attempt to collect data electronically and prospectively.

I gained an appreciation of the institutional differences which make cross country comparisons so difficult while costing the opportunity costs of performing ultrasounds in an emergency department versus a radiology department (see [7]). We used the Medicare reimbursement system to cost each (emergency department ultrasound vs radiology ultrasound), and while the costing methodology was clear, the measure of cost we derived is not comparable with other health services like the UK's National Health Service and the Irish Health Service.

8. Institutional details matter more procedure than one thinks. Be extremely careful to take account of them when attempting comparisons.

9. Micro costing allows one to make interesting extrapolations, which may enhance debates on areas of health care provision. This is a powerful rhetorical device.

We performed an extrapolation of locally derived costs to national costs of using radiological ultrasounds in one paper, and found the opportunity cost to be tens of millions of dollars, for one subset of one procedure. Even if one disagrees with the number itself, agreement over the magnitude of the estimate can create debate and spur change in the provision health services.

Finally, my tenth lesson is

10. The benefits of micro costing outweigh the costs, especially when the data can be gathered in a digital way, because the precision one gains via this methods allows a more targeted policy prescription and/or a better service evaluation.

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