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Commentary

You can't put a value on that... Or can you? Economic evaluation in simulation-based medical education

Simulation-based medical education (SBME) is often resource intensive, yet rigorous evaluation of the costs and benefits of simulation programmes or activities is rare. Lin et al raise the important issue of economic evaluation of SBME and offer guidance on its implementation by exploring challenges and opportunities.[1] We offer support for discipline in economic evaluation of simulation while urging caution in what and how we ascribe *value* as integral to the economic evaluation process. Consider how you might place a value on SBME in the following scenarios:

Lena has just started surgical training and is excited to use her new screen-based simulator at home to develop her decision-making skills. She's so pleased she'll be able to practice whenever and as often as she likes.

About 10 years ago, Louis received feedback from a simulated patient about his seemingly inauthentic empathy. This has stayed with him ever since, so he actively works on his interpersonal communication, trying always to be "present" with patients.

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It's complicated!

Simulation educators mostly work in resource constrained environments, encouraging reflection on the *value* of their work. Of course, we're not the only ones to find this challenging. The concept of *value* has long been an area of interest to social scientists, economists and philosophers. A shared challenge is that *value* is contextual, varying within individuals and over time.

Maloney and Haines (2016) describe economic evaluation as a comparison of value, paraphrasing – what is being obtained, what is given up to get it, and how it compares to the next best alternative.[2] Lin et al state that economic evaluation “must examine both costs and consequences of at least two alternatives.”[1] It sounds reasonable, so why don't we do this? Economic evaluation of educational programmes are rarely reported in research literature. Key reasons may include their absence from professional entry medical and health care programmes (unless surfacing in public health focused subjects) and from graduate programmes in health professions education. Economic evaluation is not a specified competency of clinical educators or in professional frameworks for simulation practitioners.[3] Reporting guidelines developed by Cheng et al (2016) for health care simulation research do not include documenting costs [admittedly, only a tiny part of economic evaluation].[4] Finally, the skills required for economic evaluation are highly specialised. Maloney and Haines (2016) also explain that economic evaluations are framed quantitatively while much health professions educational research is qualitative. They offer additional reasons for limited uptake or dissemination of economic evaluation: diverse stakeholder involvement complicates evaluation; frameworks for economic evaluation in education are nascent; and, that simulation centre staff may feel threatened if economic evaluations are unfavorable.[2]

While these explanations may be understandable, competing demands for health care resources, including education, mean that they may no longer be justifiable. A challenge for medical education is to achieve high-value and low-cost educational processes (Maloney & Haines, 2016).[2] Transparency of cost and value, alongside measures of effectiveness, are

required for true accountability. Informed choices about educational processes can only be achieved by determining the actual cost alongside value for each pedagogy, and through considering all stakeholders. This is especially important for publicly funded universities and other higher education and training organisations. That there is a global consensus on social accountability of medical schools,[5] with professional association awards for its attainment,[6] identifying and measuring cost and value is likely to take an increasingly important role despite its complexity.

Cost and value analyses have the potential to determine the feasibility and sustainability of SBME. There is a noted lack of methodological rigour and consistency in such analyses in health professions education.[7-10] With the *need* [why] for economic evaluation in SBME established, we join Lin et al in focusing on the detail [how] and consider the value of SBME as our departure point for discussion.

1. We tend to measure what we can rather than what we should.

Examples of tightly defined skills and outcome measures in SBME are reported and frequently cited as a rationale for the benefits of SBME, often with attendant economic evaluation. This process is much harder with the combination of elements that contribute to the wider arc of safe, timely, accessible and efficient patient care. With greater emphasis on economic evaluation using methods that privilege quantitative measures, the risk is that these outcomes are pursued at the expense of others less quantifiable.

2. How do we put a value on some of the outcomes?

Time-based targets and infection rates are easy to measure, but it's difficult to put a dollar value on better communication with patients and colleagues, improved team cultures or a calmer resuscitation room. Experienced clinicians know these have value, despite the lack of 'price tag'. The downstream, longitudinal outcomes are even harder to measure – passing knowledge and skills onto others, and skills acquired in one context being applied in many others.

A simulation-based programme to improve intubation quality and success rate in a neonatal ICU is established. Faculty time and equipment costs are considerable, and no change is noted in the (already very low) intubation failure rate, and hence no 'benefit'

is measured. However, the trainees leave the unit to practice safe intubation at a range of other institutions, and in turn teach good intubation skills to other staff at those institutions, confirming the 'value' of the simulation-based programme.

3. What is the cost (or value) of unintended outcomes?

Learning in complex environments has surfaced as an area of investigation for health professions educators. For example, Fenwick and Dahlgren (2015) thoughtfully precis complexity theory, acknowledging its many traditions and diverse perspectives.[11] They wrote, "most would agree that complexity theory examines how living phenomena (learning, for example) emerge in a web of relations that form among things, including both social and material things, such as bodies, instruments, desires, politics, settings and protocols. Such things do not come together in a linear cause-effect trajectory, as so many aspects of our curricula seem to presume, nor are they ordered together through top-down authority. Instead, they become combined through myriads of non-linear interactions that continually present novel possibilities and exercise multiple causal influences on what emerges." Hence an SBME intervention(s), or its cessation, may have multiple outcomes, and not all are expected.

Jack is a senior physician engaged part-time (0.5 FTE) by the simulation programme, and the cost of his involvement is estimated as \$120,000 (half a physician salary).

However, when he is asked to leave the simulation programme due to unsustainable costs, he finds he can no longer maintain a balance in his work life and leaves clinical practice entirely.

Finally, we consider whose responsibility it is to do this work?

Although many stakeholders would benefit from economic evaluation work in SBME (programme directors, policy makers, curriculum designers), few of those involved with SBME will have the necessary skills. As the propose, economic evaluation is probably best a collaborative effort between educators and health economists, and, we would propose, an economic evaluation to be undertaken to justify this effort. A worst case scenario - would the economic evaluation cost more than its value to quality medical education?

We've touched on why not, why, how, what and who relative to economic evaluation. It is an exciting time to be working in SBME and thinking critically about our practice. Economic evaluation is an important direction with key challenges of identifying and enumerating the value in e-valuation.

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Pullouts:

1. We offer support for discipline in economic evaluation of simulation-based medical education (SBME) while urging caution in what and how we ascribe *value*.
2. Informed choices about educational processes can only be achieved by determining the actual cost alongside value for each pedagogy, and through considering all stakeholders.
3. With emphasis on economic evaluation using methods that privilege quantitative measures, the risk is that these outcomes are pursued at the expense of others less quantifiable.
4. Time-based targets and infection rates are easy to measure, but it's difficult to put a dollar value on better communication with patients and colleagues, improved team cultures or a calmer resuscitation room.
5. Economic evaluation is an exciting direction with key challenges in identifying and enumerating the *valu* in e-valu-ation.