Measuring outcomes in quality improvement education: success is in the eye of the beholder

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Over the past decade, quality improvement (QI) has gone from a secret skill expected only among trained staff in the quality office to a core competency for all health professionals.[1–3] This expectation has generated new curricula which have introduced QI to a new generation of learners, but has also created some challenges for health professions educators.[4–7] Identifying knowledgeable teachers, defining core content and securing time in the curriculum represent recurring issues, while emerging discussions now centre on how best to evaluate educational efforts in QI. It is here that we find ourselves at an impasse.

In this issue of BMJ Quality and Safety, O'Leary and colleagues present their 5-year experience delivering an institutionally sponsored, team-based QI training programme which included attending physicians, residents and fellows and frontline interprofessional team members. They report on its impact on both learner outcomes and project outcomes.[8] Their programme demonstrated improvements in participant knowledge, with 172 individuals comprising 32 teams reporting that they had applied their new knowledge and skills to improve clinical quality (87%) and implement QI interventions (62%) at 6 months. At 18 months, nearly half reported leading other QI projects (48%) and many had provided QI mentorship to others (41%). In addition to measuring these learner-focused outcomes, the authors summarise QI project outcomes at programme completion, 6 and 18 months. At one or more of these time points, 20 out of 32 projects (63%) had positive results, defined as showing improvement in one or more project measures without any measure declining in performance. This comprehensive programme evaluation, which includes both learner and project outcomes, provides a unique opportunity to reflect on the goals of QI education for the field of health professions education.

Before reflecting on the goals of QI education specifically, it is important to review the yardstick by which best practices in medical education are measured. The Kirkpatrick Model, developed by Donald Kirkpatrick in 1955, remains a widely accepted framework for the evaluation of educational interventions.[9] The model describes educational outcomes at four levels: (1) learner participation and reactions, (2) learner knowledge, skills and attitudes, (3) behavioural change by the learner and (4) change in organisational practice and, in healthcare, any demonstration of benefit to patients. For decades, educators and educational researchers have approached their work by 'beginning with the end in mind' and aspired to achieve the highest level of impact from their efforts. Not surprisingly, the effectiveness of QI curricula has also been measured by the Kirkpatrick model, and three systematic reviews published on this subject use the Kirkpatrick levels as an organising framework.[4 6 7] A tension emerges in our field because what is best for promoting improvements in learner outcomes may not be the same as what is best for promoting project outcomes. Some fundamental tradeoffs inevitably arise.

MAKING THE CASE FOR FOCUSING ON QI PROJECT OUTCOMES

For most medical education interventions, it is extremely challenging, if not impossible, to impact patient level outcomes (Kirkpatrick Level 4) since these outcomes reflect many factors other than what a new learner knows or does (table 1). Even demonstrating behaviour

Table 1 Comparing Kirkpatrick outcomes of a traditional medical education curriculum with a QI curriculum

	Medical education curriculum example	QI curriculum example
Curriculum goal	Teach residents an evidence-based approach to sepsis management	Teach residents QI methodology by engaging them in a project to improve sepsis processes of care and outcomes
Curriculum methods	Case-based examples and discussion	Didactic lecture to teach key QI principles and tools; residents conduct an experiential QI project guided by a facilitator
Kirkpatrick level outcomes		
Level 1: Participation and Reaction	Postcurriculum learner satisfaction survey	Postcurriculum learner satisfaction survey
Level 2: Knowledge, Skills and Attitudes	OSCE where residents demonstrate their ability to apply the sepsis bundle to appropriately manage a patient with severe sepsis (knowledge and skills)	A QI knowledge test such as QIKAT,[26] where residents demonstrate their ability to develop an aim statement, define measures and propose system-level changes (knowledge) or a multidomain assessment tool for QI projects to evaluate a QI project presentation to assess a resident's ability to use QI tools and methodology in practice[27]
Level 3: Behaviour Change	Workplace-based assessment approaches that include direct observation and case review to assess a resident's ability to manage sepsis appropriately in the clinical setting[28]	Assessment approaches such as a portfolio of personal or systems-level QI activities over a defined time period or the frequency with which residents access a dashboard of practice-based quality metrics
Level 4: Change in Organisational Practice and/or Patient Outcomes	The ICU reports regularly on sepsis-related mortality, but unlikely that outcomes will improve given the many factors affecting sepsis survival beyond knowledge of providers	QI project aims to increase the uptake of a sepsis bundle with evidence supporting improved patient outcomes. Therefore, by design, a successful project may lower sepsis-related mortality

ICU, intensive care unit; OSCE, objective structured clinical examination; QI, quality improvement.

change for clinicians (Kirkpatrick Level 3) through unobtrusive direct observation presents inherent logistical challenges. On the other hand, an experiential QI curriculum which involves a group of healthcare professionals represents a learning activity designed to change some aspect of the healthcare system, usually with the explicit goal of improving patient care outcomes. When this occurs, suddenly, Level 4 outcomes become attainable to the educator!

In addition to the theoretical advantage of potentially achieving Level 4 educational outcomes, focusing on project outcomes as a marker of curricular success offers practical advantages. First and foremost, healthcare institutions and schools for health professions are both more likely to fund educational programming when the training is mutually beneficial and aligned. By highlighting changes in clinical outcomes as the educational outcome of interest, the educator speaks in a language that the healthcare administrator understands. Focusing on the QI project's potential for positive change from the start can also mitigate learner frustration and/or disengagement with QI.[10] Learners are more likely to engage when they are innately interested in or care about the specific quality problem being proposed. Finally, careful consideration of the factors that increase the likelihood of QI project success (eg, stakeholder support, availability of data) helps inform curricular content and teaching methods.

MAKING THE CASE FOR FOCUSING ON LEARNER OUTCOMES

Despite the advantages stated above, focusing exclusively on project outcomes as the barometer for a successful educational QI intervention can create problems. Imagine for a moment that you are an educator leading a team of students tackling inappropriate medication use in the geriatric patient population as their QI learning experience. Fast-forward 9 months and imagine your reaction and the students' reactions, if the QI intervention falls flat. The students may become frustrated and the teacher dejected.

The reality is that many QI projects fail. This is not dissimilar to research. Many clinical trials show no benefit for the study treatment. We do not regard these 'negative results' as failures on the part of the investigators. The chance that an improvement project will fail to deliver significant benefit is at least as high as that in clinical research—probably higher because we know less about how to do QI effectively than we do about clinical research. Moreover, with clinical trials, investigators have only to worry about the evaluation, not developing the study treatment itself. In QI, we have to do both—develop an effective intervention and evaluate it well. The first part in particular presents numerous challenges, especially the first time. Thus, the fact that a QI project outcome is negative should not reflect poorly on the teacher, the students or the curriculum. Whether due to lack of stakeholder consensus, long wait times for an information technology change request or simply change fatigue by the individuals who are the target of the improvement, the contextual unknowns in the messy world of QI can never guarantee success.

Another problem with focusing on project outcomes is that many experiential QI curricula for students are forced to occur in an artificially shortened time

frame due to competing curricula and rigid clinical schedules structured around rotations. In QI work, where learning is iterative and based on small tests of change, a successful project might require 10 Plan-Do-Study-Act (PDSA) cycles over 6–12 months.[11] For their first project, however, learners might complete only one or two PDSA cycles, increasing the likelihood that they will not see positive results before the end of their educational experience. In the relatively young field of QI education where many faculty are still struggling with how to teach the topic, or teach it better, we risk educator attrition and lack of adoption of promising curricular innovations if we focus too heavily on project outcomes.

But perhaps the greatest threat of a singular focus on project outcomes is that it reinforces and relegates QI to 'project work'—that is, something that is started and finished; completed or not completed; successful or not successful. This narrow perspective diverts attention away from our higher goal as health professions educators, namely an appreciation of and commitment to continuous improvement activities in daily practice among our learners. A focus on the long game will necessitate a shift in our approach to the organisation of QI education and how we define success.

LINKING QI EDUCATION TO LONG-TERM IMPROVEMENTS IN OUTCOMES THROUGH BEHAVIOUR CHANGE

It has been proposed that educators must establish logical links between educational interventions and patient outcomes.[12] O'Leary and colleagues in their article nicely demonstrate the causal link between QI education and the acquisition of QI knowledge and skills,[8] and this link has been demonstrated previously by others.[4 7] The next logical link is to determine if these newly acquired knowledge, skills and attitudes result in behavioural change for the learner. If so, the behavioural changes could impact the desired downstream outcomes of improved care *beyond* the curriculum and *beyond* the QI project outcome. Thus, assessing behaviour change as an outcome of QI education, while difficult, represents a critical target for educators.

What are the implications of a shift towards behaviour change as the main focus for QI education? We believe that there are several important considerations for educators.

1. QI education must adopt strategies known to influence behaviour change. But how does one organise QI education to engender ongoing participation in QI efforts? Much of the literature on behaviour change for healthcare professionals focuses on a concrete behaviour change linked to a specific clinical process or problem. For example, physicians are more likely to adopt guideline-concordant prescribing behaviours with audit and feedback interventions or default options embedded within the electronic health record.[13 14] Not surprisingly, many of these interventions bear little relevance to encouraging health professionals to change their behaviours as they relate to QI. However, other interventions, such as educational outreach, may have greater relevance and could inform future QI educational efforts.[15]
2. We need to develop strategies to capture downstream QI behaviour change. Some simple ones are easy to imagine. Do learners take on a new improvement project after completing the curriculum?[16] In this instance, we commend O'Leary and colleagues, as their study is one of a minority of studies that actually reports on future involvement in QI work (48% of their graduates reported taking on a new QI project within 18 months of completing the programme).[8] However, other less tangible behaviours are difficult to measure, yet critically important to capture. For example, do learners review reports of their clinical practice outcomes? Do they take the time to actively reflect on them and design a small PDSA cycle in their daily work? Do they recognise how an isolated problem could be an opportunity for broader QI and take steps towards leading a change? Tracking these types of behaviours might involve the use of assessment methods such as multisource feedback or portfolios[17 18] or require novel approaches that borrow from other fields, such as the social and behavioural sciences.[19]
3. The clinical learning environment plays a critical role in shaping future behaviours of health professions learners.[20] Recent studies demonstrate that future physician practices and even the clinical outcomes experienced by their patients are strongly influenced by the quality outcomes achieved in the training environments where they learn.[21 22] Given this relationship, one could argue that the clinical learning environment can also be manipulated to encourage desired behaviours. Such an approach would require QI education to move beyond the 'QI project' and instead embed learners in clinical environments where QI is core business and where continuous improvement cannot be disentangled from daily work.[23] Learning would still be 'experiential', but the real value would lie in experiencing an optimal practice environment, as opposed to conducting an improvement project in any practice environment.
4. QI education research must be oriented to establish those links that connect QI knowledge and skills acquisition with behaviour change and QI behaviour change with longer-term improvements in clinical outcomes.[12] Another study from this same issue of *BMJ Quality and Safety* provides an instructive example of the type of research that can begin to address such linkages. McNicholas and colleagues report their 3-year experience refining their QI programme to optimise the authentic use of PDSA. The authors used an established framework to measure authentic use of PDSA (ie, the desired QI behaviour change).[24] They made iterative changes to their curriculum, and through qualitative document analysis and key informant interviews, explored how these curricular changes improved PDSA knowledge and skills and led to improved use of PDSA over time. The evaluative

approach taken, which sought to draw linkages between programme design, immediate learning outcomes and downstream behaviour change, represents the type of QI education research that is needed.

As health professions educators, we are all striving to embed the value of continuous improvement in personal performance and system performance in our learners. As stated over a decade ago by Batalden and Davidoff, the goal in QI education is for everyone who works in healthcare to recognise that they have two jobs when they come to work every day: doing the work and improving it.[25] As QI educators aspire to shift the professional identify of our learners towards one that values continuous QI, we believe that a greater focus on behaviour change as an outcome of QI education is urgently needed.

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