Commentary: The learning curve

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Bridgewater and colleagues have studied the surgical results of surgeons in each of their first four years of independent practice and report that there is a learning curve.[1] To explain the concept of a learning curve a surgeon writing in the *New Yorker* magazine chose for his example the insertion of a central venous line into the subclavian vein by the subclavicular route.[2] His chosen example was a good one. Pneumothorax and major bleeding are common in inexperienced hands and the technique merits special precautions, but in Gawande's experience it is taught, resident to resident, at the bedside, on a "see one, do one" basis. He uses it to explain the inescapable fact—that there is risk in being a patient. Our duty in providing health care is to get that risk to a minimum while at the same time learning ourselves and training others. As the then President of the Royal College of Surgeons of England, Sir Barry Jackson, told the Bristol inquiry, patients should somehow be spared the "learning curve." This has apparently been achieved in cardiac surgical training.[3] Patients operated on by trainees have a lower mortality than those operated on by consultants, an effect which does not go away when it is corrected for the variable of inherent risk in the patient[4] but analysis of outcome by operating surgeon is not on an "intention to treat" basis. If complications, difficulties, or adverse events emerge in the progress of a training operation, typically the trainer takes over the operation and responsibility for the outcome. It is thus a moot point whether this averts the hazard associated with learning or merely hides it. But what happens when there is no senior surgeon standing opposite to take over?

The objective of Bridgewater and colleagues was to study the learning curve associated with embarking on independent practice in coronary artery surgery.[1] They found a significant effect over the first four years. When surgery was performed by a surgeon in the first year the survival rate was 97.8% and rose year by year to 98.8%, better than the overall rate of 98.0%. "What does that mean for me?" a patient might ask. In terms that might be grasped more readily the answer would be "For 500 people having this operation, surgeons in their first two years might have one extra death or, put in simple numbers, that is 11 rather than 10." "Well that's good to know!" To be perfectly honest with the patient, we should also go on to say that surgeons in their third or fourth year of independent practice would have three fewer deaths in 500 (seven rather than 10). Face validity then fails.

There are reasons for caution in interpreting this finding. The outcome data are corrected for inherent risk in the patients by the EuroSCORE method, but a meta-analysis that included the data from north west England showed that the method consistently overpredicts risk in the low risk cases by up to 2% and probably underestimates risk to a much greater degree in high risk cases.[5] Not only is this a shortcoming in that the primary purpose of risk adjustment is to compensate surgeons for taking on high risk cases but conclusions about learning curves based on fractions of 1% in mortality figures are insecure. None the less, the study is interesting and well done, but is it generalisable to other surgeons' concept of a learning curve? Coronary surgery is performed at institutional volume rates of 500-1000 a year in UK hospitals. It is far from Gawande's "do one, see one" illustration of a learning curve and in stark contrast to the small institutional volumes for oesophageal and pancreatic cancer surgery, where half of the patients are operated on in hospitals with annual numbers in single figures and death rates of 10-20%.[6] These outcomes of cancer surgery now merit closer attention rather than the continued picking over of extraordinarily good cardiac figures. Onora O'Neill, in her Reith lectures, warned of dangers. "Perhaps the culture of accountability that we are relentlessly building for ourselves actually damages trust rather than supporting it. Plants don't flourish when we pull them up too often to check how their roots are growing."[7]

Competing interests: None declared.

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Endpiece

Teaching medicine, 1816

The greatest art of the teacher of medicine is to protect his students in time from the dangerous delusion that merely speculative statements are certain, to teach them to doubt everything that is not confirmed by mature experience, and to acquaint them with the gaps, with the known limits of the art, as well as with the best sources from which they can obtain truth in the future also.

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