Accounting for outcomes: Lies, damned lies, and statistics

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Starnes¹ presents an enlightening discussion of the benefits and risks of disclosing personal performance data. In our opinion, the critical ethical issue is reliability of the mortality and morbidity rates of an individual surgeon. Starnes¹ describes confounding issues in making comparisons with either database outcomes or journal reports of outcomes, such as misleading mortality rates owing to poor accounting for comorbidities and other risk factors, unreliable risk adjustment models, and choice of conflicting databases.

FIGURE 1. Mortality rates for esophageal cancer surgery. These confidence intervals display the overlap between mortality rates after esophageal cancer surgery, comparing results from the Society of Thoracic Surgeons General Thoracic Surgery Database (STS DB), St Ciffret surgeons, and hypothetical doctor Andrea Smith.

Confidence intervals convey the uncertainties of comparing outcome data.

Central Message

Surgeons are under no obligation to provide patients with raw numbers of operations done or how their results compare with those of others. To do so would misinform and mislead patients.

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Even if these confounding issues did not exist, the problem of the statistical meaning of a surgeon's outcomes remains. Starnes observes that surgeons must "know what our true outcomes are,"¹ but how do we know what are our true outcomes and how they compare with others? A *P* value provided by statistical tests has little meaning, especially if the numerator is small.² A more accurate understanding of a surgeon's true mortality rate can be gained from comparison of confidence intervals (CIs) of the surgeon's results compared with CIs derived from database or other reported outcomes. The mortality rate calculated from a surgeon's results is merely an estimate of the true value, which actually lies somewhere within the CI. CIs provide an understanding of the precision around the estimated rate; the 95% CI indicates that we can be 95% sure that the true rate lies within that range.

This idea can be illustrated with data from the Society of Thoracic Surgeons (STS) General Thoracic Surgery Database. Between July 2011 and June 2014, the mortality rate for esophageal cancer surgery was 3.1% (170 hospital deaths in the collected series of 5494 patients). Imagine that a hypothetical doctor, Andrea Smith, has performed 25 such operations and 2 patients died, a mortality rate of 8%, more than 2.5 times higher than the STS database rate. Across town, surgeons at St Ciffret have performed 700 operations with 11 deaths (1.6%, half the STS rate). Should Smith inform her patient of these rates and offer referral to St Ciffret where the mortality rate is 5 times lower than hers?

We know with 95% certainty that the STS surgeons' true mortality rate for esophageal cancer operations is between 2.65 and 3.59 (95% CI) (see [Figure 1](#)). Smith's true rate is 0.98 to 26.03, whereas St Cifferet's rate is 0.79 to 2.79. St Cifferet's results are probably better than the STS rate, but Smith's true rate substantially overlaps both of the others, so we do not know with a reasonable degree of certainty whether her mortality rate is better or worse than the other 2 measures.

Smith is under no obligation to provide her patient with esophageal cancer with raw numbers of operations done

or how her results compare with those of others, in our view. To do so would misinform and mislead the patient. Smith's recital of the operative risks to her patient should include mortality risk, but only in general terms that can be readily understood by this particular patient.

References

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