EDITORIAL

Is volume a proxy for quality?

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WHEN we go to a restaurant, we make our choice depending on what kind of experience and what kind of quality we are looking for. We can usually get better wines and ingredients, and cooking with higher skill and attention to detail, if we are prepared to pay more. We usually do not select the restaurant that has the largest volume for the highest quality, although a certain volume may allow cost-effective meals; for example, hamburgers to feed the hungry are not costly in large-volume enterprises. But somehow we have come to believe that volume equals quality in medicine.

A number of epidemiological studies of US hospitals have shown lower mortality and morbidity in high-volume medical centers. Subsequently, hospital volume has become associated with better outcomes and is frequently thought of as an independent predictor of quality of care. Dr. Lindekleiv et al. have analyzed 1-year mortality after treatment of intracranial aneurysms in Scandinavian centers to corroborate the correlation of hospital volume and outcome.¹ These investigators did not find this correlation: there were large differences in mortality after treatment across hospitals and between countries, and the findings did not consistently show lower long-term mortality rates in higher-volume centers.

The findings are seemingly shocking and surprising. Scandinavia is a small region with a homogenous culture and health care system, and large differences would primarily not have been expected. Yet, we have previously detected large differences in survival after glioma treatment within Sweden, in spite of a legal requirement of equal health care for all.² Likewise, Lindekleiv et al. found large differences in survival after treatment of aneurysms in Scandinavia. It is not possible to know whether the differences reflect a different quality of treatment or were influenced by selection of patients. There could be a selection bias from different policies of treating patients with high Hunt and Hess grades. Lindekleiv et al. have not assessed mortality rates for untreated patients and have not assessed patients who were not transferred to neurosurgical departments. The study of Lindekleiv et al. is, however,

a well-performed epidemiological study with very important findings.

The comprehensive population data and the reporting of 1-year mortality instead of discharge data are strengths of the study, but it suffers from the same inherent weaknesses as all retrospective epidemiological studies. It utilizes induction as a scientific method, and the scientific value reflects the extent to which a story can be constructed to fit the observations; however, this story, the theory, is, never challenged by testing the hypotheses that would follow from the theory. The idea of postulating and testing causality is remote from epidemiology and evidence-based medicine.^{3,4} Regardless, the findings of aneurysm outcomes provide a *prima facie* falsification of the idea that large hospital volume guarantees better outcomes. Possible causal relations need to be considered for critical analysis of the opposite claims regarding volume and quality.

Actually, the claim that volume in itself would provide good quality is mindless. A certain volume can be a prerequisite to develop expertise in certain pathologies, and high expertise can attract a large volume of patients, but the idea that volume would create quality “out of the blue” is unlikely. The essential factors for high-quality aneurysm treatment would be experienced and skilled vascular and endovascular surgeons, knowledgeable anesthesiologists, good nursing, accessible hospital beds, and sufficient resources. Individual knowledge, attention, and continuity in patient care are important. A study on volume and outcomes should consider to which extent these factors can be optimized and to which extent they are linked to the volumes. Most studies that claim a correlation between volume and quality originate from the US.¹ The US large-volume centers are tertiary referral centers that exist in a competitive market with institutional and individual inducements to attract patients by good reputation and quality. In contrast, the volumes of Scandinavian centers have been decided by geographical location and political decisions. It is difficult for patients to choose treatment at a hospital outside of the catchment area. There is a shortage

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of neurosurgical beds in several Scandinavian countries; hence additional patients become a logistical problem, and individual caregivers benefit little from attracting patients. Sociologically, a high level of trust among the population leads to confidence in the local caregivers. Thus, the volume-quality curves in Scandinavia and the US reflect completely different health care systems, and different relationships between quality and volume. It is probable that the highest-quality centers in either system would have access to the best clinical expertise and resources as necessary conditions for their better aneurysm outcomes.

The search for simple proxy markers of quality is fueled by the need to administer health care. A complex medical framework is not practical for bureaucratic measures. It is important that the medical profession remains aware of stultifying simplification and retains a critical mind. When we want to improve quality we need to measure quality and not anything else. I certainly agree with Lindekleiv et al. that a prospective comprehensive quality registry, which is run by neurosurgical professionals, is a good vaccine to simplified surrogate markers and misleading policymaking.

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Response

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We appreciate the valuable comments and summary of

our work by Professor Tiit Mathiesen. Data on care quality and patient safety are important for doctors, policymakers, and patients. The lack of such data results in the use of surrogate markers, such as hospital volume, to substitute for clinical end points. However, hospital volume is not in itself a reliable predictor of outcome after surgery.

Quantifying health care quality is a complex process and requires a collection of comprehensive, high-quality data in registries. Such quality registries allow patients to decide where to receive treatment, policymakers to monitor health care, and doctors to identify and share the best practices. Unless data from such registries become available, important decisions on how patient care is delivered will continue to be based on potentially invalid and misleading surrogate markers.

Furthermore, if we truly believe that patients should decide where to receive treatment, we need to bridge the information asymmetry that currently exists between doctors and patients. There is an increasing body of evidence suggesting that public release of hospital performance data stimulates change at the hospital level and improves the quality of care.³ Such a release of information to the public has been pioneered by cardiothoracic surgeons in the United Kingdom, who publish data on outcome after cardiac surgery down to the individual surgeon level.² Publication of cardiac surgery mortality data in the United Kingdom has been shown to be associated with decreased risk-adjusted mortality without evidence that fewer high-risk patients are undergoing surgery.¹

We believe prospective registries for evaluating patient outcomes after treatment for intracranial aneurysms are highly warranted, and that mortality data for individual hospitals and surgeons after intracranial aneurysm treatment should be provided to the public.

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