Telestroke, QALYs, and current health care policy: The Heisenberg uncertainty principle
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The Heisenberg uncertainty principle

Cost-effectiveness analysis first appeared in the medical literature more than 40 years ago. Cost-effectiveness analysis is a systematic method of comparing 2 or more interventions (preventive, diagnostic, or treatment strategies) by measuring their costs and health outcomes. The consequences of each intervention are measured in the same common units related to the clinical objective of the interventions (life-years gained).

One measure of the value of one intervention compared with another is the incremental cost-effectiveness ratio, which is the change in costs divided by the change in health benefit when 2 strategies are compared. Health benefit can be measured in many ways, including quality-adjusted life-years (QALYs) gained. A QALY is calculated by assessing how long a patient lives and how persons assess quality of life during their lifetime. QALYs allow cost-effectiveness of interventions for different diseases and conditions to be assessed and compared. The commonly considered threshold for cost-effectiveness of an intervention is $50,000/QALY. This threshold was introduced in 1982, has no established justification, and would be more than $120,000 per QALY if adjusted in current dollars.1

Treatment of ischemic stroke with IV recombinant tissue plasminogen activator (IV rtPA) has been demonstrated to be a cost-effective treatment that improves stroke outcomes and results in a reduction in the long-term cost of care.2 Telestroke, the application of telemedicine to stroke, provides the ability to bring a stroke expert to the bedside at any hour of the day or night.3 As such, its cost may be measured against that of providing an in-house 24/7 neurologist/stroke expert.

Telestroke has demonstrated several benefits in the treatment of ischemic stroke. These include being more accurate than telephone consultation for acute decision-making for IV rtPA,4 increasing the administration of IV rtPA, and comparable or better functional health outcomes, including reduced mortality and dependency, compared with conventional care.5 It also addresses the shortage of stroke specialists in both rural and urban hospital settings with increased support/backup and reduced incidence of protocol violations. Telestroke levels the playing field for equal access to acute stroke care in different environments. The American Heart Association Policy Statement recommends telestroke deployment whenever local or on-site acute stroke expertise or resources are insufficient to provide around-the-clock coverage for a health care facility.6

IS TELESTROKE COST-EFFECTIVE? A previously published cost-effectiveness analysis of telestroke from Denmark7 is not generally applicable to the United States because it assumed the presence of an in-hospital neurologist. In this issue of Neurology®, Nelson et al.8 critically evaluate the cost-effectiveness of a telestroke network in the United States. Nelson et al. chose to utilize QALYs as the appropriate metric. They found that when a lifetime perspective is taken, the incremental cost of telestroke was less than $2,500/QALY. The costs of a telestroke network were found to be sensitive to the equipment cost, size of network served, training time, and transfer costs. These results argue strongly for policy change. Telestroke, as live off-site care, has now been shown to be cost-effective, thus encouraging reimbursement for these services to the same extent as live on-site care.

WHAT IS THE INCREMENTAL COST OF TELESTROKE, AND IS THIS TYPE OF COST-EFFECTIVENESS ANALYSIS APPROPRIATE TO EVALUATE THIS CHANGE IN CARE DELIVERY? Telestroke is less a “treatment” or “treatment strategy” than a method of delivering established, improved acute stroke care. The incremental costs of equipment, training time, and infrastructure are either difficult to measure or a moving target. Equip-
ment for videoconferencing, which is the principal technology in telestroke, continues to rapidly decrease in price, while increasing in availability, options, and reliability. Videoconferencing is no longer a curiosity; it is now available on social networks such as Facebook (http://www.facebook.com/pages/Videoconferencing/112453248766576; accessed July 13, 2011) and Google Plus (http://video-conference.co/technological-details-of-google-video-conferencing-feature/; accessed July 13, 2011). Training time and cost will be decreased by the general familiarity and comfort with such systems.

The development of a telestroke network provides benefits beyond the technology which are difficult to measure. The implementation of stroke teams, continuous medical education for personnel of participating network hospitals, collaboration with stroke neurologists, and telemedicine support provide an impetus for better organization and standardization of stroke care.

Despite its use outside the United States, such as the British National Health Service, cost-effectiveness analysis has had little impact here in regard to clinical practice, insurance coverage, and policy decisions. The Center for Medicare Services has avoided use of cost-effectiveness in coverage decisions. Since cost per QALY is not utilized in any systematic way in the United States, there is no clear consensus on the appropriate value of a QALY to guide coverage decisions and policies. The Federal Government recently enacted the Patient Protection and Affordable Care Act.9 This act created a Patient-Centered Outcomes Research Institute (PCORI) to conduct comparative-effectiveness research but prohibited this institute from developing or using cost-per-QALY thresholds. Legislators in the United States specifically avoided what critics have labeled “big-government” intrusion into health care. The legislation specifies that the PCORI “shall not develop or employ a dollars per quality-adjusted life-year (or similar measure that discounts the value of a life because of an individual’s disability) as a threshold to establish what type of health care is cost-effective or recommended.”10

As we face the fact that costs will need to be controlled in our medical system, efforts will hopefully focus on the value, in addition to the costs, of health care interventions. Telestroke appears to answer all of these questions positively, for the health care system, stroke neurologists, and most importantly, our patients.

**AUTHOR CONTRIBUTIONS**

Dr. Rudolph: drafting/revising the manuscript, analysis or interpretation of data. Dr. Levine: drafting/revising the manuscript, study concept or design, analysis or interpretation of data, study supervision.

**DISCLOSURE**

Dr. Rudolph serves on the speakers’ bureau for Boehringer Ingelheim. Dr. Levine serves as an Associate Editor for MEDLINK; previously served on an acute stroke advisory board; receives publishing royalties for Transient Ischemic Attacks (Blackwell Futura, 2004); receives research support from the NIH (NHLBI, NINDS); and has reviewed medicolegal cases concerning acute stroke.

**REFERENCES**


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