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Evaluating Outcomes and Costs in Perioperative Care

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Over the past three decades, international comparisons of medical spending and population health outcomes have become a commonplace feature of U.S. health policy debates. Most often, these contrasts are cited as prime evidence of shortcomings in the cost-effectiveness of health care in the U.S., where medical expenditures dramatically exceed those seen in other developed nations despite comparable or worse performance on commonly-cited public health metrics such as life expectancy or infant mortality.

Rarely acknowledged in such discussions is the observation that international comparisons also offer suggestive evidence that the U.S. health care system may already be ahead of the pack in at least one important area: keeping patients safe during and after major surgical procedures. At present, reliable information on outcomes after surgery for U.S. patients relative to those treated in peer nations remains sparse; yet available research suggests that patients hospitalized for major surgical procedures in the U.S. may face a dramatically lower risk of death than do those treated in the United Kingdom.¹

Two recent studies—one from the U.K., and one from an international consortium of European investigators—shed new light on reasons why surgical patients may do better in the U.S., with important implications for current policy efforts to control health care costs. The first of these, published in 2011 by the U.K. National Confidential Enquiry into Patient Outcome and Death (NCEPOD), examined data on surgical care and outcomes for 18,565 patients undergoing major operations at National Health Service hospitals over seven days in March 2010. Among all patients, the risk of 30-day mortality was 1.6%. Yet when the investigators grouped patients according to pre-operative risk factors, they observed that postoperative deaths were concentrated in a high-risk subgroup of patients—20% of the full sample—whose rate of mortality was nearly four times that seen in the overall cohort. Most concerning to the investigators was their finding of a systemic underuse of critical care services for these high-risk patients; despite being able to prospectively identify those individuals for whom the likelihood of adverse outcomes was greatest, the authors noted that half of all high-risk patients who died never went to an intensive care unit.²

A second study, published in 2012 by a consortium of researchers across 28 European countries, confirmed several findings from the NCEPOD report. Examining data on 46,539 patients undergoing major operations in 498 hospitals over 7 days in April 2011, the authors

observed an inpatient mortality rate of 4%, substantially higher than that reported by the NCEPOD investigators. Yet the authors also described a pattern of underuse of postoperative critical care services similar to that seen in the U.K. study. Out of all patients in the cohort, only 5% underwent a planned admission to an intensive care unit after surgery. And among those patients who died during hospitalization, three out of four were never treated in an intensive care unit.³

To the study's authors, these findings indicated "a systematic failure in the process of allocation of critical care resources" in Europe.³ Yet the utilization of critical care services after surgery also represents one important way in which the U.S. health care system differs from those of its peer nations. Among patients who died during hospitalizations after major surgeries in the U.K. in 2001, approximately 8.5% were admitted to an intensive care unit at some point in their hospital stay. Over the same period in the U.S., this figure was seven times greater, at 61%.⁴ Importantly, the degree to which ICU care might yield survival benefits for any group of surgical patients remains unknown, precluding definitive conclusions as to the "right" level of ICU utilization for a particular health system. Nonetheless, these findings raise questions as to whether the U.S. health care system might excel relative to its peers in matching high-risk patients to postoperative care settings capable of rapidly identifying and treating serious postoperative complications.

On one level, such data might be taken to offer encouragement regarding the quality of care that surgical patients in the U.S. now receive, and to align with recent observations that surgical mortality among Medicare beneficiaries is lowest in settings where treatment intensity is higher.⁵ Yet these findings may also point to inconvenient truths that hold potential to complicate efforts to limit the financial costs of medical care in the U.S. Simply put, critical care services are expensive. In 2005, the average cost of one day spent in a U.S. intensive care unit exceeded \$3,500. That year, ICU services alone accounted for 4% of all U.S. health care expenditures, or nearly 1% of the gross domestic product.⁶ Beyond these financial considerations, overly aggressive use of intensive care services may also carry distinct human costs, particularly if not aligned with individuals' goals of care at the end of life.

These observations should not be taken to imply that the vast resources that American society has invested in perioperative care have been wasted. Instead, what this investment has bought is a system of caring for patients during and after surgery that, despite still having substantial room for improvement, is already seen by other nations as a model. Pointing to differences in surgical mortality rates between the U.S. and the U.K., the NCEPOD investigators commented that the "disturbing...explanation for the apparently poor results we achieve [in the U.K.]" is that "people die because we do not give them the level of care they are entitled to expect."² Such comments emphasize the extent to which U.S. health care providers, policy makers, and the public may have reason to be proud of a health care system that, despite its flaws, has come to be regarded by others as a leader in its ability to provide safe care to surgical patients. Yet they also imply that in efforts to achieve good surgical outcomes, there really may be no free lunch: tradeoffs between cost and quality are inherent to the contemporary delivery of intra-operative and post-operative care.

For U.S. health policy makers, defining and balancing these tradeoffs represents a crucial, unsolved challenge for health care reform. The necessary task of limiting spending on health care services for surgical patients while also preserving health care quality creates a need for a fuller understanding of the distinct ways in which preoperative, intraoperative, and postoperative care services currently contribute to surgical outcomes. Further, such policy considerations also highlight a need for high-quality research on how key postoperative outcomes, such as mortality, failure-to-rescue, and functional recovery, differ between the

U.S. and its peer nations; how variations in the setting and quality of postoperative care inform such differences; and what financial and social costs come are incurred by differing approaches to ICU utilization for high-risk surgical patients. Ultimately, by allowing a more forthright evaluation of both the positive and negative aspects of how surgical care is now delivered in the U.S., such research can help to define the potential gains and losses that systemic changes may bring. In so doing, these efforts represent a key step towards advancing a fundamental goal of health reform itself, as succinctly expressed by the NCEPOD investigators: to provide people with “the level of care they are entitled to expect.”

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References

1. Bennett-Guerrero E, Hyam JA, Shaefi S, et al. Comparison of P-POSSUM risk-adjusted mortality rates after surgery between patients in the USA and the UK. *Br J Surg*. 2003; 90:1593–8. [PubMed: 14648741]
2. Findlay, G.; Goodwin, A.; Protopapa, K.; Smith, N.; Mason, M. *Knowing the Risk: A Review of the Perioperative Care of Surgical Patients*. London: National Confidential Enquiry into Patient Outcome and Death; 2011.
3. Pearse RM, Moreno RP, Bauer P, et al. Mortality after surgery in Europe: a 7 day cohort study. *Lancet*. 2012; 380:1059–65. [PubMed: 22998715]
4. Wunsch H, Linde-Zwirble WT, Harrison DA, Barnato AE, Rowan KM, Angus DC. Use of intensive care services during terminal hospitalizations in England and the United States. *Am J Respir Crit Care Med*. 2009; 180:875–80. [PubMed: 19713448]
5. Silber JH, Kaestner R, Even-Shoshan O, Wang Y, Bressler LJ. Aggressive treatment style and surgical outcomes. *Health Serv Res*. 2010; 45:1872–92. [PubMed: 20880043]
6. Halpern NA, Pastores SM. Critical care medicine in the United States 2000–2005: an analysis of bed numbers, occupancy rates, payer mix, and costs. *Crit Care Med*. 2010; 38:65–71. [PubMed: 19730257]