Cognitive Outcome of Surgery: Is There No Place Like Home?

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Once upon a time, being “in a home” was a pejorative. Now, thanks largely to the government’s uncontrolled experiment in health care reform, everyone seems to want in. At least physicians do. “Homes” are popping up everywhere. One type currently under construction and described by several articles in this month’s issue of Anesthesia & Analgesia is the “perioperative surgical home.”

The perioperative surgical home concept is simple enough: better care, better service, and lower costs through standardization of the continuum of surgical care. It’s a nice idea but there are at least 2 problems. One is that the ability of such health care redesign to achieve these goals is unproven. The second is that most of the cost variability in surgery comes from what happens after hospital discharge and some of the clinical conditions driving these costs are poorly understood and not readily modifiable.

Cognitive outcome is a case in point. Delirium and postoperative cognitive dysfunction (POCD) are extremely common in geriatric surgical patients, a group the government pays for because they are enrolled in Medicare. After elective major joint replacement or other types of major surgery, about 5% to 15% of elders develop delirium and 25% to 40% and 12% to 15% develop, respectively, early or late POCD. This may not seem like much but it far exceeds the rate of other complications we spend a lot of time talking about and managing. Delirium and POCD are associated with prolonged length of stay, discharge to a place other than home (i.e., the physical place they actually live, not a virtual administrative home), and higher 1-year mortality (e.g., persistent delirium is associated with a 2.9-fold increase [95% confidence interval, 1.9–4.4] in mortality at 1 year). In addition, delirium is associated with an accelerated trajectory of cognitive decline to dementia and patients with POCD are more likely to leave the workforce. As such, delirium and POCD are important, expensive morbidities, just the kind of problems that theoretically could be improved by standardizing management in a perioperative surgical home.

An article from Denmark by Krenk et al., in this issue of the Journal puts that theory to the test. Elderly patients having elective total hip or knee replacement surgery (N = 225; median age 68 years) were enrolled prospectively in a fast-track approach to elective total hip or knee surgery where everything from preoperative assessment to anesthesia (mostly spinal, with or without propofol sedation) to the surgical procedure to postoperative analgesia, mobilization, and discharge was standardized. Neuropsychological testing was conducted preoperatively and 1 to 2 weeks (“early”) and 3 months (“late”) after surgery using a validated 4-test battery.

The results are interesting: surgery took only about 1 hour (anesthesia twice that long), patients were discharged within 2 to 3 days, and all went home. Early and late POCD occurred in about 9% and 8% of the patients and, although wide confidence intervals prevent firm conclusions, early POCD likely did not predict late POCD. There was no concurrent control for non–fast-track surgery but this incidence of early POCD is 2- to 5-fold lower than reported in previous larger studies where many, but not all, of the patients had major elective joint replacement procedures. One interpretation of this result is that the fast-track approach, standardization of everything from soup to nuts, reduces the risk of early POCD, which is consistent with previous work by the same group that showed no patient developed delirium under fast-track conditions. This supports the standardization premise of the perioperative surgical home, right?

Not necessarily! As the authors explain, it is difficult to compare and generalize about how care pathways might influence the incidence of POCD because details of perioperative care have not typically been reported, and this study did not have controls for the effect of hospitalization or a nonstandardized approach. In addition, POCD is not a clinical diagnosis; it is defined, as in Krenk et al., by performance on a neuropsychological test battery. Such test batteries are not uniform among studies and are too long and specialized for routine clinical use. In fact, some argue that POCD does not exist but rather reflects typical age-related cognitive decline or some undetected preexisting condition such as mild cognitive impairment. Since preoperative cognitive screening is not routine, as we have

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argued it should be, preexisting cognitive deficits could go unnoticed, only to be identified later and labeled as POCD when “grandpa isn’t what he used to be.” Along these lines, Krenk et al. screened patients with the Mini Mental State Examination preoperatively. Although this tool is well suited for identifying dementia, it is relatively insensitive for detection of milder forms of cognitive impairment.

The situation is not much better for delirium. Although delirium is a clinical diagnosis with an International Classification of Diseases, Ninth Revision code and well-validated bedside tools for identifying it, postoperative delirium is missed in up to 80% of cases. The previous study of Krenk et al. may fall into this category; zero patients reportedly developed delirium after fast-track major joint replacement surgery but delirium was diagnosed by clinical interaction, not structured screening. Paradoxically, a perioperative surgical home diligently screening for delirium would miss fewer cases but appear to underperform a center using less rigorous clinical interaction-based screening methods. Length of stay is not a good proxy for cognitive recovery either because many hospitalized geriatric patients are delirious when they arrive at a post-acute care facility and sometimes remain so for months.

Finally, despite many theories and abundant research, no one knows what causes delirium or POCD. This obviously hampers the ability to do something about it, regardless of whether one is in a process-oriented home or not. In fact, with the best prevention programs, it is estimated that only 40% or fewer cases of delirium are avoidable and such interventions have little or no effect on the severity or duration of delirium.

It was sobering realities like these that dissuaded Medicare from treating delirium as a “no pay” condition, as it originally intended a few years back. The message is that while perioperative cognitive morbidity is common and has major functional, economic, and mortality implications, it often stays under the clinical radar, lasts well beyond hospital discharge, and is not yet readily prevented or treated. Thus, there is little to suggest that being in a home (the administrative one) will make cognitive outcome better or cheaper.

Still, hospitals are inhospitable. All things being equal, rapid discharge therefore seems intuitively advantageous (e.g., less exposure to drug errors, infection, etc.). But length of stay can be misleading as either a quality/outcome or economic metric, especially for elderly persons. One reason is that some adverse outcomes (e.g., cognitive morbidity) extend beyond the typically short time window of the hospital. Another is that the “post-acute” care (e.g., skilled nursing facility, rehabilitation, or home health care) after discharge is an important driver of costs.

To understand the relationship, researchers have investigated heterogeneity in U.S. Medicare payments among regions, since heterogeneity indicates drivers of cost without value. Medicare’s 30-day payments for hip replacement were 39% greater for the upper quintile than the lower quintile of hospitals, after adjusting for local differences in prices, patient comorbidity, etc. Post-acute care accounted for 85% of this difference. Likewise, Medicare’s 90th to 10th percentiles of annual payments per member differed 32% among tertiary hospital referral regions, after adjusting for differences in patient health status. Of this variation, 73% was due to post-acute care. The mean annual (covariate adjusted) differences in payments for post-acute care between Iowa City, IA and Boston, MA; Dallas, TX; and Miami, FL were $1010, $2300, and $4800, respectively.

One can see the potential impact of this by comparing Krenk et al. with other studies. In Krenk et al., length of stay was 2 to 3 days and everyone went home, although whether they needed in-home services is not clear. Not so in the United States. Although length of stay in the United States for these procedures, at 3.5 days without fast-tracking in 2008 and, based on a report by Garson et al., this in issue of the Journal, 3 days with the surgical home model, were similar to that of Denmark, differences in post-acute care were huge. In Denmark, everyone who had total joint replacement surgery under fast-track conditions went home, whereas in the United States, even when patients were managed in a surgical home, approximately 50% were discharged to a skilled nursing facility and another 25% received home health care. Differences in length of stay of this magnitude are relatively unimportant because the marginal cost of the last 0.5 to 1.0 days in the hospital after joint arthroplasty is small, but the costs of differences in post-acute care add up quickly. It is currently unknown what accounts for this difference because although delirium prolongs length of stay and increases the chance of being discharged to a skilled nursing facility, many other factors come into play (e.g., local custom and bed vacancy elsewhere) including, in this comparison, potential cultural and infrastructure differences between the 2 nations. The availability of family to care for elders after hospital discharge may even differ because of national laws and policies on work hours, vacation, and family leave time. Although seemingly objective, length of stay data alone are deceptive. The 3-day hospital stay with discharge to home in Denmark has very different implications for the patient and the economy than the same length of stay followed by discharge to a skilled nursing facility in the United States because the bulk of the cost variation comes from what happens after discharge. Therefore, for a surgical home to have a meaningful economic impact, it must manage, measure, and take responsibility for what happens after the patient leaves the hospital.

As Dorothy famously says in the Wizard of Oz, “there is no place like home.” We agree, to a point. Ideally, a patient having surgery to restore function or resolve pain would return to his or her own home more functional and better off than before entering the hospital. On the other hand, it remains to be seen whether patients, physicians, and institutions will yearn for administrative surgical homes. The perioperative surgical home might decrease hospitalization expense but is unlikely to materially improve outcomes or significantly reduce overall costs unless it thinks about and takes responsibility for postdischarge, long-term results. That is a challenge when, like delirium and POCD, adverse outcomes are costly, poorly understood, and not amenable to a quick fix. Moreover, thinking about long-term outcomes is unnatural for a profession traditionally focused on today.
This suggests soul searching is in order before we buy. Are we truly willing, ready, and able to deal with the challenges of surgical home ownership and will the investment pay off in the long run for our profession and our patients?

RECUSE NOTE
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