Editorial View

Measuring and reducing perioperative anesthetic-related mortality: View from East Asia

Florence Nightingale, the social reformer and founder of modern nursing, pioneered the application of medical statistics to improve patient outcomes in hospitals. She took measurements in British field hospitals during the Crimean War and used calculations to determine that more soldiers died from infectious diseases exacerbated by unsanitary conditions than died from battle injuries. Nightingale invented compelling data visualization formats and used them to convince Queen Victoria to order systematic improvements in military and later civilian hospital management standards and practices. Ultimately, Nightingale’s work resulted in modernizing hospital policies and procedures that continue to save lives and improve healthcare outcomes globally to the present day, helping to transform the hospital, in the minds of many around the world, into a place to go for healing rather than a place to go to die.1,2

But how reliably, in this present day, do we capture medical and public health information? How effectively is it leveraged to motivate advances in policy development and outcomes? We concern ourselves with such questions particularly with respect to perioperative anesthesia, especially in East Asia, and precisely on quantifying adverse events, risk management, and outcome improvement. We embark by reviewing some fundamentals on the impact of surgery and anesthesia on public health around the world.

While opinion on the relative value of surgery has remained controversial from its inception, a developing consensus tends it as impacting vitally and positively on global public health.3 Experts are asserting that operative interventions are a boon as a factor influencing disability-adjusted life years and in terms of more fundamental constructs such as economic and psychological well-being; further, they assert that this value has been underestimated.4,5 However, it is also recognized that 5 billion people around the world lack access to necessary surgical and anesthesia care, with the problem most seriously affecting the peoples of impoverished regions in South Asia and sub-Saharan Africa.6 Where surgical and anesthesia services are accessible, researchers have engaged in efforts to quantify their safety and efficacy, but firm conclusions remain elusive at best.

A recent major review and meta-analysis on anesthetic-related mortality and anesthetic-related cardiac arrest found a significant reduction over time in anesthetic-related perioperative cardiac arrest in more highly developed countries, when comparing data from the pre-1990s to that from the years 1990–2010.7 Another study found reduced perioperative mortality over the decades, where deaths were deemed to have been caused solely by anesthesia or where anesthesia was deemed a contributing factor. The study compared pre-1970s data with that from 1970s–1980s, 1990s–2000s, and 2000s–2010. When analyzed separately by human development index level groups, the decline was found to hold true only for more highly developed countries.8

Only one nationwide investigation of anesthesia-related mortality in Taiwan has been published since the establishment of the National Health Insurance Plan in 1995. It found an average anesthetic-caused mortality rate of 11.9/100,000 cases over the years 1995–1998 and 2002–2008 (sufficient data were not collected in the intervening years), which compares poorly with other developed countries cited in the study.9 Table 1 summarizes that data.

The findings suggest that Taiwan suffers an anesthetic-related mortality rate ten times higher or more than those reported for other developed countries. We pause today to reflect on this information and its implications, to consider how well we can assume that the research, in Taiwan or elsewhere, has been able to capture reality and then we turn our gaze. We look backward in time, from the publication of the Taiwanese study 6 years ago, to the present day, and onward into the future, and we look outward, to other countries in East Asia: China (including Hong Kong), Mongolia, Japan, North Korea, and South Korea; to other neighbors in Southeast Asia and the Asian Pacific region. Finally, we anticipate whether and how we might liaise between Taiwan and other countries in East Asia, where we may enjoy cultural and language connections and possess relevant knowledge about clinical and bureaucratic practices, and researchers elsewhere who specialize in international assessment of anesthetic and surgical risk and safety.
We know that an additional dataset exists for nationwide anesthetic-related mortality in Taiwan for the years subsequent to those analyzed by Liu et al., and we are encouraging the development of a project to analyze and report on that data. We also welcome East Asian and other Asia-Pacific area researchers and policymakers to contact the corresponding author and exchange with us information on anesthetic-related mortality and safety improvement, and to collaborate with us on advancing our knowledge and practice in the future.

Obtaining clear, valid, and useful data on the safety of anesthesia is a challenge. An entry point for the introduction of misinformation lies at the place and time where adverse events occur and are labelled (or mislabeled), categorized (or miscategorized), recorded (or misrecorded), reported (or misreported), and made accessible (or not). Incorrect, incomplete, or misleading information can be communicated, missed, or lost, due to conscious or unconscious bias, to medicolegal concerns, to desires to cast people or groups in this or that light, to exaggerate a problem in order to gain attention or funding, due to corruption, or due to lack of a well-developed statistical recording and reporting infrastructure.

A cautionary story recently appeared in the form of a study published in the "BMJ" which stirred international headlines: The authors noted that death certificate reporting procedures in the United States obscured medical error as a cause of death. Using more careful methods, they estimated that deaths caused by medical error were more than 2.5 times greater than most currently-cited figures. The corrected estimate lists medical error as the third leading cause of death in the US after heart disease and cancer.10

A 2002 review of the literature on anesthesia safety sharply called into question the validity of contemporary studies on the issue, pointing to concerns with operational definitions, and concluded that “wide variations based on methodological differences reported in the literature make it impossible to detect trends in anesthesia safety”.11 Such problems continue to be cited in more recent studies and reviews, with one major 2009 review describing findings on anesthetic safety trends as “controversial”.12

Researchers treating anesthetic-related safety, risk, and mortality should carefully lay the appropriate groundwork before undertaking projects in this area. It appears sensible to believe that anesthesiology has come a long way and is safer today in more areas of the world than in past decades, while being administered to a population that is increasingly older and presents with more complex and fragile clinical situations. However, we pay heed to the warnings sounded by experts in much or most of the recent literature, and we conclude that little is known for sure about mortality and the safety profile associated with anesthesia within nations across the Far East, across Asia, or around the world. Communication and collaboration with experts in the field internationally should occur at every stage of the research undertaking, so that information collection processes, operational definitions, and research methodologies can become increasingly standardized, therefore reliable, and allow for valid international comparisons.

Florence Nightingale lives on in the popular imagination, particularly in the West, symbolized as “the lady with the lamp” (Figure 1) making hospital rounds and tending to the sick.13 Let us raise our own lights high and use the power of transparent and reliable information to illuminate a better way forward for surgical teams, policymakers, and for the public, around the Far East and throughout the global healthcare enterprise.

Conflicts of interest

All authors declare no conflicts of interest.

References


Table 1

<table>
<thead>
<tr>
<th>Country</th>
<th>Deaths/100,000 anesthetic cases</th>
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<tbody>
<tr>
<td>USA</td>
<td>0.5–1 (1989, 2005)</td>
</tr>
<tr>
<td>UK</td>
<td>0.556 (1987)</td>
</tr>
<tr>
<td>Japan</td>
<td>1 (2002)</td>
</tr>
<tr>
<td>Taiwan</td>
<td>11.9 (2008)</td>
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Figure 1. Crimean War: Florence Nightingale going around the wards at Scutari Hospital. Image title: M0003645. Wood engraving. Note. From 1855 Illustrated London News Published: 24 February 1855. Wellcome Library, London, UK. Wellcome Images http://wellcomeimages.org. Copyrighted work available under Creative Commons Attribution only license CC BY 4.0 http://creativecommons.org/licenses/by/4.0/. Reprinted with permission.
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