The Impact of Lack of Standardized Definitions on the Specialty

HOW about a quick quiz? Intraoperative hypotension is associated with which perioperative event?

A. Stroke  
B. Myocardial infarction  
C. Cognitive dysfunction  
D. Renal insufficiency  
E. All of the above

Seems like a pretty straightforward question—one that you’d like to have been asked on your written board examination. The answer clearly is E, all of the above. Or is it? Ironically, it’s more complicated than it seems. In this month’s Journal, Jilles Bijker, M.D., a resident in anesthesiology from Utrecht, The Netherlands, and his colleagues ask two great questions that we all should ask, “Does everyone define intraoperative hypoten- sion the same way?” and “What is the impact of different definitions for this event?” If only we were all as smart as our residents.

Their study is simple in format but elegant in design. Bijker et al. first performed an extensive search of the four specialty journals with the highest impact factors in 2004, seeking articles from 2000 to 2006 that defined hypoten- sion in their methodologies and used this definition in the intraoperative portion of their studies. They then retrospectively searched the intraoperative blood pressures of 15,059 adult patients at their medical center who underwent noncardiac surgery with general anesthesia and applied the various definitions of hypotension from the literature to their data. Their finding that the unique and widely variable definitions markedly impacted the prevalence of hypotension in their patient population is not surprising. What is surprising is the huge variation that they found, with prevalence rates ranging from 5% to 99%. For example, if the definition “a decrease in systolic blood pressure greater than 10% from baseline for any duration,” used in several articles from our finest specialty journals, is applied, 99% of all patients in this population had at least one episode of hypotension. In contrast, if the definition “systolic blood pressure less than 70 mmHg for at least 5 min” is used, only 5% of these patients were hypotensive.

Why does this matter, especially enough to earn an editorial comment? There are three main reasons. First, the lack of standard definitions makes it impossible to compare outcomes among different institutions. Second, the definitions that we use drive the frequency and possibly even severity of the outcomes that we read in the literature, so it is crucial that we know and understand how perioperative events are defined and applied in both clinical trials and in our personal anesthesia practices (e.g., assessment of performance improvement activities). Third, widely disparate definitions can be used both in and out of our specialty to influence the public’s perception of the care that we provide. For example, medicolegal experts often exploit this issue with or without intent to lead juries to potentially inappropriate conclusions.

The authors correctly identify that future research should describe in much greater detail aspects of the

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underlying data such as sampling interval, measurement method, and episode duration. We believe that in future research, data should be described with even greater granularity that includes, for example, the monitor used to obtain the data and the associated operational modality. This detail is necessary because different measurement techniques do not yield the same numbers. More than a decade ago, De Jong et al. demonstrated that the accuracy and agreement of noninvasive and invasive blood pressures were not clinically acceptable. There are also other factors that can influence the validity of recorded data. Digital values for blood pressure are derived from analog signals, and monitors from various vendors often use different processing techniques to arrive at the digital values that are displayed. For these reasons, research comparing blood pressures also needs to document the precise origins of each measurement, including the make and model of the recording device.

What do we do next? Historically, the main problem has been a lack of standards relating to anesthetic terminology, data definitions, and medical device communication. The future, however, is brighter, owing to several recent initiatives. The Anesthesia Patient Safety Foundation recognized this problem in 2001 and created the Data Dictionary Task Force to develop a standard terminology for anesthesiology. This work resulted in the identification of nearly 3,500 terms, which are aligned with SNOMED CT (Systematized Nomenclature of Medicine, Clinical Terminology). In 2003, this effort became international, and the International Organization for Terminologies in Anesthesia was formed. The initial terminology effort has now expanded to include the development of an underlying ontology, which will help to answer questions such as “What is hypotension?” in the context of the intraoperative anesthesia record. The description of the detailed provenance of individual measurements is now possible using ISO/IEEE 11073 point-of-care medical device communication. Although the development of standards is a long and difficult process, it is only through the use of standards that meaningful collaborative outcomes research efforts can be successful.

Anesthesiologists and other medical specialists are increasingly involved in performance assessment and improvement activities. The current emphasis on broad assessment of quality in patient interactions and clinical practice and in transparency is appropriate when performed correctly, but it places great demand on the use of credible outcome information. Sadly, it is difficult to find consistent, credible information because we have not developed standardized definitions for many outcomes. As anyone who has participated in the development of evidenced-based practice guidelines knows far too well, anesthesiology as well as much of medicine in general has simply not paid sufficient attention to the development and use of standardized outcomes. This unfortunate situation leads to much frustration when reviews of literature fail to find sufficient useful information to guide clinical practice. Here are two simple questions that apply to all anesthesiologists: “Do you know what data are being collected and assessed in reviews of your personal practice?” and “How are those data defined and validated?” As we near the use of pay-for-performance in the United States, these two questions become increasingly important.

Public perceptions of our specialty often hinge on the definitions we use when developing communications. In medicolegal actions, it can be simply amazing to review summaries of court proceedings in which anesthesiologists have been accused of providing negligent care. Medicolegal physician experts, including a number of anesthesiologists with whom we practice daily, infrequently make astounding comments about “standard” or “substandard” clinical practices and cite articles from our most prestigious journals to support their claims. As Bijker et al. showed, nearly all patients develop “intraoperative hypotension” if a broad definition recently used in several articles from these journals is applied. Scrupulous medicolegal experts, for either plaintiffs or defendants, will note that there are many definitions for a wide variety of outcomes and will lead the jury through a thoughtful review of the literature. Unscrupulous experts may not. In the political arena, anesthesiologists use variable definitions to either our specialty’s advantage or disadvantage. For example, in the past decade, American anesthesiologists have used outstanding clinical outcome data from healthy patient populations to suggest to politicians and the public that anesthesiology is extraordinarily safe. However, as insightfully expressed in an earlier review article in this journal by Lagasse, perioperative and anesthetic care is perhaps not as safe as we have announced publicly. The definition of “safe” when applied to perioperative mortality and morbidity suffers from a lack of standardization.

We are indebted to Bijker et al. for their article that hammers home the point that we must—simply must—work collaboratively across the globe to develop consensus on how we define common perioperative events.

Mark A. Warner, M.D.,† Terri G. Monk, M.D.‡ † Department of Anesthesiology, Mayo Clinic College of Medicine, Rochester, Minnesota. ‡ Department of Anesthesiology, Duke University Medical Center, Durham, North Carolina.

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