To the Editor—The recent study by Dexter et al. indicating a methodology of using "cost per unit" to determine a more equitable and accurate mechanism of comparing costs per case is an excellent example of developing value-added information from existing data. All practicing anesthesiologists intuitively recognize the fairness of this type of equation; however, this is the first published study I am aware of that effectively illustrates this point.

My comments are only that I hope to see more of these types of practical studies. Unfortunately, in our new era of cost containment, unless we begin implementing these types of evaluations, we will have no effective tools to combat the cost-containment pressures coming from the hospital and third-party payors. I sincerely believe that in a short period of time, we will be required to demonstrate our cost effectiveness to maintain our positions in our hospitals. It has been obvious that pure cost-per-case evaluations would not take into account the many variables of our profession.

Another concern of mine is that even the cost-per-unit methodology demonstrated by these authors may not totally evaluate the real factors affecting the costs of delivering care. I suspect a more-detailed evaluation of the patient's "surgical risk classification," as defined by the Consensus Group of the Johns Hopkins Medical Institutions, and possibly the Charlson comorbidity index rating may provide even more granular results. For example, for the same ASARVS generated from two cases, the total costs (intraoperative and postoperative) may differ greatly when we take into account two widely disparate types of surgical cases and/or patient comorbidity. This type of evaluation is not easy, because we do not use any standard severity rating for surgical cases. However, we may need to add these variables to truly ascertain our most accurate cost coefficient.

Finally, I find it interesting that this methodology also uses the same formula as is used to determine actual professional fee charges. This methodology has frequently been criticized as being too complex, although as a profession, we have always maintained that it is the only fair method of determining our true charges. I would endorse this methodology as a mechanism for establishing this cost-per-unit evaluation of costs. With the AIMCare clinical system, we use a tool to capture these data elements in real time, which not only allows us to generate all charge information, but also provides us with detailed procedure and diagnosis coding for outcome analysis. Comparison of this cost per unit with outcome analysis may be able to finally give us a yardstick to truly measure cost versus quality. It is ironic that as we implement this methodology to further understand our own profession, we are feeling pressure from managed care and HCFA to abandon this complex billing practice and use a charge-per-case methodology. I would suggest that this type of study further provides an argument to maintain our existing billing practices.

References


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In Reply—Dr. Atkin questions whether comparing anesthesia drug and supply costs among anesthesiologists will be productive. In our table 4, we evaluated "costs per case" and "costs per unit" for anesthesia drugs and supplies among surgical specialties. The relative differences in cost per case between cardiac and neurosurgical anesthesiologists at Duke equaled $207. $63 = 3.3:1. The relative differences using cost per unit = 3.9:2.2 = 1.8:1. Therefore, the use of cost per case suggested that the differences were larger between the surgical specialties than did our method of using cost per unit. Therefore, Dr. Atkin's comments are not referring to the use of cost per unit versus cost per case, but rather the strategy of comparing costs among anesthesiologists by any methodology. We suggest that the relevant question is not whether costs will be compared among anesthesiologists. The questions are (1) whether costs will be compared among anesthesiologists with any form of adjustment for variation in case mix and, if so, (2) how much money will anesthesia groups have to pay to collect the data required to report their cost data.
CORRESPONDENCE

Cost per unit provides some rudimentary form of case-mix adjustment while using data that are already collected by anesthesia groups for the purposes of billing for their services.

Dr. Atkin states that 'the authors' work demonstrates the need to commit to building databases of relevant information." Although we believe that information technologies will contribute to a reduction in perioperative costs, anesthesia groups do not need to purchase new information technologies to use our method. Anesthesia groups have two choices to achieve cost control for drugs and supplies:

**Strategy 1.**

Purchase information technologies to track drug and supply usage by individual anesthesiologists. Set quantitative cost goals within the anesthesia group on a cost-per-unit basis. Use information systems to provide quantitative feedback to individual anesthesiologists regarding how well they are satisfying group requirements. The advantage of this strategy is that anesthesiologists continue to have flexibility in their clinical practice. The disadvantage is that anesthesiologists are responsible for the cost outcome of their practice. As a result, individual assignment of cost may lead to inappropriate economic credentialing. In addition, an individual anesthesiologist's efforts to decrease costs associated with a practice may contribute to an increase in costs or a decrease in revenue for the institution. In any case, our manuscript provides a methodology to assist in this option, but it does not require that this option be selected.

**Strategy 2.**

Use clinical pathways or practice guidelines, or both, to suggest or regulate (not monitor), or both, appropriate usage within the anesthesia group. The advantage of this strategy is that it does not require the use of an as-sophisticated information system, because only deviation from the clinical pathways or practice guidelines, or both, need to be recorded. The disadvantage of this strategy is that it decreases anesthesiologists' flexibility in clinical practice. In addition, the impact of clinical pathways and practice guidelines on education is unclear. In any case, the use of cost per unit applies equally to this strategy as to the preceding strategy.

Our manuscript did not address the relative benefits of each of these two strategies.

Dr. Stonemetz suggests that the use of more comprehensive methods to adjust for variations in case mix may do a better job at evaluating the "costs of delivering care." If an anesthesia group has these data available, then using such data is rational. We cannot determine whether the hypothesis is true using our data. It is our opinion that it is not known yet whether anesthesia groups will benefit from purchasing more sophisticated information technologies to track these measures of perioperative risk. Studies need to be performed showing that incorporating these measures of risk into assessments of anesthesia drug and supply costs improves the accuracy of predicting these costs and that the improvement in accuracy is cost-effective relative to the cost required to collect the data. An advantage of monitoring cost per unit at the level of an anesthesia group is that the data are already collected (i.e., quarterly costs divided by quarterly units).

Dr. Stonemetz points out that cost per unit cannot only be used to adjust drug and supply costs for variations in case mix, but also can adjust labor costs (i.e., anesthesiologist and anesthetist salaries). We agree completely. The use of cost per unit is an exceedingly rational, straightforward, and inexpensive approach to measure anesthesia work. The fact that we focused our analysis on drug and supply costs should not mislead others into thinking that we were focusing on the most important issue: Measuring labor costs (salaries) using costs per unit is far more important, because the majority of perioperative costs are accounted for by salaries.

Finally, Table 1 does have a typographic error. The correct value is 12.7 ± 7.4.

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Critical Hemoglobin Desaturation Can Be Delayed by Apneic Diffusion Oxygenation

To the Editor—We read with interest the article by Benumof et al. concerning the development of critical hemoglobin desaturation after neuromuscular block with 1 mg/kg succinylcholine. Benumof et al. suggested that achievement of functional recovery from succinylcholine block before significant desaturation is not a realistic possibility and a rescue option should be instituted aggressively and early, whereas Bourke considered that this assumption may not be entirely justified and may, in some cases, lead to premature or potentially hazardous interventions.

We agree with the recommendations of Benumof et al. that whenever attempts at tracheal intubation after preoxygenation and rapid-sequence induction of anesthesia fail, we should not wait for recovery from succinylcholine block. Ventilation must be promptly initiated because the risk of critical hemoglobin desaturation if apnea is prolonged is far more serious than the risk of regurgitation associated with controlled ventilation while cricoid compression is performed.

To delay critical hemoglobin desaturation during apnea in a