

chart may have major implications, because AFE is the second leading cause of maternal death in developed countries and near-miss morbidity is often a modifiable precursor.⁷

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(Accepted for publication April 20, 2012.)

In Reply:

We thank Holck *et al.* for their interest in our publication and comments regarding our flow diagram guiding the management of amniotic fluid embolism.¹ The format of our case scenario was intended to be an overview of the presentation and management of amniotic fluid embolism, and the purpose of the flow chart was to serve as a very general educational guide toward management options. It was not meant to be a completely exhaustive algorithm of clinical analysis and treatment course.

However, we appreciate the authors suggesting the possibility of using fibrinogen concentrate as a newer alternative blood product therapy. We acknowledge that there may be a benefit of rapid low-volume bolus administration when compared with the delay encountered to thaw fresh frozen plasma or cryoprecipitate. However, use of fibrinogen concentrate also relies on its availability. Neither our community-based obstetric unit nor our level I trauma university hospital has fibrinogen concentrate readily available, and we suspect the same may be true of many institutions. It is also important to recognize that the dose and timing of administration of alternative blood products remains controversial.^{2,3} As was discussed both in our case scenario and emphasized by Holck *et al.*, the use of factor VII should only be considered in

cases of hemorrhage refractory to other therapies due to the risk of embolic consequences. Caution should also likely be exercised for fibrinogen concentrate because larger prospective studies are needed to determine its clinical efficacy and safety.³

Holck *et al.* are correct in stating that there is probably no flow chart that would direct every possible available therapy in managing the coagulopathy and the hemodynamic presentation of cases of amniotic fluid embolism. We would like to reemphasize the importance of having a transfusion protocol for massive obstetric hemorrhage, regardless of etiology. A multidisciplinary approach with specific guidelines outlining rapid, early, and aggressive intervention and resuscitation is likely to optimize maternal outcomes.^{4,5}

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(Accepted for publication April 20, 2012.)

The Devil in the Details

"First we shape our buildings; thereafter, they shape us."

—Winston Churchill

To the Editor:

In the recent article by Wijeysondera *et al.*, the authors demonstrated a significant level of variability in the preoperative testing patterns at different hospitals in Ontario, Canada.¹ Their statistical analyses show that the testing patterns were not explained by the type of surgery, hospital, or patient. However, the authors did not characterize the types of preoperative evaluation processes (*e.g.*, physician-based, nurse-telephone, web-based intake, on-site clinic, etc.). This is important because multiple preoperative assessment systems have been developed; it would not be surprising to find a myriad of systems in one Canadian province. Historically, these clinics were developed because of financial pressures

and a desire to improve perioperative outcomes. Large variability is also seen in U.S. perioperative screening. Katz *et al.* showed that anesthesiologists and surgeons cannot agree on the number of appropriate preoperative tests.² This variability, as Wijeyesundera *et al.* point out, exists at a local, regional, and national level, despite the proliferation of clinical testing algorithms and consensus guidelines. Even anesthesiologists within the same group cannot agree; this results in canceled surgeries because the preoperative anesthesiologist is not the anesthesiologist on the day of surgery.

The goal of reducing variability in the delivery of health care is a worthy goal in itself, even if outcome data are not initially available. In 1989, Laffel and Blumenthal pointed out that modern industrial quality science (*e.g.*, statistical process control) “may well make important advances in the quality of care and service through the application of rigorous principles and techniques.”³ Inherent in statistical process control is that every complex system, which health care most certainly is, has a certain level of variability. Continuous process improvement must involve the reduction of system variability. Reducing variability in the system has numerous advantages. Less variable systems are easier to study and need smaller sample sizes to prove a hypothesis. It is easier to introduce new guidelines in less variable systems. Although it is true that it will be difficult to produce “objective research” that includes “risk-adjustment and outcome measures,” such as “clinical results, financial costs, and process efficiency,” it should not deter us from improving the system or missing clinical opportunities.⁴

There will always be a level of variability in preoperative consultations, not only in Ontario, but also in the rest of the world. Some disagreement is inevitable because guidelines are not rules, and medicine is as much craft as science. This leads to different decisions when an anesthesiologist evaluates a moderate-risk patient for a moderate-risk surgery even with the publication of guidelines. Moreover, most guidelines are based on expert opinion and extrapolation, and we still do not know if many of these guidelines are “correct.” However, we should recognize that many unnecessary tests and consults could be reduced by simply using clinical decision support programs that reduce variability. For instance, anesthesiologists in Europe have used web-based preoperative systems to minimize variability in preoperative testing patterns for years.⁵ These programs, or other tools that reduce variability, may allow us to direct our ever-shrinking healthcare resources to where they are most needed.

Although additional research is needed, we believe that Wijeyesundera *et al.* present a unique opportunity to improve the preoperative evaluation system in Ontario without further research. The data clearly show that the government has the opportunity to refine preoperative consultations simply by reducing variability in the patient population that had the most preoperative testing and examining the testing patterns at institutions where the percentages of consults is greater than the average for all the institutions. The majority of the preoperative consults were ordered for total knee and

hip replacement surgeries and for patients with hypertension and diabetes. We believe that the government of Ontario should develop new processes to reduce these preoperative consults and drive the percentage down to the average. U.S. anesthesiologists should do the same. More importantly, these steps should be done in parallel with a prospective database that tracks patients’ perioperative outcomes from the beginning to end. Ultimately, reduced systemic variability allows us to study these questions in a more focused, cost-effective, rational manner. Simply put, improving the system and additional research need not be mutually exclusive.

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(Accepted for publication April 25, 2012.)

In Reply:

We thank Tsai and Black for their insightful comments. As previously stated,¹ we agree that our data sources did not describe several important clinical details, which may have further explained the substantial interhospital variation in rates of preoperative medical consultation. Given that the only previous characterization of preoperative evaluation practices in Ontario occurred in 1997,² our future research plans include an updated cross-sectional survey to better understand contemporary practices in the province.

We further agree that decreasing the current variability in preoperative consultation practice is an important goal for perioperative care. However, the initial emphasis should be on better understanding which specific patients benefit from preoperative medical consultations. Previous research has demonstrated that some perioperative interventions (*e.g.*, β -blockers)³ and tests (*e.g.*, cardiac stress tests)⁴ are beneficial when applied to some individuals, yet potentially harmful when applied to others. A similar pattern is likely to apply to preoperative medical consultation. Consequently, initiatives that narrowly focus on reducing overall consultation rates may not improve clinical outcomes if the result is a reduced use of consultations among patients who most need them.