

References

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Data on the Anesthetic Procedure or Surgical Risk Are Still Necessary

To the Editor:

I have read the very interesting and detailed article by Ramachandran *et al.* recently published in *ANESTHESIOLOGY*,¹ dealing with perioperative cardiopulmonary arrest and the possibility of its prediction through a retrospective database analysis. The authors showed results on the influence (predictors) of perioperative diseases, type of cardiac rhythm when pulseless activity was detected, event location (operating room, postanesthesia care unit, intensive care area, telemetry,

or general ward), and other patient characteristics. Although designed to study the survival to hospital discharge as the primary outcome, and the neurological outcome (intact or affected by neurological disability) as the secondary one, I was surprised by the fact that several items usually (and in my opinion obligatory) included in anesthesia-related mortality and morbidity studies, as those cited by the authors^{2–4} and others,^{5–8} as are the surgical procedure (even grossly classified), any kind of risk stratification or score (American Society of Anesthesiologists' physical status, *etc.*), and, perhaps the most important, the type of anesthetic procedure the patient was subjected to, were not included in the analysis or not showed. Otherwise, the exclusion of these informative data was not clearly explained. These are important because it could explain some of the findings of the study, as the relatively high survival rates, with good neurological outcomes of asystolic arrests, and, in part, the better outcome of cardiac arrests occurring in the operating room or in the postanesthesia care unit: for instance, asystolic cardiac arrests due to spinal anesthesia have been described as with easier resuscitation and good outcomes,^{2,9} and those can occur in younger patients having better physical status. Another example would be that general anesthesia is frequently chosen in the more severe patients and in high-risk surgeries, and consequently, worse prognostic should be expected if a cardiopulmonary arrest occurs.²

Competing Interests

The author declares no competing interests.

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In Reply:

The Get With The Guidelines-Resuscitation database is an American Heart Association–sponsored, prospective, multi-site, observational registry. Trained nurse abstractors input data at each site, by reviewing the medical record for in-hospital cardiac arrest (IHCA) management. The quality and completeness of site data are evaluated by a robust quality control process. Several important points have been raised by Drs. Xue *et al.* and Errando in response to our study.

1. The study has the potential for significant unmeasured confounding variables. We have acknowledged this fact in detail in our study,¹ but these limitations are generic to all observational studies. Dr. Xue points out that the duration of hospital participation could be an important confounder in predicting outcome,² but previous work within the Get With The Guidelines-Resuscitation database has not found this to be the case with IHCA.²
2. Telemetry was associated with better outcomes in IHCA with shockable rhythms, in comparison with general care and operating room locations. Only 20% of the operating room IHCA had shockable rhythms, with a preponderance of trauma and shock. Shockable rhythms were more frequent, whereas trauma or shock was less frequently seen in IHCA events occurring in telemetry locations. Thus, location-specific differences in outcome likely reflect primary differences in patient populations.
3. Monitoring was associated with improved survival in previous studies of the Get With The Guidelines-Resuscitation database.³ The presence of skilled and trained providers who recognized IHCA and instituted early defibrillation, epinephrine administration,

and invasive airway placement partially explains the improved outcomes seen in monitored locations such as the operating room and postanesthesia care unit. However, as described above, it is possible that some of this improved survival relates to indication bias, in that patients at greater risk of IHCA with shockable rhythms are more likely to receive telemetry monitoring. Thus, summary conclusions to increase monitoring levels on the general care units cannot be made based on this study alone. Although expert opinion⁴ and emerging evidence⁵ continue to point toward outcome modification with increased pulse oximetry monitoring, the largest prospective study⁶ to date failed to show survival or outcome benefit in patients. In addition, there is some evidence of serious harm with increased monitoring, prompting the Joint Commission to issue a sentinel alert in 2013.*

4. I agree that improved survival in the operating room IHCA could be explained partially by reduced resuscitation errors. The quality of resuscitation as measured by time to defibrillation, epinephrine administration, or intubation was significantly superior in the operating room, suggesting better run codes.
5. The Get With The Guidelines-Resuscitation database does not provide information on surgical procedure or anesthetic management. Databases such as the Multi-center Perioperative Outcomes Group† could provide valuable insight, but measures of cardiac resuscitation and neurological outcome are often missing from such databases.

I would like to thank the editor and the respondents to our study for the interest and look forward to more research in this area.

Competing Interests

Dr. Ramachandran was a paid *ad-hoc* consultant to Galleon Pharmaceuticals, Horsham, Pennsylvania, and Merck Sharp and Dohme, Whitehouse Station, New Jersey, in 2012–2013.

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* Available at: http://www.jointcommission.org/assets/1/18/sea_50_alarms_4_5_13_final1.pdf. Accessed March 7, 2014.

† Available at: <http://mpog.med.umich.edu/>. Accessed March 7, 2014.