

one-lung ventilation. *J Cardiothorac Vasc Anesth* 2021; 35:1381–7

25. Gaskell AL, Sleight JW: An introduction to causal diagrams for anesthesiology research. *ANESTHESIOLOGY* 2020; 132:951–67

### Appendix: Multicenter Perioperative Outcomes Group Investigators

The following collaborators attest to their substantial role in research protocol revisions or data collection/validation efforts as part of the Multicenter Perioperative Outcomes Group (MPOG) Perioperative Clinical Research Committee: Mark Neuman, M.D., M.Sc., University

of Pennsylvania, Philadelphia, Pennsylvania; Michelle T. Vaughn, M.P.H., Michigan Medicine; Roy Soto, M.D., Beaumont Health, Belleville, Michigan; Surendrasingh Chhabada, M.D., Cleveland Clinic, Cleveland, Ohio; Robert E. Freundlich, M.D., M.S., M.S.C.I., Vanderbilt University Medical Center, Nashville, Tennessee; Michael F. Aziz, M.D., Oregon Health and Science University, Portland, Oregon; Shital Vachhani, M.D., University of Texas, M.D. Anderson Cancer Center, Houston, Texas; Robert B. Schonberger, M.D., M.H.S., Yale School of Medicine, New Haven, Connecticut; Karen B. Domino, M.D., M.P.H., University of Washington, Seattle, Washington; Catherine L. Chen, M.D., M.P.H., University of California, San Francisco, San Francisco, California.

## ANESTHESIOLOGY REFLECTIONS FROM THE WOOD LIBRARY-MUSEUM

### The National Halothane Study: Did “Fluothane” Deliver or De-liver?



One fateful morning in 1962, a community hospital pathologist telephoned John Bunker, M.D., Chair of Anesthesia at Stanford. A 16-year-old girl had died of liver failure two weeks after receiving halothane (branded “Fluothane,” *left*) anesthesia for a wrist-laceration repair. Her case, along with others, sparked the National Halothane Study (*right*), a large-scale comparison of halothane with other anesthetics in relation to the incidence of fatal hepatic necrosis. Within the first month, randomization was halted on ethical grounds following a new case of lethal hepatitis. In the end, a retrospective cohort design found 82 unexplained cases of massive hepatic necrosis out of 856,000 general anesthetics given at 34 hospitals over 4 years (1959 to 1962). Most occurred after high-risk surgery. There were too few cases to establish “halothane hepatitis” as a clinical syndrome, but the rare occurrence of halothane-induced liver failure could not be ruled out. Overall mortality was shown to be lower with halothane than with other agents. Although inconclusive with respect to its primary objective, the National Halothane Study was a revolution in modern data processing. By revealing a surprisingly large difference in surgical outcomes between institutions, it ushered in a new era of quality improvement. (Copyright © the American Society of Anesthesiologists’ Wood Library-Museum of Anesthesiology.)

*Jane S. Moon, M.D., University of California, Los Angeles, California, and Melissa L. Coleman, M.D., Penn State College of Medicine, Hershey, Pennsylvania.*