



## 27 Neostigmine Administration after Spontaneous Recovery to a Train-of-Four Ratio of 0.9 to 1.0: A Randomized Controlled Trial of the Effect on Neuromuscular and Clinical Recovery

The benefits of using neostigmine to reverse neuromuscular blockade (reduced incidence of postoperative residual weakness and associated complications) must be balanced against its known cholinergic side effects and theoretical risks (neostigmine-induced muscle weakness) if it is administered when spontaneous recovery from neuromuscular blockade is almost complete. In 90 patients with spontaneous recovery to a train-of-four ratio greater than or equal to 0.9 after using low-dose rocuronium to facilitate tracheal intubation for procedures with expected duration of at least 90 min and not requiring maintenance of neuromuscular blockade, the hypothesis tested was that train-of-four ratios

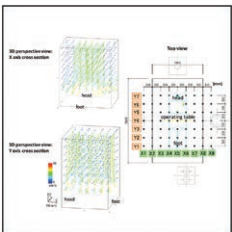
at the time of postanesthesia care unit admission would not be less in patients randomized to receive neostigmine (40  $\mu\text{g}/\text{kg}$ ) than they would be in patients administered saline (placebo). Neostigmine administration to patients with objective evidence of neuromuscular recovery did not adversely affect train-of-four ratios, respiratory function, or signs and symptoms of muscle strength. *See the accompanying Editorial View on page 1.* (Summary: M. J. Avram. Illustration: S. Jarret, C.M.I. Photo: J. P. Rathmell.)



## 55 Crystalloid versus Colloid for Intraoperative Goal-directed Fluid Therapy Using a Closed-loop System: A Randomized, Double-blinded, Controlled Trial in Major Abdominal Surgery

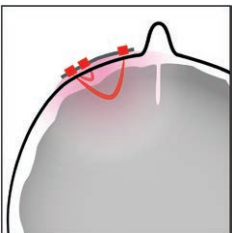
The volume of fluid administered intraoperatively influences the incidence of postoperative complications, as may the type of fluid administered. Goal-directed fluid therapy based on optimization of flow-related variables represents the best approach for fluid administration in high-risk surgical patients. The hypothesis that an automated closed-loop assisted goal-directed fluid therapy using balanced colloids is associated with fewer postoperative complications than one using balanced crystalloids was tested in a two-arm parallel randomized controlled double-blind superiority study of 160 patients scheduled for nonurgent open major abdominal surgery. The primary outcome was the Post-

Operative Morbidity Survey score at postoperative day 2. Colloid-based goal-directed fluid therapy was associated with a lower Post-Operative Morbidity Survey score and fewer postoperative complications than crystalloid-based goal-directed fluid therapy. These beneficial effects may be secondary to the decrease in intraoperative fluid and net fluid balance in the colloid group. (Summary: M. J. Avram. Image: J. P. Rathmell.)



## 79 Effects of Forced Air Warming on Airflow around the Operating Table

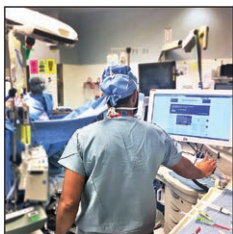
Forced air warming systems are widely used to prevent unintentional hypothermia during surgery, which delays healing and predisposes patients to wound infections. Laminar airflow systems are recommended for preventing surgical site infection in the operating room. Changes in operating room airflow caused by forced air warming, with or without laminar airflow, were evaluated to address concerns that convection flows caused by forced air warming could disrupt laminar airflow and impede its ability to prevent surgical site contamination. Airflow speed and direction from a lower body forced air warming device were measured using three-dimensional ultrasonic anemometer. Airflows from lower- and upper-body forced air warming devices were visualized using smoke particles illuminated by laser light. Airflow caused by forced air warming was well counteracted by downward laminar airflow from the ceiling, making it unlikely to cause surgical field contamination in the presence of sufficient laminar airflow. (Summary: M. J. Avram. Image: Adapted from original article.)



## 85 An International, Multicenter, Observational Study of Cerebral Oxygenation during Infant and Neonatal Anesthesia

Determining the incidence of low cerebral oxygen saturation during anesthesia in infants and neonates as well as associated physiologic factors, such as hypotension and hypoxemia, could improve anesthetic safety as these mechanisms may be preventable causes of neurologic injury. The incidence of low regional cerebral oxygenation during anesthesia measured by near-infrared spectroscopy was determined in a prospective, multicenter, observational study of 453 infants less than 6 months of age scheduled to undergo a general anesthetic for noncardiac surgery expected to last more than 30 min. Regional cerebral oxygenation during surgery was also described and factors associated with cerebral desaturation were sought. Mild and moderate cerebral and arterial desaturation and mild,

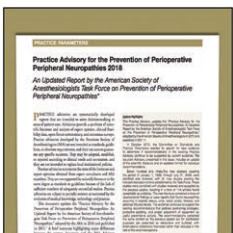
moderate, and severe hypotension occurred frequently, while severe cerebral desaturation was rare. Arterial hypotension and mild to moderate arterial desaturation were not major contributors to mild or moderate cerebral desaturation or clinically useful to predict low regional cerebral oxygen saturation. (Summary: M. J. Avram. Illustration: J. P. Rathmell.)



#### 44 Prevalence of Potentially Distracting Noncare Activities and Their Effects on Vigilance, Workload, and Nonroutine Events during Anesthesia Care

The nature and incidence of potentially distracting non–patient care activities during anesthesia care by anesthesiology residents and nurse anesthetists were determined at an academic medical center where every operating room has a computer with unrestricted internet access and all anesthesia providers have intraoperative access to handheld electronic communication devices. Intraoperative behavioral task analysis was conducted, video records were reviewed, workload and vigilance were assessed, and intraoperative internet usage was tracked in 319 cases to delineate the epidemiology of intraoperative distractions and elucidate their potential effect on patient care tasks, clinical workload, and vigilance, as well as their relationship to nonroutine events. At least one distraction was observed

in more than half of the cases, with the most common distraction being personal internet use. Distractions only occurred during low workload periods and vigilance was not adversely affected. A few nonroutine events were associated with noncontributory distractions. See the accompanying Editorial View on [page 6](#). (Summary: M. J. Avram. Image: P. Topiwala, Brigham and Women's Hospital.)



#### 11 Practice Advisory for the Prevention of Perioperative Peripheral Neuropathies 2018: An Updated Report by the American Society of Anesthesiologists Task Force on Prevention of Perioperative Peripheral Neuropathies (Practice Parameters)

This Practice Advisory updates the Practice Advisory for the Prevention of Perioperative Peripheral Neuropathies: An Updated Report, adopted by the American Society of Anesthesiologists in 2010 and published in 2011. It specifically focuses on perioperative positioning of the adult patient, use of protective padding, and avoidance of contact with hard surfaces or supports that may apply direct pressure on susceptible peripheral nerves. It is intended to apply to adult patients who are or have been sedated or anesthetized. Advisory recommendations are provided for preoperative history and physical assessment, positioning strategies for the upper extremities, positioning strategies for the lower extremities, the use of protective padding, and the use of equipment. It also includes recommendations for postoperative physical assessment of extremity nerve function and documentation of specific perioperative positioning actions. (Summary: M. J. Avram. Image: J. P. Rathmell.)

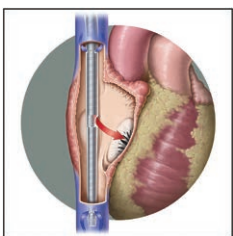
history and physical assessment, positioning strategies for the upper extremities, positioning strategies for the lower extremities, the use of protective padding, and the use of equipment. It also includes recommendations for postoperative physical assessment of extremity nerve function and documentation of specific perioperative positioning actions. (Summary: M. J. Avram. Image: J. P. Rathmell.)



#### 168 Malignant Hyperthermia in the Post-Genomics Era: New Perspectives on an Old Concept (Review Article)

Malignant hyperthermia is a pharmacogenetic disorder of skeletal muscle triggered by volatile anesthetics or succinylcholine. Three genes, *RYR1*, *CACNA1S*, and *STAC3*, have been definitively associated with malignant hyperthermia susceptibility and the severe dysregulation of skeletal muscle  $Ca^{+2}$  homeostasis that results in the clinical features of a malignant hyperthermia reaction under anesthesia. The range of clinical defects that may be present in malignant hyperthermia–susceptible individuals include myopathies, exertional rhabdomyolysis, and a recently reported bleeding disorder associated with an *RYR1* variant implicated in malignant hyperthermia susceptibility. The latest evidence on the genetics of malignant hyperthermia susceptibility and its connection to nonanesthesia-related disorders are

reviewed, as are the guidelines for genetic diagnosis of malignant hyperthermia susceptibility and the limitations of current genetic screening. Nonanesthetic phenotypes associated with *RYR1*-related disorders are also discussed. See the accompanying Editorial View on [page 8](#). (Summary: M. J. Avram. Image: C. Brodoway, Nemours/A. I. duPont Hospital for Children.)



#### 181 Perioperative Management of the Adult Patient on Venovenous Extracorporeal Membrane Oxygenation Requiring Noncardiac Surgery (Review Article)

Venovenous (VV) extracorporeal membrane oxygenation (ECMO) uses an external membrane to both oxygenate and decarboxylate blood, thereby facilitating lung protective ventilation in patients with severe respiratory failure. Despite extracorporeal support, these patients remain prone to perioperative hypoxemia and hypercarbia, which necessitate adjustments to the ECMO system settings before implementing traditional management techniques. VV ECMO affects preoperative assessment, patient transportation, choice of anesthetic, drug dosing, patient monitoring, and intraoperative and postoperative management of common patient problems. Systemic anticoagulation is an integral part of

treatment with VV ECMO because extracorporeal circulation introduces thrombogenic surfaces. Perioperative management of anticoagulation, as well as thresholds for packed erythrocytes and blood products, must take into account specific patient factors. Safe management of VV ECMO patients undergoing noncardiac surgery requires the ability to respond to not only common system complications and alarms but also complete circuit failure. (Summary: M. J. Avram. Illustration: Adapted from original article.)