Hi, this is Evan Kharasch, Editor-in-Chief of Anesthesiology, with some highlights from the January 2021 issue, as selected by the journal editors.

I'll begin this month with a systematic review and meta-analysis of the analgesic effectiveness of quadratus lumborum block in cesarean delivery. Dr. Nasir Hussain at The Ohio State University and colleagues elsewhere in Canada and in the United States authored this study. They reviewed randomized clinical trials that evaluated the benefits of quadratus lumborum block in cesarean deliveries that used spinal anesthesia. The authors considered trials that made one of three different comparisons. Some trials compared quadratus lumborum block and spinal morphine versus spinal morphine alone. Other trials compared quadratus lumborum block versus spinal morphine alone. Still other trials compared quadratus lumborum block with no block or spinal morphine. The authors analyzed 12 trials that included 924 patients. Their primary outcomes were postoperative 24-hour cumulative oral morphine equivalent consumption and pain at 4-6 hours. The results showed that quadratus lumborum block does not enhance analgesic outcomes. This was the case when quadratus lumborum block was combined with or compared to spinal morphine. However, the quadratus lumborum block did improve post-cesarean analgesia when no spinal morphine was used. This was based on evidence that was considered moderate quality. The authors concluded that the clinical utility of quadratus lumborum block in cesarean delivery may be limited to situations when spinal morphine is not used.

Next, we have a clinical study that explored complications of perioperative arterial cannulation in children. Dr. Stephen Gleich of the Mayo Clinic and colleagues there and at Sanford Health, Sioux Falls, South Dakota, conducted the study. The authors examined 10 years of Mayo Clinic institutional data. They evaluated use patterns and incidence of major short-term complications associated with perioperative arterial cannulation in children. They also described the rates of major complications by anatomical site and patient age. There were more than 5,100 arterial cannulations performed in nearly 4,200 patients during the decade evaluated. Two-thirds of the cannulations were performed in the radial artery. The femoral artery was the second-most frequently used site, with 30% of cannulations. In the 5100 arterial cannulations, there were 11 major complications. This was an incidence rate of 0.2%, or 1 in 500. Eight of the complications were vascular and 3 were infections. All of the complications occurred in femoral arterial lines in children younger than 5 years. Infants and neonates had the greatest complication rates. There were no major complications in distal arterial cannulation sites, including more than 3,000 radial cannulations.

Our next clinical study evaluated data from five phase 1, single-center human studies of the pharmacology of the sedative-hypnotic and $GABA_A$ receptor agonist ABP-700. The purpose was to create a pharmacokinetic-pharmacodynamic model for ABP-700 effects on the Bispectral Index (BIS) and on sedation, as measured by the Modified Observer's Assessment of Alertness/Sedation (MOAA/S) score. In addition, ABP-700 causes involuntary muscle movements, and the authors sought to understand how these movements would affect their pharmacokinetic-pharmacodynamic model. Dr. Beatrijs Valk of the University of Groningen, Groningen, The Netherlands, and colleagues there and elsewhere, conducted the study. They analyzed data from 266 people, including more than 6,300 ABP-700 arterial and venous plasma concentrations. They developed a recirculatory pharmacokinetic model. They also explored the relationships between plasma concentrations and BIS and sedation and involuntary muscle movements. The final pharmacokinetic model showed that ABP-700 had small compartmental volumes and rapid systemic clearance. The pharmacodynamic model for the BIS had an effect- site for BIS suppression, and a secondary excitatory/disinhibitory effect-site associated with involuntary muscle movements. In contrast, the pharmacodynamic model for sedation did not show any excitatory effects. The authors concluded that their pharmacokinetic-pharmacodynamic model, which incorporated involuntary muscle movements, could provide information that may be useful to improve depth of anesthesia monitoring for $GABA_A$ receptor agonists.

Our next study addresses the timely topic of whether intubation barrier devices provide protection from aerosols, including exhaled viral particles. Dr. Richard Fidler of the San Francisco VA Medical Center and colleagues there and elsewhere in California conducted the study. The study was motivated by the COVID-19 pandemic, and the exposure of healthcare workers to aerosols during intubation, and the desire to reduce such exposures. The investigators tested the hypothesis that barrier devices reduce aerosols even outside the barrier. They evaluated aerosol containment in closed, semi-closed, semi-open and open barrier devices. They tested nine levels of protection, from a drape tent to the original "aerosol box" to no barrier at all. The authors set out to qualitatively describe aerosol behavior using a vapor generator. They also quantitatively described aerosol behavior using a condensation particle counter and aerosol mass spectrometer. The investigators measured aerosol evacuation using standard hospital suction, a surgical smoke evacuator, and a consumer-grade wet-dry vac. They found that only closed and semi-closed devices and the aerosol box reduced aerosol particle counts. Aerosol evacuation to baseline required 15 minutes with standard suction and the wet-dry vac, and 5 minutes with a smoke evacuator. The manuscript concluded that barrier devices may reduce exposure to droplets and aerosol. The "glove box" and drape tent can retain aerosol during airway management if they are carefully tucked. Devices that are not fully enclosed may direct aerosol toward the laryngoscopist. And lastly, aerosol evacuation reduces aerosol content inside fully enclosed devices.

Next, we have a clinical study that examines the association between neuraxial analgesia and neonatal morbidity in women who undergo operative vaginal delivery. Dr. Alexander Butwick of Stanford University and colleagues there and at the University of Iowa conducted this population-based cross-sectional study. They tested the hypothesis that neuraxial analgesia for these women is associated with a reduced risk of neonatal morbidity. The authors used United States birth certificate data from 2017 to identify women who underwent forceps or vacuum-assisted delivery. They examined the relationships between neuraxial labor analgesia and neonatal morbidity. They defined neonatal morbidity as: 5-min Apgar score less than 7, immediate assisted ventilation, or assisted ventilation greater than 6 h. They also considered neonatal ICU admission, neonatal hospital transfer, and neonatal seizure or serious neurologic dysfunction. The authors found that more neonates in the neuraxial analgesia group experienced complications than in the nonneuraxial group. However, a post-hoc analysis found that the association between neuraxial analgesia and neonatal morbidity was not statistically significant. This finding came after the authors excluded two potential confounders from the composite outcome. The authors concluded that a neonatal benefit of neuraxial analgesia for operative vaginal deliveries was not observed. They did caution however, that confounding by indication bias is a relevant possibility

Our next study uses a rat model to explore whether different bupivacaine enantiomers would have different ion channel blocking ability. Dr. Daisuke Uta of the University of Toyama, and colleagues there and elsewhere in Japan, conducted the study. Bupivacaine is used clinically as a racemic mixture of 2 enantiomers, D- and L-bupivacaine. The investigators tested the hypothesis that bupivacaine enantiomers would have different ion channel blocking effects. They performed electrophysiological analysis on rat dorsal root ganglion neurons *in vitro*. They also analyzed spinal transmissions *in vivo*. They found that bupivacaine decreased the amplitudes of action potentials in the dorsal root ganglion. All three types of fibers-- unmyelinated C, thinly myelinated Aδ, and Aβ fibers, were blocked by both L-bupivacaine and D-bupivacaine. However, for C and Aδ fibers, potency of L-bupivacaine was greater than that of D-bupivacaine, measured by the lower half-maximum inhibitory concentration of L-bupivacaine compared with that of D-bupivacaine. This suggests that L-bupivacaine preferentially inhibits impulses in nociceptive neurons. The authors concluded that the L-bupivacaine more potently inhibits noxious transmission to the spinal dorsal horn. It does this by blocking action potential conduction through C and Aδ afferent fibers.

Next, our first Clinical Focus Review article this month explored important issues in perioperative temperature monitoring. Dr. Daniel Sessler of the Cleveland Clinic authored this review. Most unwarmed surgical patients become hypothermic, which causes complications. Of dozens of clinical indications for temperature measurement, Dr. Sessler chose to

emphasize those most relevant to anesthesia. Core body temperature should be measured, or reliably estimated, in most patients given general or neuraxial anesthesia for more than 30 min. Medical thermometers accurately estimate temperature of adjacent tissue. However, few core sites are accessible. Temperatures taken at non-core sites are lower than core temperatures, and by variable amounts. The esophagus and nasopharynx are usually the best practical temperature monitoring sites during general anesthesia. Both are true core sites, and both are resistant to artifact. Suitable alternatives for neuraxial anesthesia and postoperative care include oral and axillary temperatures. Zero-heat flux forehead temperature is another good option. Uncompensated skin temperature or skin temperature adjusted by adding a constant are not reliable ways of estimating core temperature. Temporal artery scanning and infrared ear canal thermometers are also inconsistent. Rectal and bladder temperatures are suboptimal in adults because they can substantially lag core temperature during rapid thermal changes. Unless hypothermia is specifically indicated, anesthesiologists should maintain patients' intraoperative core temperature at greater than 36°C.

I'll close this month with another Clinical Focus Review article. This article discusses how to use pulse wave analysis to estimate cardiac output. A team of authors led by Dr. Karim Kouz of the University Medical Center Hamburg–Eppendorf, Hamburg, Germany, wrote this article. Pulse wave analysis is the mathematical analysis of the arterial blood pressure waveform. Pulse wave analysis enables the anesthesiologist to continuously estimate cardiac output in real time. Pulse wave analysis also allows for the assessment of dynamic cardiac preload variables. For example, the anesthesiologist can use pulse pressure variation and stroke volume variation to predict fluid responsiveness in patients with sinus rhythm and controlled mechanical ventilation. Pulse wave analysis methods are classified into invasive, minimally invasive, and noninvasive methods. Pulse wave analysis methods are further classified into externally calibrated, internally calibrated, and uncalibrated methods. Anesthesiologists can use cardiac output and dynamic cardiac preload variables derived from pulse wave analysis to guide perioperative goal-directed therapy. This is especially true in high-risk patients having major surgery. Pulse wave analysis–derived continuous real-time cardiac output estimations can also be used during tests of fluid responsiveness in critically ill patients.

As always, thank you for interest in and support of our journal. I hope that you will use the information published in Anesthesiology to guide and improve your clinical practice. I look forward to keeping you informed as Anesthesiology continues to publish important research and trusted evidence each month.