

## ANESTHESIOLOGY



Deborah J. Culley, M.D., Editor


**Comparison of safety and efficacy of methadone vs morphine for treatment of neonatal abstinence syndrome: A randomized clinical trial. JAMA Pediatr 2018; 172:741–8.**

Morphine and methadone are commonly used to treat neonatal abstinence syndrome after opioid use during pregnancy. It is currently unknown which of these opioids has better safety profile and treatment efficacy. In this randomized, double-blind, intention-to-treat trial, 117 opioid-exposed neonates presenting abstinence syndrome were allocated to either methadone or morphine treatment. The primary endpoint was defined as length of hospital stay while secondary outcomes were length of hospital stay attributable to the abstinence syndrome and the length of drug treatment. The authors found that methadone when compared with morphine treatment was associated with a 14% reduction of hospital stay (relative number of days, 0.86; 95% CI, 0.74 to 1;  $P = 0.046$ ; corresponding to a difference of 2.9 days) and with a 16% reduction in the length of treatment (relative number of days, 0.84; 95% CI, 0.73 to 0.97;  $P = 0.02$ ; corresponding to a difference of 2.3 days). These results suggest that short-term outcomes after neonatal abstinence syndrome are better in infants receiving methadone when compared with morphine. (Summary: Laszlo Vutskits. Image: ©ThinkStock.)

**Take home message:** Methadone appears to be more effective than morphine to treat neonatal abstinence syndrome in opioid-exposed neonates.


**Association of perioperative red blood cell transfusions with venous thromboembolism in a North American registry. JAMA Surg 2018 Jun 13 [Epub ahead of print].**

Proinflammatory responses to surgery and general anesthesia have been implicated in the development of postoperative venous thromboembolism. Perioperative erythrocyte transfusion has been implicated in development of a hypercoagulable state. Using the American College of Surgeons National Surgical Quality Improvement Program database, the authors analyzed 750,937 adults undergoing noncardiac surgery excluding trauma or solid organ transplant in 2014. The primary outcome was new postoperative venous thromboembolism, a composite of deep vein thrombosis and pulmonary embolism within 30 days of surgery requiring treatment with anticoagulation or a vena cava filter. The independent variables were perioperative erythrocyte transfusion events (the number of units transfused was not captured) 72h before or after surgery. Multivariable logistic regression and propensity score matching were used. In this cohort, 6.3% received at least one erythrocyte transfusion and venous thromboembolism occurred in 0.8% of patients. Erythrocyte transfusion was associated with venous thromboembolism (odds ratio, 2.1; 95% CI, 2.0 to 2.3), deep vein thrombosis alone (odds ratio, 2.2; 95% CI, 2.1 to 2.4), and pulmonary embolism alone (odds ratio, 1.9; 95% CI, 1.7 to 2.1). A significant dose–response relation was observed, and associations were robust across all surgical subspecialties analyzed. (Summary: Martin J. London. Image: J. P. Rathmell.)

**Take home message:** In a large national surgical registry, perioperative erythrocyte transfusion was independently associated with postoperative venous thromboembolism.


**Effect of acupuncture vs sham acupuncture or waitlist control on joint pain related to aromatase inhibitors among women with early-stage breast cancer: A randomized clinical trial. JAMA 2018; 320:167–76.**

Joint pain after treatment of breast cancer with aromatase inhibitors is common. Some small studies have suggested that acupuncture may be efficacious in decreasing pain after treatment with aromatase inhibitors. In this multicenter prospective randomized trial performed between March 2012 and February 2017, 226 patients with breast cancer treated with aromatase inhibitors and pain scores greater than 3 on the Brief Pain Inventory Worst Pain score were randomized 2:1:1 to acupuncture ( $n = 110$ ), sham acupuncture ( $n = 59$ ), or control ( $n = 57$ ). The primary outcome was change in the 6-week Brief Pain Inventory Worst Pain score. At 6 weeks after treatment, the Brief Pain Inventory Worst Pain score was 2 points lower in the true acupuncture group and 1 point lower in the sham acupuncture and control group. The adjusted differences for true acupuncture versus sham acupuncture pain scores were 0.92 points (95% CI, 0.20 to 1.65;  $P = 0.01$ ) and 0.96 points for the true acupuncture group when compared with the control group (95% CI, 0.24 to 1.67;  $P = 0.01$ ). (Summary: Deborah J. Culley. Image: ©ThinkStock.)

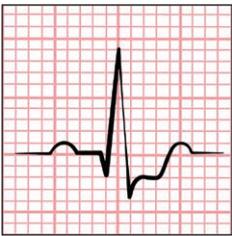
**Take home message:** Acupuncture may reduce joint pain 6 weeks after initiation in patients with breast cancer treated with aromatase inhibitors.



### Unravelling residents' and supervisors' workplace interactions: An intersubjectivity study. *Med Educ* 2018; 52:725–35.

Evaluation of interactions between residents and attendings leading to successful engagement resulting in achievement of common goals is a complicated process. In this study the authors conducted a constructivist grounded theory study involving focus groups and direct observation of residents and attendings in an anesthesiology program to elucidate the interactions using the lens of intersubjectivity, the sharing of experiences leading to shared meanings through social interaction. They identified three patterns of resident adaptation leading to a shared understanding during patient care: pattern 1, complying with the supervisors' directions, which could be led by both the force of attending suggestion and the resident assuming a more passive role; pattern 2, negotiating the supervisor's preference, where the resident tries to influence the directions of the supervisor by suggesting an alternative; and pattern 3, shared decision-making, where both the supervisor and resident are working together to create a plan of action. This was used more frequently with senior residents or residents finishing a rotation. (Summary: Dawn Dillman. Image: J. P. Rathmell.)

**Take home message:** Recognizing that supervisory interactions are progressive adaptation processes may be important for resident growth and development as a physician.



### Dabigatran in patients with myocardial injury after non-cardiac surgery (MANAGE): An international, randomised, placebo-controlled trial. *Lancet* 2018; 391:2325–34.

Myocardial injury after noncardiac surgery is estimated to occur in 8 million adults per year and is associated with an increased risk of cardiovascular morbidity and mortality. This international, multicenter, randomized, placebo-controlled trial tested the hypothesis that institution of dabigatran or placebo within 35 days of myocardial injury after noncardiac surgery would reduce the incidence of myocardial injury after noncardiac surgery. Composite primary efficacy (major vascular complication) and safety outcomes (organ bleeding) were considered in an intention-to-treat design with follow-up every 6 months. Between January 2013 and July 2017, 1,754 patients were randomized to either dabigatran (877) or placebo (877) and 556 patients were randomized to omeprazole (results to be published elsewhere).

Of the 1,754 myocardial injury after noncardiac surgery subjects, 91% of myocardial injury after noncardiac surgery events were clinically silent. Dabigatran reduced the incidence of the composite major vascular outcomes (hazard ratio, 0.72; 95% CI, 0.55 to 0.93;  $P = 0.0115$ ) with no difference in the occurrence of the safety outcome (3% dabigatran vs. 4% placebo; hazard ratio, 0.92; 95% CI, 0.55 to 1.53;  $P = 0.76$ ). (Summary: Martin J. London. Image: J. P. Rathmell.)

**Take home message:** Oral anticoagulation with dabigatran was associated with a significant reduction in long-term cardiovascular complications with no significant increase in major bleeding complications.



### How do resuscitation teams at top-performing hospitals for in-hospital cardiac arrest succeed? A qualitative study. *Circulation* 2018; 138:154–63.

Outcomes after in-hospital cardiac arrest vary substantially between hospitals. The purpose of this study was to identify how top-performing hospitals achieve higher survival rates after in-hospital cardiac arrests. Between 2012 and 2014, the American Heart Association Get with the Guidelines-Resuscitation registry hospitals were divided into top, middle, and bottom quartiles for survival and qualitatively evaluated by site visits with clinical and administrative staff to identify prominent themes from nine of the top-performing hospitals. A total of 185 individuals from multiple disciplines were interviewed. Four broad themes were identified including team designs that included dedicated or designated resuscitation team members; team composition and roles that included physicians, nurses, anesthesiologists, security, pharmacy, and spiritual staff; communication and leadership during in-hospital cardiac arrest that encouraged multidisciplinary discussion and respect; and training/educational efforts around resuscitation including mock codes with structured postdebriefing. (Summary: Deborah J. Culley. Image: Courtesy of STRATUS Center, Brigham and Women's Hospital, Boston, Massachusetts.)

**Take home message:** Hospitals with low mortality after in-hospital cardiac arrest often have designated code teams, diverse code team member composition, good communication and leadership skills, and training/educational efforts.

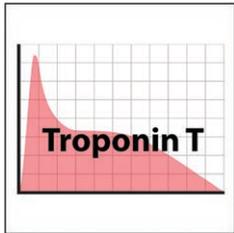


### Clinical trial of fluid infusion rates for pediatric diabetic ketoacidosis. *N Engl J Med* 2018; 378:2275–87.

Diabetic ketoacidosis in children is associated with neuromorbidity in up to 1% of patients. Rapid administration of intravenous fluids to rehydrate patients has been suggested to contribute to brain injury in this context via reduced serum osmolality and concomitant brain swelling. In this randomized controlled multicenter trial, the authors evaluated the effects of the rate of administration and the sodium chloride content of intravenous fluids on neurologic outcomes in 1,255 children presenting with 1,389 episodes of diabetic ketoacidosis. Using a two-by-two factorial design, they showed that neither the sodium chloride concentration (0.9% vs. 0.45%) nor the rate of fluid administration (rapid vs. slow) had any influence on the incidence of decline in mental status (defined by two consecutive Glasgow Coma Scale scores of less than 14,  $P = 0.76$ ). Memory and intelligence quotient scores up to 6 months after the ketoacidosis period

were also comparable between the treatment groups. (Summary: Laszlo Vutskits. Image: J. P. Rathmell.)

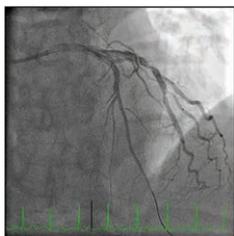
**Take home message:** Neither the rate of administration nor the sodium chloride content of intravenous fluids influenced neurologic outcomes of diabetic ketoacidosis in children.



**Myocardial injury after noncardiac surgery (MINS) in vascular surgical patients: A prospective observational cohort study. *Ann Surg* 2018; 268:357–63.**

Noncardiac surgery has been associated with a high incidence of postoperative myocardial injury, the majority of which is silent. This international, prospective cohort study investigated myocardial injury in 15,102 patients undergoing noncardiac surgery. This manuscript reports on 502 vascular surgery patients to determine whether myocardial injury after noncardiac surgery was prognostically important and whether it predicted 30-day mortality. Investigators measured troponin T concentrations during postoperative days 1 to 3 and defined myocardial injury after vascular surgery as a troponin T level greater than or equal to 0.03 ng/ml. Myocardial ischemia after vascular surgery occurred in 19% of patients. Those that developed myocardial ischemia had a higher 30-day mortality rate (odds ratio, 9.5; 95% CI, 3.5 to 26.0;  $P < 0.001$ ) and the majority of the patients had silent myocardial ischemia (74.1%; 95% CI, 63.6 to 82.4) that would not be detected without measurement of troponin T levels. (Summary: Deborah J. Culley. Image: J. P. Rathmell.)

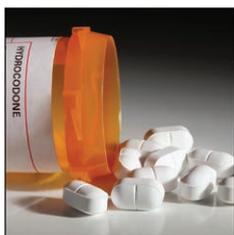
**Take home message:** Myocardial ischemia detected by troponin T levels may occur in 19% having vascular surgery and is associated with increased 30-day mortality. Measuring troponin T levels may provide an opportunity to improve postoperative outcomes in vascular surgery patients.



**Effects of statins on coronary atherosclerotic plaques: The PARADIGM (Progression of Atherosclerotic Plaque Determined by Computed Tomographic Angiography Imaging) study. *JACC Cardiovasc Imaging* 2018 Jun 8 [Epub ahead of print].**

Statins have been shown to reduce the incidence of major adverse cardiac events although their precise actions on coronary artery plaques are not well characterized. This study describes the results from a prospective international, observational registry of 2,252 subjects with known or suspected coronary artery disease undergoing serial coronary computed tomography angiography. Among the 2,252 patients in the registry, 1,225 patients did not have evidence of coronary artery disease on their first scan and were included in this study; of that subset, 781 were on statin therapy at baseline. Statin use was associated with a slower rate of plaque volume progression (1.76 + 2.40% per year vs. 2.04 + 2.37% per year,  $P = 0.002$ ) but a higher rate of calcified plaque volume (1.27 + 1.54% per year vs. 0.98 + 1.27% per year,  $P < 0.001$ ). Interestingly, progression to obstructive disease status was not different between the two groups. (Summary: Martin J. London. Image: J. P. Rathmell.)

**Take home message:** Statin use in relatively low-risk patients may not decrease the risk of progression to obstructive coronary artery disease.



**Prevalence of preoperative opioid use and characteristics associated with opioid use among patients presenting for surgery. *JAMA Surg* 2018 Jul 11 [Epub ahead of print].**

The prevalence of preoperative opioid use in patients undergoing surgery is poorly understood. This study investigated the prevalence of preoperative opioid utilization and demographic and procedural characteristics of patients undergoing surgery who were taking opioids preoperatively. The data for this study were from a prospective institutional research registry. Among the 34,186 patients included in the study, preoperative opioid use was identified in 23%. On multivariate analysis, patients taking preoperative opioids were more likely to be between the age of 31 and 40 (odds ratio, 1.3; 95% CI, 1.1 to 1.5;  $P = 0.001$ ), a current (odds ratio, 1.6; 95% CI, 1.5 to 1.8;  $P < 0.001$ ) or former (odds ratio, 1.3; 95% CI, 1.2 to 1.4;  $P < 0.001$ ) smoker, more likely to have a history of opioid (odds ratio, 1.7; 95% CI, 1.2 to 2.6;  $P = 0.007$ ) or nonopioid (odds ratio, 1.2; 95% CI, 1.0 to 1.5;  $P = 0.01$ ) illicit drug use, and were more likely

to have higher pain scores, lower life satisfaction and depression, and higher American Society of Anesthesiologists and Charlson Comorbidity index scores when compared with patients that were not taking opioids preoperatively. There were also procedural differences in preoperative opioid consumption. (Summary: Deborah J. Culley. Image: ©ThinkStock.)

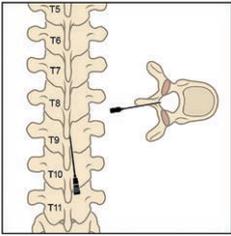
**Take home message:** Nearly a quarter of patients presenting for surgery are taking opioids preoperatively.



**Sodium bicarbonate therapy for patients with severe metabolic acidemia in the intensive care unit (BICAR-ICU): A multicentre, open-label, randomised controlled, phase 3 trial. *Lancet* 2018; 392:31–40.**

Sodium bicarbonate is often administered to patients with severe acidemia even though the therapeutic value of this approach on outcomes is poorly defined. In this trial, the authors evaluated whether sodium bicarbonate infusion improves survival and organ function in adult patients with severe acidemia ( $\text{pH} \leq 7.2$ ,  $\text{Paco}_2 \leq 45$  mmHg, sodium bicarbonate concentration  $\leq 20$  mmol/l). They have found no difference in the primary composite outcome, defined as mortality by day 28, and the presence of at least one organ failure at day 7 after admission between patients who received either no sodium bicarbonate or 4.2% sodium bicarbonate to maintain arterial pH above 7.30. The probability of survival by day 28 was 46% (95% CI, 40 to 54%) in the control group and 55% (95% CI, 49 to 63%) in the bicarbonate group ( $P = 0.09$ ). Importantly, in a prespecified subgroup of patients with acute kidney injury, administration of sodium bicarbonate improved 28-day survival (63% [95% CI, 52 to 72%] vs. 46% [95% CI, 35 to 55%],  $P = 0.03$ ). Sodium bicarbonate infusion was also associated with more days alive and free from renal replacement therapy in patients with acute kidney injury. (Summary: Laszlo Vutskits. Image: J. P. Rathmell.)

**Take home message:** In critically ill patients with severe metabolic acidemia ( $\text{pH} \leq 7.2$ ) and acute kidney injury, administration of sodium bicarbonate may reduce mortality and improve outcome.



**Conventional epidural vs transversus abdominis plane block with liposomal bupivacaine: A randomized trial in colorectal surgery. J Am Coll Surg 2018; 227:78–83.**

Enhanced recovery from anesthesia and surgery anesthesia protocols often include either epidural or transversus abdominis plane blocks. This prospective study randomized 83 patients to either epidural analgesia (bupivacaine and fentanyl;  $n = 39$ ) or transversus abdominis plane block analgesia (liposomal bupivacaine;  $n = 44$ ). The primary outcome was hospital length of stay. Secondary outcomes included time to flatus, postoperative nausea and vomiting, urinary retention, mortality, and 30-day readmission. Seventy-eight patients were included in the analysis. Interestingly, more patients with diverticulitis were randomized to the epidural group ( $P = 0.02$ ). Hospital length of stay was decreased in the transversus abdominis plane block group when compared with the epidural group ( $2.8 \pm 0.8$  days vs.  $3.3 \pm 1.2$  days, respectively;  $P = 0.02$ ). There were no differences in time to first flatus, nausea, or urinary retention

between the groups, although the study may have been underpowered to detect differences in secondary outcomes. (Summary: Deborah J. Culley. Image: G. Nelson.)

**Take home message:** Transversus abdominis plane block may be associated with shorter hospital length of stay in patients undergoing abdominal surgery when compared with epidural analgesia.