SCIENCE, MEDICINE, AND THE ANESTHESIOLOGIST

ANESTHESIOLOGY

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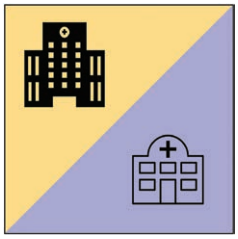
Key Papers from the Most Recent Literature Relevant to Anesthesiologists

Racial/ethnic disparities in longer-term outcomes among emergency general surgery patients: The unique experience of universally insured older adults. Ann Surg 2018; 268:968–79.

The extent to which insurance coverage status affects disparities in outcomes during the postacute care recovery period among older adult patients remains unclear. This study focused on universally insured emergency general surgery patients ages 65 yr and older to determine the existence of racial/ethnic disparities in mortality, major morbidity, and unplanned readmissions. The authors performed a survival analysis of 6.78 million Medicare records using risk-adjusted Cox proportional-hazards models. Compared to non-Hispanic white patients, minority patients were less likely to die (non-Hispanic black patient hazard ratio 0.88; 95% CI, 0.86 to 0.89). The differences became less pronounced with 180-day survival data: black *versus* white hazard ratio 1.00; 95% CI, 0.98 to 1.02. Differences in major morbidity and unplanned readmission were comparable among whites, Hispanics, and Asians, but black patients fared consistently worse. Similar trends were identified across diagnostic categories, but significant differences were often attributed to geography. This study also identified that teaching status, age cohort, and a hospital's percentage of minority patients accounted for up to 50% of readmission differences between racial/ethnic groups. *(Article Selection: Deborah J. Culley. Image: ©gettyimages.)*

Take home message: Persistent race/ethnic disparities in postacute care outcomes may occur in older surgical patients.



Changes in prevalence of health care-associated infections in U.S. hospitals. N Engl J Med 2018; 379:1732–44.

In 2011, approximately 4% of U.S. hospitalized patients had a healthcare-associated infection. This study presents data from a 2015 survey aimed at assessing whether the infection rate has changed. Participating hospitals selected one day on which to identify and assess a random sample of patient records. The authors performed multivariable log-binomial regression modeling to evaluate how the survey year was associated with the risk of healthcare-associated infections. The authors found that fewer patients had healthcare-associated infections in 2015 (394 patients [3.2%; 95% CI, 2.9 to 3.5]) than in 2011 (452 patients [4.0%; 95% CI, 3.7 to 4.4]; $P < 0.001$). The decrease in the infection rate was attributed to reductions in the prevalence of surgical-site and urinary tract infections. The most common healthcare-associated infections were pneumonia, gastrointestinal infections (mostly due to clostridium difficile), and surgical-site infections. Accordingly, a patient's risk of having a healthcare-associated infection was 16% lower in 2015 than in 2011 (risk ratio 0.84; 95% CI, 0.74 to 0.95; $P = 0.005$) after adjusting for age, presence of devices, hospital length of stay, and hospital size. *(Article Selection: Deborah J. Culley. Image: J. P. Rathmell.)*

Take home message: The prevalence of healthcare-associated infections was lower in 2015 than in 2011. Prevention of clostridium difficile infection and pneumonia should be targeted for improvement.

Association of dairy intake with cardiovascular disease and mortality in 21 countries from five continents (PURE): A prospective cohort study. Lancet 2018; 392:2288–97.

Dietary guidelines recommend minimizing whole-fat dairy product consumption to reduce the risk of cardiovascular disease. However, limited data exist describing the health effects of dairy products in low-income and middle-income countries. This multinational cohort study assessed the associations between dairy consumption and mortality and major cardiovascular disease. The primary outcome was the composite of mortality or major cardiovascular events. In the study population, 6,796 deaths and 5,855 major cardiovascular events were identified. Consumption of more than two daily servings of total dairy was associated with a lower risk of the composite adverse outcomes than no dairy consumption (hazard ratio 0.84; 95% CI, 0.75 to 0.94; P trend = 0.0004), total mortality (hazard ratio 0.83; 95% CI, 0.72 to 0.96; P trend = 0.0052), noncardiovascular mortality (hazard ratio 0.86; 95% CI, 0.72 to 1.02; P trend = 0.046), cardiovascular mortality (hazard ratio 0.77; 95% CI, 0.58 to 1.01; P trend = 0.029), major cardiovascular disease (hazard ratio 0.78; 95% CI, 0.67 to 0.90; P trend = 0.0001), and stroke (hazard ratio 0.66; 95% CI, 0.53 to 0.82; P trend = 0.0003). Higher intake of milk (hazard ratio 0.90; 95% CI, 0.82 to 0.99; P trend = 0.0529) and yogurt (hazard ratio 0.86; 95% CI, 0.75 to 0.99; P trend = 0.0051) was associated with lower composite outcome risk. Cheese consumption was not significantly associated with the composite outcome (hazard ratio 0.88; 95% CI, 0.76 to 1.02; P trend = 0.1399). *(Article Selection: Deborah J. Culley. Image: ©gettyimages.)*

Take home message: Dairy consumption may lower the risk of mortality and major cardiovascular disease events in a diverse multinational cohort.

<zdoi;10.1097/ALN.0000000000002556>

The correlation of stress in residency with future stress and burnout: A 10-year prospective cohort study. J Grad Med Educ 2018; 10:524–31.

Although it is common for medical residents to display signs of stress, it is unknown whether this stress is associated with subsequent burnout. This study assessed whether stress persisted after residency and correlated with future burnout. During three academic years, residents were surveyed to measure stress in residency. Ten years later, the authors contacted these former residents for a second survey measuring professional stress and burnout. The initial survey included responses from 143 residents (92% response rate). In 2015, the authors sent follow-up surveys to 122 participants, with 81 responses received (66% response rate and 57% of original participants). The authors found that emotional distress in residency correlated with emotional distress in professional practice (correlation coefficient = 0.45, $P < 0.0001$), emotional exhaustion (correlation coefficient = 0.30, $P = 0.007$), and depersonalization (correlation coefficient = 0.25, $P = 0.029$). Multivariate linear regression showed that emotional distress in residency was associated with future emotional distress (β estimate = 0.57, $P = 0.005$) and depersonalization (β estimate = 2.29, $P = 0.028$). *(Article Selection: Dawn Dillman. Image: ©gettyimages.)*

Take home message: Emotional distress as a resident is associated with persistent emotional distress in professional practice 10 yr later and has an association with burnout in practice.

Functional trajectories before and after major surgery in older adults. Ann Surg 2018; 268:911–7.

Major surgery among older adults, although common, can lead to functional decline and disability. This prospective cohort study examined sets of functional trajectories identified in the year before and after major surgery. The authors included 250 participants ages 70 yr and older who underwent their first major surgery during the study period. Before surgery, four functional trajectories were identified: no disability (n = 60, 24%), and disability ranging from mild (n = 84, 34%), moderate (n = 73, 29%), and severe (n = 33, 13%). Similarly, four postoperative functional trajectories were identified: improvement described as rapid (n = 39, 16%), gradual (n = 76, 30%), partial (n = 70, 28%), or little (n = 57, 23%). The authors observed rapid improvement for 31 participants (52%) with no disability before surgery. Rapid improvement was uncommon among those with mild disability (n = 8, 10%) and was not observed in the moderate and severe trajectory groups. Participants with preoperative mild to moderate disability most often showed gradual improvement (n = 46, 54.8%) and partial improvement (n = 36, 49%). Most participants with severe preoperative disability (n = 27, 82%) showed little improvement. *(Article Selection: Deborah J. Culley. Image: J. P. Rathmell.)*

Take home message: Functional prognosis in the year after major surgery is highly dependent on premorbid function.

Deep learning algorithms for detection of critical findings in head CT scans: A retrospective study. Lancet 2018; 392:2388–96.

Noncontrast head computed tomography (CT) is the standard initial imaging modality for patients with head trauma or suspected stroke. This study described a set of deep learning algorithms to automate detection on CT of intracranial hemorrhage, calvarial fractures, midline shift, and mass effect. The authors assembled a dataset containing 313,318 head CT scans and their accompanying reports from 20 Indian institutions. They used a randomly selected portion (Qure25k dataset, n = 21,095) for validation and developed an additional, unrelated two-batch validation dataset (CQ500 dataset, batch 1 n = 214, batch 2 n = 277). They used areas under the receiver operating characteristic curves (AUCs) primarily to assess the algorithms. The Qure25k dataset algorithms achieved an AUC of 0.92 (95% CI, 0.91 to 0.93) for detecting intracranial hemorrhage. On the CQ500 dataset, AUC was 0.94 (95% CI, 0.92 to 0.97) for intracranial hemorrhage. AUCs on the Qure25k dataset were 0.92 (95% CI, 0.91 to 0.94) for calvarial fractures, 0.93 (95% CI, 0.91 to 0.94) for midline shift, and 0.86 (95% CI, 0.85 to 0.87) for mass effect. The corresponding AUCs on the CQ500 dataset were 0.96 (95% CI, 0.92 to 1.00), 0.97 (95% CI, 0.94 to 1.00), and 0.92 (95% CI, 0.89 to 0.95), respectively. *(Article Selection: Deborah J. Culley. Image: J. P. Rathmell.)*

Take home message: This study suggests that deep learning algorithms can accurately identify head CT scan abnormalities requiring urgent attention, opening up the possibility to use these algorithms to automate the triage process.

<zdoi;10.1097/ALN.0000000000002556>

Effect of a pharmacist-led educational intervention on inappropriate medication prescriptions in older adults: The D-PRESCRIBE randomized clinical trial. JAMA 2018; 320:1889–98.

Inappropriate prescribing for older adults increases the risk of adverse events and drug-related hospitalizations. This randomized study compared a pharmacist-led educational intervention to usual care regarding discontinuation of inappropriate medication in older adults. Participants had been prescribed sedative-hypnotics, glyburide, or nonsteroidal antiinflammatory drugs. Intervention-group pharmacists were encouraged to send patients a deprescribing brochure and their physicians an evidence-based recommendation to deprescribe. The main outcome was discontinuation of relevant prescriptions at 6 months. At 6 months, 106 of 248 patients (43%) in the intervention group no longer filled prescriptions for inappropriate medication. This compares to 29 of 241 (12%) in the usual care group (risk difference 31%; 95% CI, 23 to 38%). In the intervention *versus* control group, nonsteroidal antiinflammatory drugs were discontinued at the highest rate, with 19 of 33 patients (57.6%) *versus* five of 23 (21.7%), respectively (risk difference 35%; 95% CI, 10 to 55%; $P = 0.09$). No adverse events requiring hospitalization were reported, although 29 of 77 patients (38%) experienced withdrawal symptoms when attempting to taper sedative-hypnotics. *(Article Selection: Deborah J. Culley. Image: ©gettyimages.)*

Take home message: Among older adults, a pharmacist-led educational intervention compared to usual care resulted in greater discontinuation of inappropriate medication after 6 months. The generalizability of these findings to other settings requires further research.

Effect of protocolized weaning with early extubation to noninvasive ventilation vs invasive weaning on time to liberation from mechanical ventilation among patients with respiratory failure: The Breathe randomized clinical trial. JAMA 2018; 320:1881–8.

It is unknown whether noninvasive ventilation may be effective in a general intensive care population. This study investigated the effects of protocolized weaning with early extubation to noninvasive ventilation among patients with weaning difficulty. It compared time to liberation from ventilation compared with protocolized invasive weaning. This open-label, multicenter trial enrolled adults who received invasive mechanical ventilation for more than 48 h and failed a spontaneous breathing trial. Patients received either protocolized weaning *via* early extubation to noninvasive ventilation (n = 182) or protocolized standard weaning (n = 182). The primary outcome was time from randomization to successful liberation from all forms of mechanical ventilation. Among 319 evaluable patients, the median time to liberation was 4.3 days in the noninvasive group *versus* 4.5 days in the invasive group (adjusted hazard ratio 1.1; 95% CI, 0.89 to 1.40). The noninvasive group received less invasive ventilation (median, 1 *vs.* 4 days; incidence rate ratio 0.6; 95% CI, 0.47 to 0.87) and fewer total ventilator days (median, 3 *vs.* 4 days; incidence rate ratio 0.8; 95% CI, 0.62 to 1.0). Adverse events occurred in 45 patients (24.7%) in the noninvasive group compared to 47 (25.8%) in the invasive group. There was no significant difference in reintubation, tracheostomy rates, or survival. *(Article Selection: Martin J. London. Image: J. P. Rathmell.)*

Take home message: Among patients requiring mechanical ventilation in whom a spontaneous breathing trial had failed, early extubation to noninvasive ventilation did not shorten time to liberation from any ventilation.

Patient-centered outcome spectrum: An evidence-based framework to aid in shared decision-making. Ann Surg 2018; 268:980–4.

Prediction tools currently present risks for discrete outcomes rather than a composite measure. This study developed a tool for presenting risk as a composite measure of anticipated outcomes after emergency general surgery. The Patient-Centered Outcomes Spectrum was developed using the American College of Surgeons National Surgical Quality Improvement Program Participant Use File for older adult patients undergoing emergency surgery. The Patient-Centered Outcomes Spectrum defines good, intermediate, and bad outcomes and allows prospective stratification of patients based on their surgical diagnosis and preoperative surgical risk profile. Of the study patient population, 13,330 (46.4%) achieved a good outcome during their 30-day postoperative course. Additionally, 11,617 patients (40.4%) experienced an intermediate outcome and 3,791 patients (13.2%) were classified as having a bad outcome. For low-risk patients, the incidence of good, intermediate, and bad outcomes was 69.7%, 28.2%, and 2.1%, respectively. For high-risk patients the incidence was 22.0%, 48.9%, and 29.1%, respectively. *(Article Selection: Deborah J. Culley. Image: ©gettyimages.)*

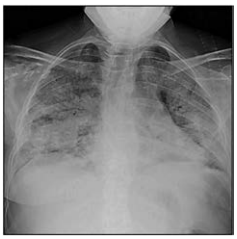
Take home message: Consistent with the goals of shared decision-making, the Patient-Centered Outcomes Spectrum provides an evidence-based construct based on a composite outcome measure for patients and providers as they weigh the risks of undergoing emergency surgery.

<zdoi;10.1097/ALN.0000000000002556>

Exploring trajectories of health care utilization before and after surgery. J Am Coll Surg 2019; 228:116–28.

Questions remain about long-term trajectories of surgery-related healthcare utilization. This study examined utilization trajectories among surgical patients and identified possible related factors after surgical admissions. Veterans Health Administration medical-surgical admissions within 2 yr of an index inpatient surgery were identified. Group-based trajectory analysis was used to identify five trajectories of inpatient admissions involving surgery. Bivariate statistics and multivariate logistic regression were used to compare trajectories of utilization across patient groups. Of 280,681 surgeries, most patients underwent orthopedic (29%), general (28%), or peripheral vascular (12%) procedures. Among consistently high inpatient utilizers, 5% of patients accounted for 34% of inpatient days. Male (95% *vs.* 94% female, $P < 0.01$) and unmarried patients (62% *vs.* 53% married, $P < 0.01$) were most likely to be high utilizers. High utilizers also had more comorbidities and a notably higher rate of mental health diagnoses. *(Article Selection: Deborah J. Culley. Image: J. P. Rathmell.)*

Take home message: Mental health, social/behavioral, and pain-related factors are independently associated with high preoperative and postoperative healthcare utilization in surgical patients.



Effect of a low vs intermediate tidal volume strategy on ventilator-free days in intensive care unit patients without ARDS: A randomized clinical trial. JAMA 2018; 320:1872–80.

It remains unclear whether invasive ventilation should include the use of low tidal volumes in critically ill patients who do not have acute respiratory distress syndrome (ARDS). This study examined whether a low tidal volume ventilation strategy (6 ml/kg) yielded better outcomes than an intermediate one (10 ml/kg). This study was performed in six Dutch intensive care units and involved 961 patients who did not have ARDS and were expected to remain intubated for at least 24 h. Patients were randomized to receive invasive ventilation using low tidal volumes (n = 477) or intermediate tidal volumes (n = 484). The primary outcome was survival at day 28 and the number of ventilator-free days. On day 28, patients in both groups had achieved a median of 21 ventilator-free days (low group range 0 to 26; intermediate group range 0 to 26; mean difference, –0.27 [95% CI, –1.74 to 1.19]; $P = 0.71$). There were no significant differences in length of stay (both intensive care unit and hospital) or 28-day and 90-day mortality. *(Article Selection: Martin J. London. Image: J. P. Rathmell.)*

Take home message: In intensive care unit patients without ARDS requiring mechanical ventilation, a low tidal volume strategy did not result in a greater number of ventilator-free days than an intermediate tidal volume strategy.

Operating room attire policy and healthcare cost: Favoring evidence over action for prevention of surgical site infections. J Am Coll Surg 2019; 228:98–106.

In an attempt to reduce surgical-site infections, the Association of Perioperative Registered Nurses released new guidelines for operating room attire in 2015. This single-institution study assessed the relationships among operating room attire, surgical-site infections, and healthcare costs. Propensity score matching was used to compare surgical-site infection rates and microbiologic culture data for 30,493 general surgery, cardiac, neurosurgery, orthopedic, and gynecology procedures before and after policy implementation. The study included 12,585 matched pairs spanning the policy change. The surgical-site infection rate between groups was comparable before and after the policy change (1.0% postpolicy group *vs.* 1.1% prepolicy group; $P = 0.7$). The incidence of *Staphylococcal* species cultured from wounds was comparable between groups (19.3% postpolicy group *vs.* 16.8% prepolicy group; $P = 0.6$). The best independent predictors of surgical-site infections were wound classification and emergent procedures. The prepolicy per-person cost of operating room attire ranged from $0.07 to $0.12. This increased to $1.11 to $1.38 after policy change. The mandated operating room long-sleeved jackets alone added annual costs of $1,128,078. *(Article Selection: Deborah J. Culley. Image: Brigham & Women's Hospital.)*

Take home message: Implementation of the Association of Perioperative Registered Nurses guidelines may not decrease surgical-site infections and may have increased healthcare costs.

<zdoi;10.1097/ALN.0000000000002556>