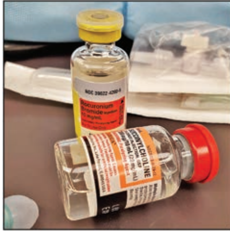
SCIENCE, MEDICINE, AND THE ANESTHESIOLOGIST
ANESTHESIOLOGY
Deborah J. Culley, M.D., Editor

Key Papers from the Most Recent Literature Relevant to Anesthesiologists



Effect of rocuronium vs succinylcholine on endotracheal intubation success rate among patients undergoing out-of-hospital rapid sequence intubation: A randomized clinical trial. JAMA 2019; 322:2303–12.

Rapid sequence intubation is often recommended for patients requiring emergency out-of-hospital tracheal intubation. It remains unclear whether rapid sequence intubation with rocuronium as the neuromuscular blocking agent is inferior to succinylcholine. This study tested the hypothesis that rocuronium (1.2 mg/kg) was not inferior to succinylcholine (1.0 mg/kg) for out-of-hospital rapid sequence intubation. A total of 1,226 patients were included in the analysis (n = 610 rocuronium, n = 616 succinylcholine). The primary outcome of the study was the percentage of patients successfully intubated on the first attempt with a noninferiority margin of 7%. The percentage of patients intubated on the first attempt was 75% in the rocuronium group and 79% in the succinylcholine group (difference –5; one-sided 97.5% CI, –9 to ∞). Secondary outcomes included no difference in tracheal intubation difficulty, percentage of patients with excellent and good intubation conditions, use of alternative intubation techniques, Cormack-Lehane grade, and severe complications. *(Article Selection: Martin J. London. Image: M. Lane-Fall.)*

Take home message: This study demonstrates that rocuronium was noninferior to succinylcholine for rapid out-of-hospital intubations in terms of successful first attempt intubations.

Association of long-term ambient ozone exposure with respiratory morbidity in smokers. JAMA Intern Med 2019 Dec 9 [Epub ahead of print].

The effects of long-term exposure to ambient ozone among people with a history of heavy smoking remains unknown. This study investigated the association between 10-yr historical ambient ozone concentrations and the development of chronic obstructive pulmonary disease (COPD), computed tomography measures of respiratory disease, patient-reported outcomes, disease severity, and exacerbations in smokers at risk for pulmonary disease. Data were obtained from the Air Pollution Study, an ancillary study of the Subpopulations and Intermediate Outcome Measures in COPD Study from participants enrolled in seven clinical sites in the United States. Among the 1,874 individuals who were analyzed, every five parts per billion increase in ozone concentration was associated with an increased percentage of patients with emphysema as detected by computed tomography scan ($\beta = 0.94$; 95%CI, 0.25 to 1.64; $P = 0.007$), other computed tomography measures of respiratory morbidity, and respiratory exacerbations. *(Article Selection: Beatrice Beck-Schimmer. Image: Adobe Stock.)*

Take home message: This study suggests that every five part per billion increase in the ozone concentration is associated with increased risk of pulmonary disease in patients who smoke and are at risk of pulmonary disease.

National Quality Forum guidelines for evaluating the scientific acceptability of risk-adjusted clinical outcome measures: A report from the National Quality Forum Scientific Methods Panel. Ann Surg 2019 Dec 9 [Epub ahead of print].

The ability to accurately measure quality is necessary to achieve high-quality lower-cost surgical and medical care by aligning patient outcomes with financial incentives. The National Quality Forum evaluates the quality of the data used to create performance measures and the reliability and validity of the measures themselves. These guidelines from the National Quality Forum provide guidance on the standards used by the National Quality Forum to judge the scientific acceptability of performance measures that are submitted to the National Quality Forum for endorsement. *(Article Selection: Laurent Glance. Image: Adobe Stock.)*

Take home message: This report from the National Quality Forum Scientific Methods Panel provides guidance on the standards used by the National Quality Forum to evaluate the scientific acceptability of risk-adjusted clinical outcome measures.

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 DOI: 10.1097/ALN.0000000000003248

Design and impact of a novel surgery-specific second victim peer support program. J Am Coll Surg 2019 Nov 20 [Epub ahead of print].

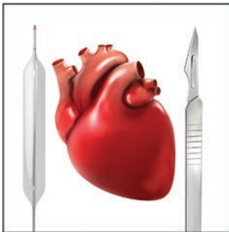
Physicians often have feelings of guilt, sadness, and anxiety after adverse patient events. This article describes the development of a second victim peer support program in an academic department of surgery. It included the creation of a conceptual framework for the program, a choice of peer supporters who represent the type of people peers would want to turn to when things go wrong, protected time for training of peer supporters, multiple ways to identify major adverse events, and development of an intervention plan with an outreach email sent to each individual involved in the adverse event with an offer to speak with a peer supporter. When surveyed, the majority of program participants agreed or strongly agreed with the statement that they were satisfied with the program's confidentiality, timeline for intervention, were likely to recommend the program to colleagues, and wanted to become or continue being a peer supporter. *(Article Selection: Deborah J. Culley. Image: Adobe Stock.)*

Take home message: Programs for peer support after adverse events may be used to decrease a second victim among surgeons.

Sleep fragmentation, microglial aging, and cognitive impairment in adults with and without Alzheimer's dementia. Sci Adv 2019; 5:eaax7331.

Sleep disruption and alterations in inflammatory pathways have been associated with cognitive impairment and Alzheimer disease in older patients. This analysis included data from 685 patients from the Rush Memory and Aging Project and the Religious Orders Study. Sleep fragmentation was measured antemortem by actigraphy and postmortem by gene expression and microglial gene expression in the brains of deceased patients. Microglial gene expression and morphologic activation were associated with fragmented sleep and chronologic age but were not significantly different between individuals with or without Alzheimer pathology. Interestingly, there was an association between the expression of genes characteristic of aged microglia and composite global cognition before death when controlling for dementia-associated brain pathologies. These findings suggest that the association between the expression of aged microglia genes among patients with fragmented sleep may explain the relationship between fragmented sleep and cognitive impairment. *(Article Selection: Martin J. London. Image: Adobe Stock.)*

Take home message: Sleep fragmentation is associated with both cognitive impairment and the development of an aging microglia gene signature.



Percutaneous coronary angioplasty versus coronary artery bypass grafting in the treatment of unprotected left main stenosis: Updated 5-year outcomes from the randomised, non-inferiority NOBLE trial. Lancet 2020; 395:191–9.

There is controversy as to whether percutaneous coronary interventions (PCIs) for revascularization of the left main coronary artery lead to outcomes that are similar to those for coronary artery bypass (CABG). This article reports on the 5-yr outcomes from 592 patients enrolled in the Nordic–Baltic–British Left Main Revascularisation (NOBLE) trial where patients were randomized to PCI or CABG. The primary outcomes were major adverse cardiac or cerebrovascular events, a composite of all-cause mortality, nonprocedural myocardial infarction, repeat revascularization, and stroke. Major adverse cardiac or cerebrovascular events occurred in 28% of patients who had PCI and in 19% of patients who had CABG (hazard ratio 1.58; 95% CI, 1.24 to 2.01; $P = 0.0002$). After PCI the risk of nonprocedural myocardial infarction was 8% compared to 3% after CABG (hazard ratio 2.99; 95% CI, 1.66 to 5.39; $P = 0.0002$) and the risk for repeat revascularization was 17% *versus* 10%, respectively (hazard ratio 1.73; 95% CI, 1.25 to 2.40; $P = 0.0009$). There were no differences in all-cause mortality ($P = 0.68$) or stroke ($P = 0.11$) between the groups. *(Article Selection: Beatrice Beck-Schimmer. Image: Adobe Stock.)*

Take home message: PCI demonstrated less favorable outcomes 5 yr after a left main coronary revascularization when compared to CABG in this trial.

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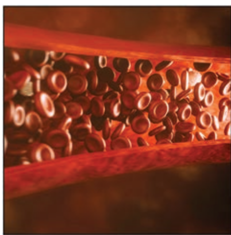
Lack of routine health care among resident physicians in New England. J Am Coll Surg 2019 Nov 22 [Epub ahead of print].

Resident physicians may confront difficulties in obtaining routine medical care despite evidence that healthy physicians are better providers. This study distributed a 44-question survey on medical and psychiatric health to 102 residency program directors in 20 teaching hospitals. Among the 299 residents who completed the survey, 35% did not have a regular care provider. Similarly, 38% of residents who were taking prescription medications did not have a regular care provider. Residents who had not seen a mental health care expert within the past year were more likely to screen positively for depression (81% *vs.* 62%; $P = 0.003$) and burnout (50% *vs.* 36%; $P = 0.03$) when compared to those who had seen a mental health care expert. Residents in anesthesiology (odds ratio 5.60; 95% CI, 1.57 to 20.02), surgery (odds ratio 4.08; 95% CI, 1.17 to 14.24), internal medicine (odds ratio 4.64; 95% CI, 1.32 to 16.34), radiology (odds ratio 5.57; 95% CI, 1.26 to 24.60), pediatrics (odds ratio 8.18; 95% CI, 2.13 to 31.43), and obstetrics/gynecology (odds ratio 6.03; 95% CI, 1.46 to 24.85) were less likely to have a routine place to receive medical care when compared to residents in family medicine. There were no differences between residents in family medicine when compared to those in emergency medicine, neurology, pathology, or psychiatry. *(Article Selection: Deborah J. Culley. Image: Adobe Stock.)*

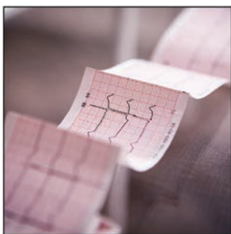
Take home message: Many residents, including those in anesthesiology, may not receive routine medical or psychiatric care during their residency.



Effect of a strategy of comprehensive vasodilation vs usual care on mortality and heart failure rehospitalization among patients with acute heart failure: The GALACTIC randomized clinical trial. JAMA 2019; 322:2292–302.

It is unclear whether early aggressive vasodilation improves outcomes in patients with acute heart failure. The purpose of this randomized, open-label, multinational study was to determine whether early aggressive vasodilation improves outcomes among patients with acute heart failure. The primary endpoint was the composite of all-cause mortality or rehospitalization for acute heart failure at 180 days. Of the 788 patients randomized for the study, 781 were eligible with 386 patients randomized to early intensive and sustained vasodilation and 402 randomized to usual care. There were no differences in the primary outcome of composite all-cause mortality or rehospitalization for acute heart failure at 180 days (absolute difference 2.8%; 95% CI, –3.7% to 9.3%). Similarly, there were no significant differences in secondary outcomes. *(Article Selection: Beatrice Beck-Schimmer. Image: Adobe Stock.)*

Take home message: In this study early aggressive vasodilation for the treatment of acute heart failure was not associated with a reduction in the composite of all-cause mortality or rehospitalization for acute heart failure at 180 days.



Association of high mortality with postoperative myocardial infarction after major vascular surgery despite use of evidence-based therapies. JAMA Surg 2019 Dec 4 [Epub ahead of print].

Major vascular surgery is a risk factor for postoperative myocardial infarction (MI). The aim of this study was to determine patient and surgery characteristics associated with postoperative MI in patients undergoing vascular surgery and to determine whether evidence-based therapies to treat MI improved long-term outcomes in a retrospective cohort of prospectively collected data from private and academic hospitals in Michigan. Logistic regression analysis in 26,231 patients identified age (odds ratio 1.03; 95% CI, 1.02 to 1.05), rural hospitalization (odds ratio 1.37; 95% CI, 1.02 to 1.82), diabetes mellitus (odds ratio 1.51; 95% CI, 1.20 to 1.91), congestive heart failure (odds ratio 1.52; 95% CI, 1.16 to 1.98), significant valvular disease (odds ratio 1.45; 95% CI, 1.02 to 2.05), coronary artery disease (odds ratio 1.38; 95% CI, 1.06 to 1.80), preoperative P2Y12 antagonist use (odds ratio 1.37; 95% CI, 1.08 to 1.73), and type of surgical procedure (open abdominal aortic aneurysm [odds ratio 4.53; 95% CI, 2.73 to 7.52] or bypass [odds ratio 2.38; 95% CI, 1.82 to 3.10]) as risk factors for developing postoperative MI. Those who had a postoperative MI had a higher 1-yr mortality despite reasonable compliance with the American Heart Association/American College of Cardiology guidelines for the management of MI. *(Article Selection: Martin J. London. Image: Adobe Stock.)*

Take home message: Among vascular surgery patients there are both surgical and patient-specific risk factors for the development of a postoperative MI that is associated with an increased 1-yr mortality despite reasonable compliance with guidelines for the care of patients with a MI.

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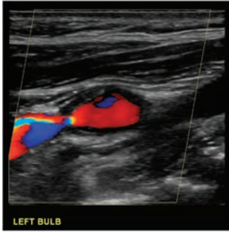
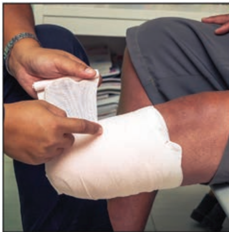


Association of transcarotid artery revascularization vs transfemoral carotid artery stenting with stroke or death among patients with carotid artery stenosis. JAMA 2019; 322:2313–22.

Transfemoral carotid artery stenting has been shown to be associated with a higher stroke rate when compared to carotid endarterectomy. Transcarotid revascularization with flow reversal has recently been introduced. The purpose of this study was to compare stroke and death rates between patients treated with transfemoral carotid artery stenting *versus* transcarotid artery revascularization. Data were gathered prospectively from the Society for Vascular Surgery Vascular Quality Initiative Transcarotid Artery Revascularization Surveillance Project and the Transfemoral Carotid Artery Stent Registry. Patients having these surgeries between September 2016 and April 2019 were included. The exploratory composite endpoint was in-hospital stroke or death. A total of 11,891 patients were included in the analysis, of which 44% underwent transcarotid artery revascularization and 56% transfemoral carotid artery stenting in 319 centers. The risk of in-hospital composite stroke and death rate was 1.6% in the transcarotid group and 3.1% in the transfemoral group (relative risk 0.51; 95% CI, 0.37 to 0.72; $P < 0.001$). Similar findings were noted 30 days after the procedure (1.9% composite stroke and death rate in the transcarotid group and 3.7% in the transfemoral group [relative risk 0.53; 95% CI, 0.39 to 0.72; $P < 0.001$]). *(Article Selection: Martin J. London. Image: J. P. Rathmell.)*

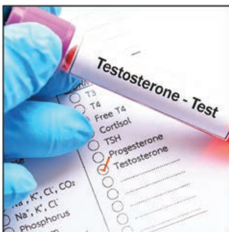
Take home message: Transcarotid revascularization may be associated with lower composite stroke and death rate compared to transfemoral carotid stenting.



Neuromas and postamputation pain. Pain 2020; 161:147-55.

Stump and phantom limb pain are common after an amputation. Some have suggested that the formation of neuromas may play an important role in the development of postamputation pain. This cross-sectional study aimed to determine whether swollen neuromas were more frequent in amputees with stump and phantom limb pain when compared to amputees without pain. Among the 67 amputees included in the analysis, 34 (51%) had stump pain and 45 (67%) had phantom limb pain. Twenty-four reported both stump and phantom limb pain. Swollen neuromas were identified in 81% (n = 45) of patients with either type of pain and in 67% (n = 8) of the patients without pain ($P = 0.56$). Interestingly, pain pressure thresholds of swollen neuromas were significantly lower in amputees with stump pain ($P = 0.02$) when compared to those without stump pain but this was not the case for phantom pain. *(Article Selection: J. David Clark. Image: Adobe Stock.)*

Take home message: This study suggests that swollen neuromas are unlikely to be the cause of postamputation stump and phantom pain.



Health outcomes among long-term opioid users with testosterone prescription in the Veterans Health Administration. JAMA Netw Open 2019; 2:e1917141.

Opioid use has emerged as a common precursor to androgen deficiency leading to testosterone treatment. However, the long-term effects of testosterone treatment remain unknown. This study looked at 21,272 long-term opioid users with low testosterone levels between 2008 and 2014. Among these patients 66% received testosterone and 34% did not. The primary outcome was all-cause mortality and first occurrence of major adverse cardiac events. Opioid users who received testosterone had significantly lower all-cause mortality (hazard ratio 0.51; 95% CI, 0.42 to 0.61) and major adverse cardiac events (hazard ratio 0.58; 95% CI, 0.068 to 0.79) when compared to those without testosterone replacement. On secondary analysis opioid users who received testosterone also had fewer femoral or hip fractures (hazard ratio 0.68; 95% CI, 0.48 to 0.96) and were less likely to have anemia (hazard ratio 0.73; 95% CI, 0.68 to 0.79) when compared to those without testosterone replacement. *(Article Selection: J. David Clark. Image: Adobe Stock.)*

Take home message: Long-term opioid users with androgen deficiency who take testosterone may have less all-cause mortality and fewer major adverse cardiac events.

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