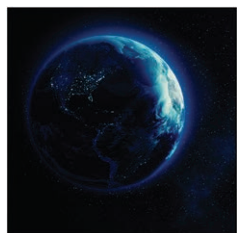


ANESTHESIOLOGY



Deborah J. Culley, M.D., Editor


The impact of surgery on global climate: A carbon footprinting study of operating theatres in three health systems. *Lancet Planet Health* 2017; 1:e381–8.

Operating theaters are known to be a resource-intensive subsector of healthcare delivery, but their environmental impact has not been studied in an integrated, quantitative manner. This article describes the environmental impact of operating theaters in three academic centers in Canada, the United States, and the United Kingdom over a 1-yr period in 2011. Greenhouse gas emissions were estimated using activity data and emission factors and reported according to the Greenhouse Gas Protocol adapted to define emissions. Anesthetic gases and energy consumption were the largest sources of emissions. Preferential use of desflurane at the U.S. and Canadian sites resulted in tenfold greater anesthetic gas emissions relative to the U.K. center, where it is not used. According to the authors, its use comprised most of the carbon footprint of these two centers. Heating, ventilation, and air conditioning accounted for 90 to 99% of operating room consumption at all sites. Operating suites were found to be three to six times more energy intense than the rest of the hospital. The authors estimate the carbon footprint of surgery in the three centers at 9.7 million tons of carbon dioxide emitted per year. (Summary: Martin London. Image: ©ThinkStock.)

Take home message: Operating rooms may have a significant effect on hospital energy consumption.


Is medical education a public or a private good? Insights from the numbers. *JAMA* 2017; 318:2303–5.

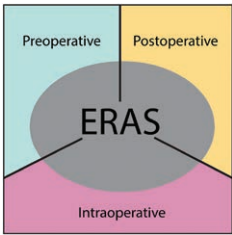
Annually, *JAMA* publishes data about medical education. The most current data about U.S. medical schools and graduate medical education programs are available in *JAMA* 2017; 318:2360–7 and 2368–87. The accompanying editorial, “Is Medical Education a Public or a Private Good? Insights from the Numbers” raises vital questions about the medical education enterprise. Written with a generic flare, the author’s questions are widely applicable to anesthesiology and critical care medicine education. Is medical education focused on the public (altruistic) or private (economically advantageous and individually promoting) good? The author encourages us to consider medical education as it relates to primary *versus* specialty care and societal questions about population groupings of sex, ethnicity, religion, sexual orientation, disabilities, and other aspects of diversity. The author’s query is as follows: Is medical education, as we know it, appropriate for today’s society? (Summary: Alan J. Schwartz. Image: ©ThinkStock.)

Take home message: Is medical education, as we know it, appropriate for today’s society?


Safety of magnetic resonance imaging in patients with cardiac devices. *N Engl J Med* 2017; 377:2555–64.

Magnetic resonance imaging is rarely performed in patients with pacemakers or defibrillators for fear of unanticipated adverse outcomes. This prospective study assessed the safety of magnetic resonance imaging in patients with cardiac devices in 1,509 patients involving 2,103 magnetic resonance imaging scans. The pacemaker or defibrillator was interrogated at baseline and immediately after imaging. In 0.4% (95% CI, 0.2 to 0.7%) of the magnetic resonance imaging examinations, the patient’s device reset to a backup mode. Pacemakers without magnet-mode programming capability experienced transient asymptomatic asynchronous pacing at the pacemaker-specific magnet rate without any clinically relevant symptoms. While there were patients that experienced premature atrial and ventricular beats, ventricular tachycardia, and paroxysmal atrial fibrillation, none were temporally related with magnetic resonance imaging. There were no clinically significant long-term consequences or changes that required device revision or reprogramming. (Summary: Deborah J. Culley. Image: J. P. Rathmell.)

Take home message: Magnetic resonance imaging in patients with cardiac devices may not result in any long-term adverse outcomes.



Association of an enhanced recovery pilot with length of stay in the National Surgical Quality Improvement Program. *JAMA Surg* 2017 Dec 20 [Epub ahead of print].

Enhanced recovery protocols are standardized perioperative care plans that have been shown to reduce hospital length of stay, morbidity, and costs. Unfortunately, these protocols can be daunting to implement and need to be tailored to the circumstances of individual hospitals. To address this problem, the Enhanced Recovery in National Surgical Quality Improvement Program pilot in colon surgery was launched in 2014. A diverse group of fifteen hospitals took part in the pilot and were supported to implement enhanced recovery protocols by providing access to experts in implementation science, interinstitutional collaboration, support through workshops, and other measures. Outcomes for these hospitals were derived through the comparison of 3,437 colectomies before enhanced recovery protocol implementation with 1,538 patients that were cared for after protocol implementation. Mean length of stay decreased

from 6.9 days (interquartile range, 4 to 8 days) to 5.2 days (interquartile range, 3 to 6 days), and a composite morbidity and mortality statistic improved ($P < 0.001$) with the implementation of enhanced recovery protocols. This study suggests assistance in implementation of enhanced recovery protocols may speed adoption of these protocols and improve patient outcomes. (Summary: J. David Clark. Image: J. P. Rathmell.)

Take home message: Assistance in implementation of enhanced recovery protocols may speed adoption of these protocols and improve patient outcomes.



Association between handover of anesthesia care and adverse postoperative outcomes among patients undergoing major surgery. *JAMA* 2018; 319:143–53.

Transition of care, also known as handover, has been associated with an increased risk of adverse patient outcomes, particularly in a critical care setting. It is unclear, however, if handover from one anesthesiologist to another during surgery is also associated with the same risk. In a large population-based retrospective cohort study ($N = 313,066$), the authors compared 5,941 surgeries with handover to 307,125 surgeries without handover. Because the two groups of patients were expected to differ systematically (e.g., longer-duration surgeries more common in the handover group), the authors used sophisticated statistical methods to adjust for group differences. After adjustment for baseline group differences, surgeries that were handed over from one anesthesiologist to another were associated with a 23%

increased risk of all-cause death, hospital readmission, or major postoperative complications within 30 days after surgery (composite endpoint, relative risk 1.23; 95% CI, 1.16 to 1.32). (Summary: Peter Nagele. Image: J. P. Rathmell.)

Take home message: Intraoperative handovers may be associated with a higher risk of adverse patient outcomes.



Prevalence of needlestick injuries, attitude changes, and prevention practices over 12 years in an urban academic hospital surgery department. *Ann Surg* 2018; 267:291–6.

The risk of needlestick injury and exposure to bloodborne pathogens is elevated for nurses and surgeons in the operating room. This study evaluated the occurrence, prevention, and attitudes about needlestick injury in fellows, residents, medical students, and nurses from the operating room via a survey. Thirty-nine percent of the respondents noted a needlestick injury. The prevalence of a needlestick injury was highest in fellows (100%), followed by residents (74%), nurses (51%), and medical students (22%). Overall, 66% of needlesticks occurred in the operating room. Interestingly, 34% of those surveyed had at least one needlestick injury that went unreported to occupational health primarily because it was inconvenient or too time consuming to do so. The greatest concerns regarding needlestick injuries included the risk from carriers of human immunodeficiency virus and known intravenous drug users, although

the degree of concern about needlestick injuries is significantly lower when compared to a survey of medical students performed in 2003. To prevent bloodborne pathogen exposure, 79% of those surveyed always gloved and 79% always used eye protection. Only 78% of current medical students had received the hepatitis B vaccine, whereas 100% had received the vaccine in 2003 ($P < 0.001$). (Summary: Peter Nagele. Image: ©ThinkStock.)

Take home message: Healthcare providers that work in the operating room report a high prevalence of needlestick injuries, yet when compared to 2003, fewer medical students report being immunized for hepatitis B.



Proposed performance-based metrics for the future funding of graduate medical education: Starting the conversation. *Acad Med* 2017 Dec 12 [Epub ahead of print].

Pay for performance in medicine and for funding of graduate medical education is not a new concept. A decade ago, a committee convened by the Institute of Medicine to address finance reform for payments related to the training of physicians recommended performance-based compensation, although they did not provide performance matrices. This manuscript proposes 17 potential performance-based measures for graduate medical education funding with the intention of initiating a national conversation on the topic. Most metrics are from the perspective of the institution, graduate medical education-at-large, or program level, as opposed to the individual trainee. They elaborate on the eight following "exemplar categories": (1) value, benefit, and cost; (2) access to care; (3) attention to the care of the

underserved; (4) patient safety; (5) patient- and family-centered care; (6) communication, teamwork, and transitions of care; (7) educational environments; and (8) physician well-being. The discussion includes specific examples, as well as considerations and precautions for implementation. (Summary: Cathleen Peterson-Layne. Image: ©ThinkStock.)

Take home message: The trend in medical care is performance-based compensation that will soon include graduate medical education. This manuscript proposes 17 performance matrices and considerations for implementation.

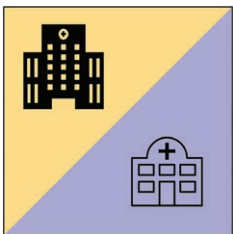
Key Papers from the Most Recent Literature Relevant to Anesthesiologists



Atraumatic versus conventional lumbar puncture needles: A systematic review and meta-analysis. Lancet 2017 Dec 6 [Epub ahead of print].

While atraumatic lumbar puncture needles have been associated with lower complication rates, the adoption of these needles for lumbar puncture has been reported to be low. This meta-analysis reports on 31,412 patients from 110 randomized controlled trials. The authors identified an 11% reduction in the risk of their primary outcome, postdural puncture headache, with the use of atraumatic when compared to conventional lumbar puncture needles (relative risk 0.40; 95% CI, 0.34 to 0.47; $P < 0.0001$). They also identified reductions in some of their secondary outcomes, including the need for an epidural blood patch, headaches, the need for intravenous fluids or controlled analgesia, nerve root irritation, or hearing disturbances. The authors suggest that atraumatic spinal needles enhance safety and are of equal efficacy when compared to conventional spinal needles. (Summary: Martin London and Deborah J. Culley. Image: J. P. Rathmell.)

Take home message: Atraumatic spinal needles reduce the incidence of postdural puncture headaches and the need for an epidural blood patch.



Association of surgical practice patterns and clinical outcomes with surgeon training in university- or nonuniversity-based residency program. JAMA Surg 2018 Jan 10 [Epub ahead of print].

There are significant differences in training between residents in university when compared to nonuniversity-based surgical residency programs, but there is little information about whether there are differences in their patient outcomes. This study attempts to address this question using an observational cohort study utilizing claims data linked to demographic and training profiles of surgeons. Practitioner practice pattern analysis was performed on 3,638 surgeons from 214 residency training programs who operated on 1,237,621 patients between 2013 and 2014. Relative to university-trained surgeons, nonuniversity-based surgeons performed more procedures (median [interquartile range], 328 [93 to 661] vs. 164 [49 to 444]; $P < 0.001$) and more of their procedures were performed in the outpatient setting (risk difference, 6.5; 95% CI, 6.4 to 6.7; $P < 0.001$). Before matching for procedure and hospital factors, there was a decrease in complications (mean risk difference -3.17 ; 95% CI, -4.21 to -2.13 ; $P < 0.001$), prolonged hospital length of stay (mean risk difference -1.89 ; 95% CI, -2.79 to -0.98 ; $P < 0.001$) and mortality (mean relative risk difference -1.01 ; 95% CI, -1.41 to -0.61 ; $P < 0.001$) among patients operated on by surgeons trained in a university-based residency program when compared to those trained in a nonuniversity-based residency program. However, after matching for procedure and hospital factors, there were no differences in patient outcomes between the two groups. (Summary: Deborah J. Culley. Image: J. P. Rathmell.)

Take home message: There may be no difference in patient outcomes when operated on by surgeons trained in a university when compared to nonuniversity-trained residency program, although the types of surgeries that they perform are vastly different in complexity.

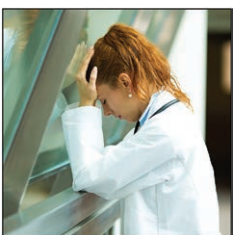


Effect of perioperative gabapentin on postoperative pain resolution and opioid cessation in a mixed surgical cohort: A randomized clinical trial. JAMA Surg 2017 Dec 13 [Epub ahead of print].

Exposure to opioids after surgery is known to be an important route to the initiation of chronic opioid use. Measures aside from simply reducing postoperative access to opioids might be useful in reducing this problem. This study investigated whether gabapentin administration accelerated opioid cessation after surgery. A total of 410 patients were randomized to a three-day perioperative treatment regime with gabapentin versus placebo and their postoperative pain levels and opioid use followed for more than 1 yr. Like several other studies, gabapentin was not found to speed the resolution of pain (hazard ratio, 1.04; 95% CI, 0.82 to 1.33; $P = .73$) or reduce the incidence of chronic pain.

However, one of the secondary endpoints, duration of opioid use, was shortened by 24% in the gabapentin group (hazard ratio, 1.24; 95% CI, 1.00 to 1.54; $P = .05$). Adverse event frequency was low for both groups. (Summary: J. David Clark. Image: J. P. Rathmell.)

Take home message: This study suggests that perioperative pharmacologic treatments, including the use of gabapentin, might reduce long-term opioid use after surgery.



Maintaining the fire but avoiding burnout: Implementation and evaluation of a resident well-being program. J Am Coll Surg 2017 Dec 28 [Epub ahead of print].

Burnout is common among residents. This study describes positive outcomes after implementing a resident well-being program for 49 residents in a single surgical residency program. The wellness curriculum was developed by a professional coach using the Energy Leadership model, which teaches self-awareness and emotional intelligence leading to an ability to effectively respond rather than reacting to stress to help avoid physician burnout, including mental, physical, and emotional well-being. One year after implementing the program, resident measures of emotional intelligence were significantly improved (3.16 ± 0.24 to 3.24 ± 0.32 ; $P = 0.03$), and their perceived levels of stress (17.0 ± 7.2 to 15.7 ± 6.2 ; $P = 0.05$) and emotional exhaustion (16.8 ± 8.4 to 14.4 ± 8.5 ; $P = 0.04$) were lower, suggesting that programs to improve resident well-being may reduce their stress and emotional exhaustion while increasing their emotional intelligence. (Summary: Deborah J. Culley. Image: ©ThinkStock.)

Take home message: Implementation of a wellness program may reduce stress and emotional exhaustion among residents.



Association of integrated care coordination with postsurgical outcomes in high-risk older adults: The Perioperative Optimization of Senior Health (POSH) initiative. JAMA Surg 2018 Jan 3 [Epub ahead of print].

Older surgical patients often have a higher incidence of adverse outcomes when compared to younger patients, and many of these outcomes are thought to be preventable. This article describes the effect of a Perioperative Optimization of Senior Health program on surgical outcomes in older patients. A total of 183 high-risk surgical patients were placed in the Perioperative Optimization of Senior Health program and their outcomes were compared to 143 control patients who had surgery performed by the same group of surgeons before the initiation of the Perioperative Optimization of Senior Health program. Even though the patients participating in the Perioperative Optimization of Senior Health program were older and had more comorbidities when compared to the control group, their outcomes were improved. They had lower 30-day readmission rates (8% vs. 18%; $P < 0.001$), were more likely to be discharged to home with self-care (62% vs. 51%; $P = 0.04$), and had fewer complications (45% vs. 58%; $P < 0.001$) despite a higher rate of delirium (28% vs. 6%; $P < 0.001$) when compared to the control group. (Summary: Deborah J. Culley. Image: ©ThinkStock.)

Take home message: Integrated care coordination for older surgical patients may enhance surgical outcomes.