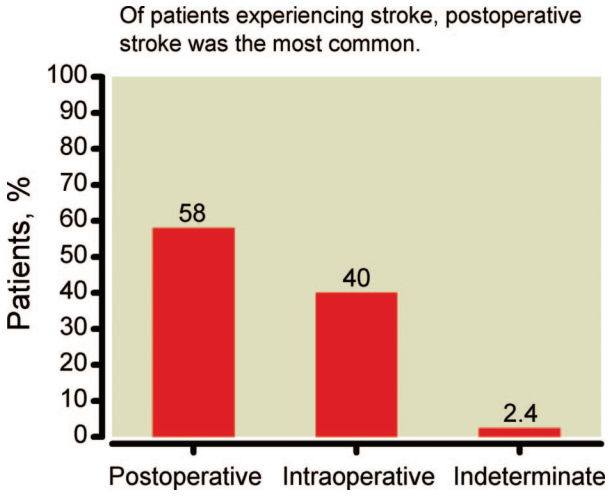
Timothy J. Brennan, Ph.D., M.D., Editor

Perioperative Medicine

J. Lance Lichtor, M.D., Editor

Temporal onset, risk factors, and outcomes associated with stroke after coronary artery bypass grafting. JAMA 2011; 305:381–90

Stroke is a common complication of coronary artery bypass graft surgery (CABG). A long-term, prospective, propensity-matched study at a single institution was conducted to assess the prevalence, temporal trends, and longitudinal outcomes of stroke after CABG. Overall, 1.6% of patients experienced stroke after undergoing CABG surgery. The prevalence decreased to 0.62% during the 28-yr period from 1982 to 2009. Stroke occurred more often after CABG (see fig. below). The risk of postoperative stroke peaked at 40 h after surgery and was reduced to a constant hazard of 0.055% per day by day 6. Mortality, prolonged ventilation, renal failure, and length of intensive care unit stay were significantly worse for patients who had a stroke than for those who did not. The risk of death was similar in patients who had strokes but survived for more than 3 months and those who did not experience stroke.



Interpretation

This 28-yr study evaluated adverse neurologic events after CABG at a single institution. Despite an increasing patient risk profile, the overall stroke occurrence declined after 1988. Continued identification of risk factors for intraoperative and postoperative strokes may contribute to additional reductions in stroke.

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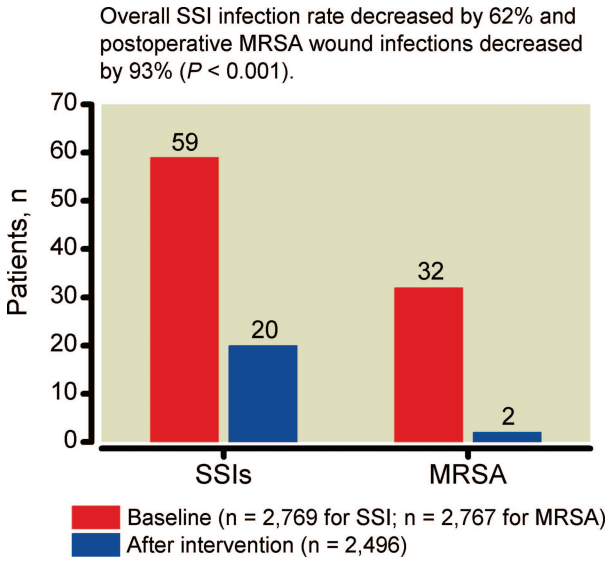
Sustained reduction in methicillin-resistant *Staphylococcus aureus* wound infections after cardiothoracic surgery. Arch Intern Med 2011; 171:68–73

The bundled approach to MRSA surgical site infection prevention: Is the whole greater than the sum of its parts? Arch Intern Med 2011; 171:73–4

Methicillin-resistant *Staphylococcus aureus* (MRSA) infections contribute significantly to morbidity and mortality after surgery. This study describes a single center's experience implementing an MRSA intervention program. The intervention included screening of personnel; preoperative screening and treatment with mupirocin of all cardiac surgery patients; and treatment with vancomycin prophylaxis for identified carriers. Two of 98 surgical staff members were MRSA carriers and subsequently decolonized. Only 2.2% of patients tested positive for MRSA and were treated. During the 3-yr follow-up after intervention, postoperative MRSA wound infections decreased by 93% (see fig. below).



Interpretation

The authors instituted a quality improvement program designed to eliminate MRSA for patients undergoing cardiac surgery through a median sternotomy. MRSA surgical-site infection rates were reduced by more than 90%. The accompanying editorial discusses

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the need for additional studies to elucidate which components of the intervention are critical for successful reduction of MRSA.

Association of myocardial enzyme elevation and survival following coronary artery bypass graft surgery. JAMA 2011; 305:585–91

A definitive study has not been conducted to evaluate the role of increased cardiac enzyme concentrations in the first 24 h after coronary artery bypass graft (CABG) surgery. Therefore, a review of primary data and longitudinal outcomes from 18,908 patients enrolled in seven different studies of CABG was conducted. Higher creatine kinase or troponin concentrations were associated with increasing 30-day and 1-yr mortality after CABG. Creatine kinase was a strong predictor of mortality regardless of baseline risk factors. The 30-day mortality rate for a creatine kinase ratio of 4 or 5 was double that of a creatine kinase ratio of 1.

Interpretation

In this large retrospective study, increased cardiac enzyme concentrations within 24 h after CABG were associated with 30-day and 1-yr mortality. The authors note that in future clinical trials, cardiac enzyme concentrations within the first 24 h after CABG could be used as an early endpoint for therapies that may improve long-term prognoses.

Overall burden of healthcare-associated infections among surgical patients: Results of a national study. Ann Surg 2011; doi: 10.1097/SLA.0b013e318202fda9

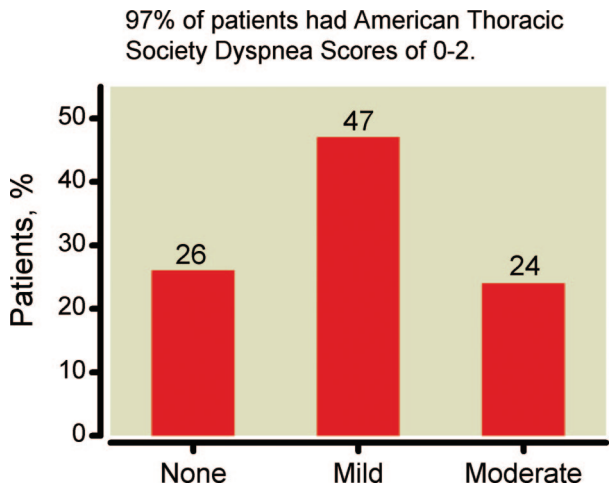
Healthcare-associated infections (HAI) result in severe economic burden to surgical and nonsurgical patients and the healthcare system. A retrospective analysis of a 2004 survey in 100 Swiss acute care hospitals was performed to compare the burden of HAIs in these patients. Surgery was an independent predictor of increased risk of HAI (odds ratio, 2.43). Regardless of hospital size, patients exposed to surgery were significantly more likely to experience HAIs than were those not exposed to surgery (10.6% *vs.* 4.2%; $P < 0.001$). Surgical site infections accounted for 5.4% of HAIs. Surgical patients had significantly more extrinsic risk factors for infection than did nonsurgical patients (such as catheters, mechanical ventilation, and intensive care unit stay).

Interpretation

The authors assessed the overall burden of HAI in a large nationwide patient population. The overall HAI burden was 2-fold greater in patients exposed to surgery than in patients with HAIs who did not undergo surgery.

Adjustments in cardiorespiratory function after pneumonectomy: Results of The Pneumonectomy Project. J Thorac Cardiovasc Surg 2011; 141:7–15

The Pneumonectomy Project is the first descriptive longitudinal study of changes in cardiorespiratory function in patients who underwent pneumonectomy for lung cancer. Nineteen percent (117 of 523) of patients remained eligible for follow-up at the end of the 5-yr study. Survivors generally were younger and more likely to have advanced tumors but had preoperative cardiorespiratory function similar to that of nonsurvivors. Most patients had no, mild, or moderate dyspnea (see fig. below). Dyspnea severity was associated with age but not time since surgery, postoperative lung function (forced expiratory volume), or pulmonary artery pressure. There was a wide range of values for forced expiratory volume and forced vital capacity among patients. However, overall reductions of predicted values in forced expiratory volume and forced vital capacity were 30% and 14%, respectively. Thirty-six percent of patients had pulmonary hypertension, mostly mild to moderate in severity.



Interpretation

Previous studies of lung function after pneumonectomy have included patients with benign disease such as tuberculosis and had few patients or a follow-up that was limited. In this study, 117 patients who underwent pneumonectomy for lung cancer and survived to 5 yr were evaluated. Pulmonary hypertension was not associated with significant changes in lung function or exercise capacity. This study demonstrates the potential survival benefits of patients after pneumonectomy.

Critical Care Medicine

Jean Mantz, M.D., Ph.D., Editor

Ventricular tachyarrhythmias after cardiac arrest in public *versus* at home. N Engl J Med 2011; 364: 313–21

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Table. Incidence and Outcomes of Cardiac Arrest Based on Location and Intervention

Type of Cardiac Arrest	Patients (N = 12,930)		
	EMS Witnessed (n = 996)	Bystander Witnessed (no AED) (n = 4,454)	Bystander Applied AED (n = 228)
Incidence of VF or PVT, %			
Home	25	35	36
Public	38	60	79
Odds ratio (*P* value)	1.63 (= 0.009)	2.28 (<0.001)	4.48 (<0.001)
Survival to hospital discharge, %			
Home	17	8	12
Public	27	20	34

AED = automatic external defibrillator; EMS = emergency medical services; PVT = pulseless ventricular tachycardia; VF = ventricular fibrillation.

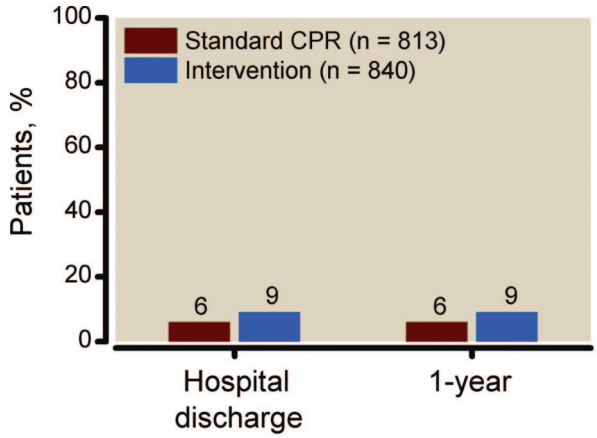
The rate of cardiac arrests characterized by initial ventricular fibrillation or pulseless ventricular tachycardia has decreased by nearly 50% in the past 30 yr. To determine the role of public access automated external defibrillators (AEDs) in this reduction, a prospective, multicenter, population-based cohort study was conducted. Cardiac arrests were more likely to occur in public than in the home ($P < 0.001$) and were more likely to be associated with bystander-applied AED and improved survival to hospital discharge (see table above). The improvements occurred regardless of whether or not emergency medical services personnel witnessed the arrest or the AED was administered.

Interpretation

This study indicates that the proportion of cardiac arrests with initial ventricular fibrillation or pulseless ventricular tachycardia is much greater in public settings than at home. The survival rate at hospital discharge was threefold greater in patients resuscitated in public. These results support the utility of AED located in public places when correctly and promptly used by bystanders and also suggest further improving the public's knowledge on use of AED rather than wide deployment of these devices at home.

Standard cardiopulmonary resuscitation *versus* compression-decompression cardiopulmonary resuscitation with augmentation of negative intrathoracic pressure for out-of-hospital cardiac arrest: a randomized trial. Lancet 2011; 377:301–11

Overall survival rates for out-of-hospital cardiac arrests are as low as 5%. Augmentation of negative intrathoracic pressure during cardiopulmonary resuscitation (CPR) may provide additional survival benefit in these patients compared with standard CPR. A randomized, multicenter trial was conducted to compare standard CPR and augmented CPR ("intervention") performed by emergency medical personal in patients experiencing out-of-hospital cardiac arrest. Patients who received the augmented CPR had improved survival rates (see fig. below) with equivalent secondary outcomes, such as cognitive skills and disability at hospital discharge. Although edema was more prevalent in the intervention group, the overall adverse event rate was similar between groups.



Patients who received CPR with augmented negative intrathoracic pressure were more likely to survive to hospital discharge ($P = 0.03$) compared with standard CPR.

Interpretation

Overall compression-decompression CPR resulted in improved survival compared with standard CPR after out-of-hospital cardiac arrest. These results support that compression-decompression CPR should be considered a potentially promising alternative to standard CPR in out-of-hospital cardiac arrest.

Interrupted pharmacologic thromboprophylaxis increases venous thromboembolism in traumatic brain injury. Trauma 2011; 70:19–26

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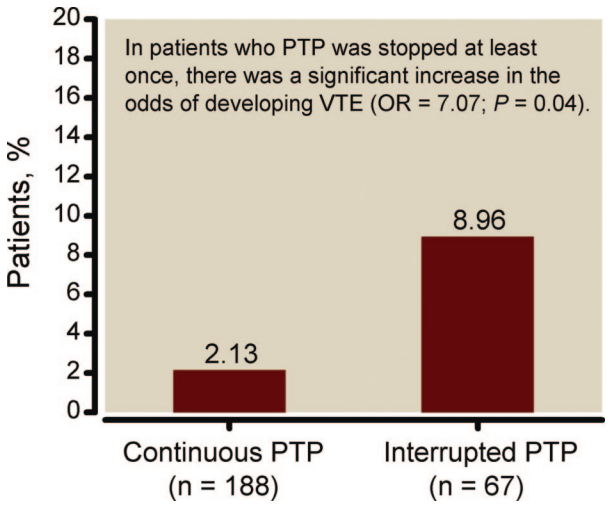
Patients with traumatic brain injury are at high risk for development of venous thromboembolism (VTE) and other thrombotic complications, but the risk may be reduced through the use of pharmacologic thromboprophylaxis (PTP). A two-center retrospective cohort study was conducted to assess the optimal timing of PTP administration in patients with traumatic brain injury. Approximately 53% (255 of 480) of patients received PTP during their hospital stay, and these patients were generally younger and more severely injured. VTE occurred in 15 patients overall, and the overall mortality rate was 4.18%.

Neither the administration of PTP (OR = 0.36) nor timing of administration (OR = 0.19) altered the risk of VTE administration. Furthermore, mortality and hemorrhage progression did not differ in patients who received PTP compared with those who did not. However, PTP administration was interrupted in 67 patients and was associated with an increased risk of VTE (see fig. below).



Interpretation

Pharmacologic thromboprophylaxis is frequently interrupted in traumatic brain injury patients, and this study clearly identifies interruption of PTP as a risk factor associated with VTE. As a retrospective cohort study, these results have limitations; however, they suggest the importance of continuous thromboprophylaxis in patients with traumatic brain injury.

A multifaceted intervention for quality improvement in a network of intensive care units. JAMA 2011: 305:363–72

Despite the demonstrated advantages of quality improvement interventions in academic centers, the rate of implementation of such interventions at community hospitals is low because of limited financial and personnel resources. A cluster-randomized pragmatic trial was conducted to test the rate of adoption of six evidence-based care practices at 15 community intensive care units (ICUs) in Canada. Overall, patients in targeted care practices were more likely to receive an active intervention than were those in control ICUs (odds ratio = 2.79; $P = 0.05$). The odds ratios favored intervention for semirecumbent positioning (to prevent ventilator-associated pneumonia) and prevention of catheter-related bloodstream infection. Rates of adherence for semirecumbent positioning increased to approximately 90% in intervention and control ICUs after 4 months of intervention, and remained high (96%) for as long as 3 additional months in intervention ICUs.

Interpretation

For improved quality of care, this study highlights the impact of programs shared concomitantly by several ICUs *versus* programs initiated in individual ICUs. The shared program noted an increase in the observance of the procedures for prevention of ventilation-acquired pneumonias and bloodstream catheter-related infections. Although the impact of this intervention on mortality was not the primary goal of the study, considerations for programs using ICU networks for improving quality of care are highlighted.

Pain Medicine

Timothy J. Brennan, Ph.D., M.D., Editor

Diagnostic imaging for low back pain: Advice for high-value health care from the American College of Physicians. Ann Intern Med 2011; 154:181–9

Routine spinal imaging of patients with low back pain is commonly reported by 40% of family practice physicians and 13% of internal medicine physicians; in addition, as many as 62% of physicians report conducting imaging for patients with low back pain and sciatica. However, routine imaging has not been shown to improve clinical outcomes. This article reviews the American College of Physicians/American Pain Society guidelines to promote a rational and cost-conscious diagnostic approach to spinal imaging.

Summaries of six randomized trials revealed routine lumbar magnetic resonance imaging or computed tomography did not provide any benefit over usual care without imaging in terms of pain, function, quality of life, or overall patient-rated improvement. The American College of Physicians/American Pain Society guidelines recommend a thorough history and physical examination to identify patients with low back pain in need of lumbar imaging (the guidelines are briefly summarized in the table on the next page).

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Table. When to Image Patients with Acute Low Back Pain

Test/Risk Factor	Finding
Thorough history and physical exam	Urine retention Saddle anesthesia Fecal incontinence Fever
Neurologic exam	Severe or progressive neurologic deficits Objective or progressive motor weakness at a single level Deficits at multiple spinal levels
Presence of risk factors	Cancer Vertebral compression fracture Ankylosing spondylitis Herniated disc Symptomatic spinal stenosis

Interpretation

This article reviews criteria for patients in whom diagnostic spine imaging is indicated. Imaging is immediately indicated for patients with major risk factors for cancer, spinal infection, acute neurologic deficit, or severe progressive neurologic deficit. Imaging does not need to be completed immediately in patients with minor risk factors for these diseases. Imaging patients without these indications does not improve outcomes.

Balloon kyphoplasty *versus* nonsurgical fracture management for treatment of painful vertebral body compression fractures in patients with cancer: A multi-center, randomized controlled trial. Lancet Oncol 2011; 12:225–35

Kyphoplasty in cancer: An encouraging step. Lancet Oncol 2011; 12:202–3

The incidence of vertebral compression fractures may be as high as 24% for patients with specific cancers. Balloon kyphoplasty is a minimally invasive technique used in conjunction with injection of viscous cement to restore lost bone. The Cancer Patient Fracture Evaluation (CAFE) study is the first randomized multicenter trial to compare the safety and efficacy of kyphoplasty (n = 70) with standard nonsurgical management (n = 65) in patients with cancer who have vertebral compression fractures. At 1-month follow-up, patients in the kyphoplasty group had significant ($P < 0.0001$) reductions in Roland-Morris disability scores and Kamofksy performance scores, whereas the control group remained unchanged. Kyphoplasty also significantly ($P < 0.0001$) improved quality of life measured by the short form (SF-36) survey. Patients in the kyphoplasty group also had significantly ($P < 0.0001$) fewer reduced activity and bed rest days at the 1-month follow-up compared with baseline. Patients in the kyphoplasty group also had significantly reduced pain scores, and fewer of them were using analgesics. The rate and type of adverse events were similar between the groups.

Interpretation

There has been increased interest in vertebral augmentation techniques to treat vertebral compression fractures in patients with cancer and noncancer patients. The accompanying editorial notes the limitations of a study that enrolls patients as indicated by the treating physician rather than strict inclusion criteria. The lack of a placebo controlled group is noted as a limitation. Nevertheless, this study demonstrated reduced disability 1 month after the augmentation treatment in patients with cancer.

A genome-wide *Drosophila* screen for heat nociception identifies $\alpha2\delta3$ as an evolutionarily conserved pain gene. Cell 2010; 143:628–38

In an attempt to identify novel targets for analgesics, a whole-genome screen was conducted in *Drosophila* fruit flies and supported by knockout mice studies and single-nucleotide polymorphism analysis in human volunteers. This multispecies study identified genes that may play a role in nociceptive behaviors, many of which had no known function. The family of $\alpha2\delta$ genes was implicated in heat nociception in flies. Mice with mutations in the $\alpha2\delta3$ gene, a mammalian calcium channel subunit, exhibited diminished pain responses.

Analysis of 189 healthy volunteers subjected to a battery of pain sensitivity tests revealed a minor allele of $\alpha2\delta3$, single-nucleotide polymorphism rs6777055, was significantly associated with reduced thermal pain sensitivity. In addition, this single-nucleotide polymorphism was associated with reduced pain in a previous prospective study of surgical discectomy patients for persistent lumbar root pain.

Interpretation

This large group of investigators identified pain-related genes in fruit flies. Deletion of one of these pain-related genes, the $\alpha2\delta3$ calcium channel in mice, decreased pain sensitivity. Genetic variations in this channel were associated with less chronic pain after spine surgery in patients. The authors suggests that the $\alpha2\delta3$ calcium channel may be a target for new analgesic drugs.

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