Anesthesiology 2010; 113:1199–1204

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

Perioperative Medicine

J. Lance Lichtor, M.D., and Joseph F. Antognini, M.D., Editors

Adherence to surgical care improvement project measures and the association with postoperative infections. JAMA 2010; 303:2479–85

Surgical care improvement: Should performance measures have performance measures. JAMA 2010; 303:2527–8

Measures developed by the Surgical Care Improvement Project (SCIP) have been adopted by many institutions in an attempt to decrease surgical infections and complication rates. However, reports from individual institutions have shown mixed results on the effectiveness of these measures.

To evaluate the association between six infection-prevention SCIP measures and postoperative infection rates, the authors performed a retrospective study of data from 398 hospitals in the Premier Inc. Perspective Database, which included discharges between July 1, 2006, and March 31, 2008. Individual SCIP measures assessed included prophylactic antibiotic use within 1 h before surgical incision or discontinued within 24 h after surgery end time; cardiac surgery patients with controlled 6 AM postoperative blood glucose; surgery patients with appropriate hair removal; and colorectal surgery patients with immediate postoperative normothermia.

Of 405,720 patient records reviewed, 62.4% were women, 68.7% were white, and 45.7% were Medicare patients. Most patients (67.8%) had undergone elective surgeries, and these were conducted at mostly urban (81.0%), nonteaching (68.3%) hospitals. There were 3,996 cases of postoperative infection documented and these patients were more likely to be older, have at least one comorbidity, and have been admitted emergently (predictive value: $P < 0.001$). Furthermore, documented infections were significantly associated with hospital characteristics and occurred most often in large, urban teaching hospitals in the Northeast. Overall, adherence rates increased over the 2-yr period. However, the reported adherence on individual SCIP measures or the composite measure for prophylactic antibiotic use was not associated with a decreased risk of infection. In fact, postoperative infection rate actually increased during the 2-yr period.

Interpretation

For anesthesiologists, intraoperative documentation of antibiotic use is now the norm. Adherence to individual SCIP measures was not associated with decreased infection. Despite the large effort directed toward SCIP, adherence has improved but surgical infection outcomes have not.

Postoperative handover: Problems, pitfalls, and prevention of error. Ann Surg 2010; 252:171–6

An efficient handover of patient care is critical for quality of care and patient outcomes. Handover failures account for 20% of malpractice claims in the United States, and a recent study of surgical patients described that 67% of anesthesia providers failed to transfer all essential information.

A qualitative, semistructured, interview-based, two-phase study was conducted to identify the information transfer and communication problems in postoperative handover and to develop and validate a novel protocol for standardizing this communication. In the collection phase, surgeons ($n = 7$), anesthesia providers ($n = 5$), and nurses ($n = 6$) of various levels of experience were interviewed by a researcher with a background in surgery and patient safety. Multiple blind coders were used to ensure triangulation and reliability of the coding process. In the validation phase, a Delphi method was used to elicit consensus from a group of 50 surgical professionals.

Interviews revealed that incomplete handovers occurred because the process was informal, unstructured, and inconsistent. Nearly all participants felt that the surgeon and anesthesia provider should be present during the handover, and most believed the theater nurse should also be present. A 28-question checklist was then identified and validated. Of these, 21 items had a mean importance score greater than 4.0 and were included in the postoperative handover proforma under the following headings: patient-specific information, surgical information, and anesthetic information.

Interpretation

Communication among members of the healthcare team is critical to improving care of patients. Handover of care of postsurgical patients is often informal and unstructured; improving communication by, among other things, having a handover protocol, might lessen errors. More research is needed to determine whether this approach would minimize errors related to handover of anesthetic care from one anesthesiologist to another.

Operative blood loss, blood transfusion, and 30-day mortality in older patients after major noncardiac surgery. Ann Surg 2010; 252:11–7

Elderly patients receive nearly half of all blood transfusions. However, there are limited large clinical trial data to

support the current hematocrit trigger at which intraoperative blood transfusions are needed in the general population and in the elderly.

This retrospective study of data from the Veterans Affairs National Surgical Quality Improvement Program database examined the effect of intraoperative blood transfusion on 30-day mortality in older patients who underwent major noncardiac surgery. Data from patients older than 65 years of age, with a hematocrit less than 0.54, who underwent one noncardiac procedure between 1997 and 2004, were included.

Of 239,286 patients, 9.4% received at least 1 unit of erythrocytes during surgery. Most patients (98%) were men, with an average age of 73 yr. Patients who received transfusions were more likely to have a lower preoperative hematocrit, were less likely to be white, and had a higher prevalence of comorbidities (*e.g.*, severe systemic disease, cardiac disease, neurologic or pulmonary disorders, or hematologic problems). Patients received an average of 2.6 units of erythrocytes intraoperatively. The overall mortality rates did not differ between groups (10.2 *vs.* 16.7% for the transfused and controls, respectively). Patients who received transfusions had a higher risk for 30-day mortality compared with propensity-matched controls, although when controlled for risk factors, transfusion benefitted some patients.

	30-day Mortality Risk for Transfused Patients	Odds Ratio (95% CI)
Overall	↑	1.37 (1.27–1.48)
Preop Hct <0.24	↓	0.6 (0.41–0.87)
Preop Hct 0.24–0.29	NC	1.04 (0.91–1.20)
Blood loss <500 ml		
Preop Hct 0.30–0.359	↑	1.29 (1.04–1.60)
Preop Hct >0.36	NC	1.40 (0.68–2.88)
Blood loss 500–999 ml		
Preop Hct 0.30–0.359	↓	0.35 (0.22–0.56)
Preop Hct >0.36	↓	0.78 (0.62–0.97)

CI = confidence interval; Hct = hematocrit; NC = no change; Preop = preoperative.

Interpretation

Trigger thresholds for transfusion remain controversial. Not unexpectedly, older patients who had low preoperative hematocrits (less than 24%), significant blood loss (more than 500 ml), or both had lower mortality when transfused. However, patients with preoperative hematocrits more than 0.30 and blood loss less than 500 ml who were transfused had increased mortality, suggesting that transfusion in such cases may be harmful.

Postoperative pneumonia in elderly patients receiving acid suppressants: A retrospective cohort analysis. BMJ Clin Res Ed 2010; 340:c2608

Acid suppressants and postoperative pneumonia. BMJ Clin Res Ed 2010; 340:c2254

Despite their beneficial effects, the use of gastric acid suppressants increases the risk of aspiration pneumonia because of bacterial overgrowth in the stomach and esophagus. However, no large clinical study has directly compared the rates of postoperative pneumonia in patients who did or did not receive gastric acid suppressants.

To test whether gastric acid suppressants are associated with an increased risk of postoperative pneumonia in patients undergoing elective surgery, a population-wide retrospective cohort analysis study of data from the Canadian Institutes for Health Information databases was conducted. Data from consecutive older patients (older than 65 yr) admitted to acute care hospitals for elective surgeries over a 16-yr period were analyzed.

Of 593,265 patients included, most were admitted for abdominal (26%) or musculoskeletal (22.7%) surgeries. Twenty-one percent of patients were taking an acid suppressant before surgery; of those, the most common drugs were omeprazole (21%) and ranitidine (37%). The frequency of postoperative pneumonia was approximately 30% higher in patients who received acid suppressants before surgery compared with those who did not. However, no increase in risk was observed after adjustment for multiple factors, including drug class, drug dose, duration, or type of surgery.

	Odds Ratio (95% CI)	*P* Value
Overall	1.3 (1.23–1.38)	<0.001
Multivariate analysis controlling for:		
Age, sex, type of surgery, duration of anesthesia	1.20 (1.13–1.28)	>0.05
Lung disease, prior pneumonia, hypoalbuminemia	1.12 (1.02–1.19)	>0.05
All baseline characteristics	1.02 (0.96–1.09)	>0.05

CI = confidence interval.

Interpretation

Postoperative pneumonia is a serious complication after elective surgery, particularly in elderly patients. This study retrospectively compared rates of postoperative pneumonia in elderly patients undergoing elective inpatient surgery who did or did not receive long-term gastric acid suppressant

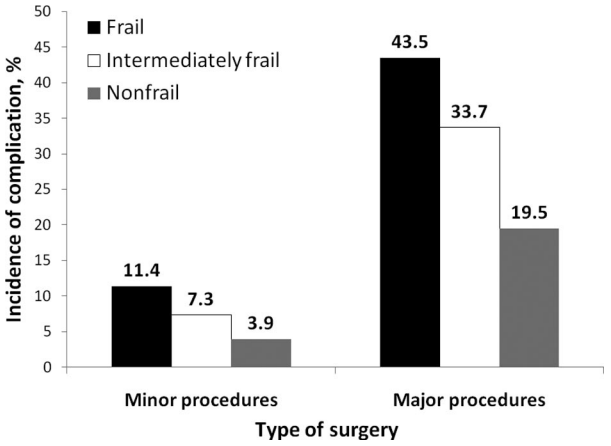
therapy and who did not find an increased risk of postoperative pneumonia. However, as the accompanying editorial points out, there are conflicting results from multiple studies, which are mostly retrospective. Therefore, prospective studies are needed to clearly analyze this potential problem.

Frailty as a predictor of surgical outcomes in older patients. J Am Coll Surg 2010; 210:901–8

As the aging population expands, more patients who are older are undergoing surgeries. These patients may be at an increased risk for postoperative complications, which can lead to multiple events, including mortality, loss of independence, and reduced quality of life. However, preoperative risk assessment and measurements of physiologic reserves are not standardized for older patients.

A prospective study was conducted to test the hypothesis that frailty predicts operative risk in older surgical patients and that it enhances current risk models. Patients 65 years of age or older presenting for a preoperative assessment underwent a standardized preoperative interview, and frailty was assessed based on a validated scoring system (*i.e.*, weight loss, weakness, exhaustion, low physical activity, and slowed walking speed). Patients scoring 4–5 were classified as frail, those scoring 2–3 were intermediately frail, and those scoring 0–1 were nonfrail.

Of 594 patients enrolled, 10.4% were frail, 31.3% were intermediately frail, and 58.3% were nonfrail. The majority of patients in all groups were white (82.8–83.9%) and the frail patients were generally older (mean age: 76.3 yr [frail], 74.5 yr [intermediate], and 71.3 yr [nonfrail]). Frailty was an independent predictor of surgical complications (odds ratio [OR = 2.54]), increased length of stay (OR = 1.69), and odds of being discharged to a skilled or assisted-living facility (OR = 20.48).



Interpretation

Frailty has been shown to be associated with poor outcome in hospitalized patients but not in perioperative patients. The authors found that frailty was associated with an increased risk of postoperative complications, length of stay, and discharge to an assisted or skilled nursing facility. Longer-term and multicenter studies are recommended.

Infection control assessment of ambulatory surgical centers. JAMA 2010; 303:2273–9

The number of ambulatory surgical centers (ASCs) has increased by 50%, and procedures being performed at ASCs have increased to more than 6 million. However, recent outbreaks of health care–associated infections and associated lapses in infection control have called into question the quality of care at ASCs.

To observe compliance with basic infection control practices and Medicare health and safety standards in ASCs, the Centers for Medicare and Medicaid Services piloted an infection control audit tool in a sample of ASC inspections. After notification of the State Survey Agencies, seven states volunteered for participation and three were selected based on geographic dispersion, number of ASCs each state committed to inspect, and relative cost per inspection. Assessments focused on five areas of infection control: Hand hygiene, injection safety and medication handling, equipment reprocessing, environmental cleaning, and handling of blood glucose monitoring equipment.

ASCs from Maryland (n = 32), North Carolina (n = 16), and Oklahoma (n = 16) were included, which reflected 9.4%, 21.1%, and 39.2% of all Centers for Medicare and Medicaid Services–certified ACSs in each state, respectively. The majority of ASCs had at least one lapse in infection control (67.6%), and 17.6% had lapses in three or more of the five categories. Lapses included problems in handling of blood glucose monitoring equipment (46.3%), failure to adhere to equipment reprocessing practices (28.4%), and using single-dose medications for more than one patient (28.1%). There was no significant association between the number of procedures performed or type of facility and a lapse in infection control for any factor assessed.

Interpretation

Infection outbreaks have recently been reported in ASCs. In this study, the authors analyzed unannounced assessments of randomly selected ASCs in Maryland, North Carolina, and Oklahoma. Lapses in hand hygiene, use of personal protective equipment, injection safety, medication handling, and equipment reprocessing were noted.

Critical Care Medicine

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

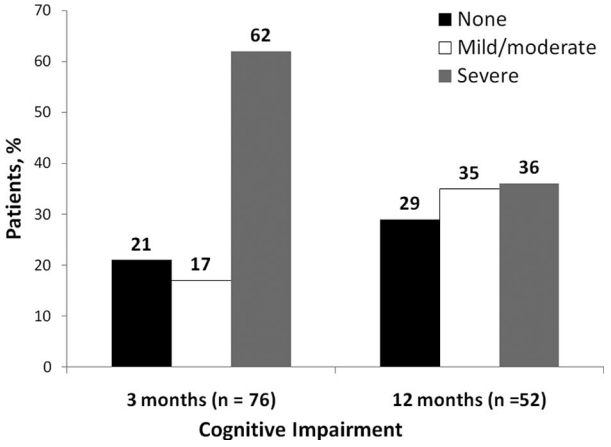
Delirium as a predictor of long-term cognitive impairment in survivors of critical illness. Crit Care Med 2010; 38:1513–20

The majority of patients who survive critical illness with mechanical ventilation develop significant cognitive impairment. However, the specific risk factors and predictors asso-

ciated with the development of cognitive impairment in these patients are not well understood.

This prospective cohort study (part of the Awakening and Breathing Controlled Randomized Trial) evaluated cognitive changes in patients for up to 1 yr after admittance to a medical intensive care unit with mechanical ventilation for at least 12 h.

Of 126 enrolled patients, only 77 (78%) were included in the analysis because of death, loss to follow up, or withdrawal. The median age was 61 yr; most were admitted for severe sepsis/acute respiratory distress syndrome (51%) or myocardial infarction/congestive heart failure (20%). Eighty-four percent experienced delirium in the intensive care unit. Overall, 71% of survivors had cognitive impairment at 1 yr. Duration of delirium was an independent predictor of worse cognitive performance but duration of mechanical ventilation was not.



Interpretation

This study establishes a strong link between acute cognitive dysfunction (delirium) emerging during a critical illness and chronic cognitive dysfunction lasting for several months or more after discharge from the intensive care unit. Whether all types of delirium, including those with a cause clearly identified and corrected (*i.e.*, metabolic, septic, drug toxicity, or withdrawal syndrome) and those with indeterminate etiology, share the same prognostic value is not known. Whether interventions to decrease delirium could reduce the incidence of chronic cognitive dysfunction remains to be determined.

Suggested by: Bernard de Jonghe, M.D.

Association between corticosteroid dose and route of administration with risk of treatment failure in acute exacerbation of chronic obstructive pulmonary disease. JAMA 2010; 303:2359–67

Systemic corticosteroids have been shown to be beneficial to the more than 6% of U.S. adults with chronic obstructive pulmonary disease (COPD), including improved lung function, reduced risk of treatment failure, and decreased length of hospital stay. However, the optimal route of administration and dose of corticosteroids have not yet been clearly defined.

A multicenter, pharmacoepidemiologic, retrospective cohort study was conducted to compare the outcomes of patients treated with low-dose oral steroids with those who received high-dose intravenous steroids. Data from patients admitted with a diagnosis of COPD in a non–intensive care setting, over a 1-yr period, from 414 hospitals in the Premier Inc. Perspective database, were collected. Treatment failure was defined as a composite measure of the initiation of mechanical ventilation after the second hospital day, inpatient mortality, or readmission for acute exacerbation of COPD within 30 days of discharge.

The median age of patients (n = 79,985) was 69 yr, most were women (61%), and hypertension was a common comorbidity (60%). Most patients (92%) received high-dose intravenous steroids. Patients who did receive low-dose oral steroids were less likely to be white or have private insurance and had a greater number of comorbidities. Overall, 1.4 and 1.0% of patients in the IV and oral groups died during hospitalization. The proportion of patients who experienced the composite endpoint was also similar (10.9 and 10.3%, respectively). Statistical analyses demonstrated a lack of correlation between steroid dose and the risk of treatment failure in these analyses.

Interpretation

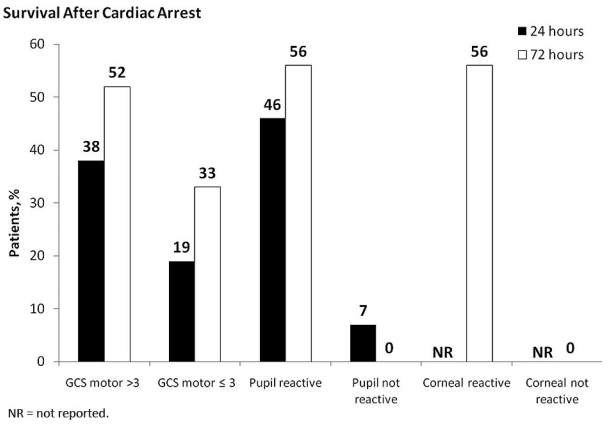
This large study was performed in non–intensive care unit–hospitalized patients with exacerbation of COPD. Low doses of corticosteroids administered orally were not associated with worse outcome than high doses administered intravenously. This study may be useful to reduce the risks associated with high-dose intravenous corticosteroid therapy. However, a prospective clinical trial is warranted to confirm these findings.

Association between clinical examination and outcome after cardiac arrest. Resuscitation 2010; 81:1128–32

The primary tool for predicting prognosis after cardiac arrest, clinical neurologic examination, does not include modern reference data. A retrospective chart review of consecutive patients was conducted to assess the association between survival and the presence of traditional neurologic measures, including pupil response, corneal reflex, and motor response in comatose patients after cardiac arrest. Furthermore, this study assessed the effects of therapeutic hypothermia on these measures.

Neurologic examination findings at arrival and 24 and 72 h after cardiac arrest using the Glasgow Coma Score (motor examination, pupil response, and corneal response) from 272 patient charts over a 4-yr period were reviewed.

The mean age of patients was 61 yr and most (57%) were men who had an out-of-hospital cardiac arrest (62%). A majority were treated with therapeutic hypothermia (59%). Overall, 33% of patients survived and 20% experienced a good outcome. A Glasgow Coma Score less than 3 at 24 or 72 h after cardiac arrest does not exclude survival to hospital discharge and good outcome. Hypothermia did not influence the association between good outcome and examination findings.



Interpretation

This retrospective study emphasizes the prognostic role of clinical examination 24 and 72 h after cardiac arrest occurring out of hospital or in hospital. These findings suggest that clinical examination has value when generating a prognostic score in the context of cardiac arrest.

Effect of tranexamic acid on death, vascular occlusive events, and blood transfusion in trauma patients with significant hemorrhage (CRASH-2): A randomized, placebo-controlled trial. Lancet 2010; 376:23–32

Hemorrhage is a common cause of in-hospital death after trauma and can also contribute to deaths from multiorgan failure. Tranexamic acid, a synthetic agent, inhibits fibrinolysis and may therefore reduce blood loss in patients with exaggerated hemostatic response to severe vascular injury. A systematic review supported the use of tranexamic acid in patients undergoing elective surgery; however, its effects in trauma patients are not known.

The Clinical Randomisation of an Antifibrinolytic in Significant Hemorrhage 2 trial was a multicenter placebo-controlled trial of adult trauma patients with significant hemorrhage or who were considered to be at significant risk within 8 h of injury. Patients were given either tranexamic acid (n = 10,093; loading dose 1 g over 10 min, then infusion of 1 g over 8 h) or placebo (n = 10,114).

The majority of patients were men (84%) with a mean age of 34 yr, most of whom had experienced a blunt trauma (68%). All-cause mortality was significantly lower in the tranexamic-acid group compared with the placebo group (14.5 *vs.* 16.0%; $P = 0.035$). Bleeding-related deaths were also significantly reduced in the tranexamic group (4.9 *vs.* 5.7%; $P = 0.0077$). Deaths due to multiorgan failure, head injury, or vascular occlusion did not differ between the two groups.

Interpretation

This multicenter, randomized, placebo-controlled trial demonstrates that tranexamic acid decreases mortality at 28 days in trauma patients with significant hemorrhage. On the basis of these findings, the use of tranexamic within 8 h of injury in trauma patients with hemorrhage should be considered.

Pain Medicine

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

Natural history of sensory function after herpes zoster. Pain 2010; 150:83–92

Natural history of cutaneous innervation following herpes zoster. Pain 2010; 150:75–82

Postherpetic neuralgia (PHN) is the most common complication of herpes zoster (HZ), and the risk increases with increasing disease severity. However, the relationships between PHN and nerve injury and sensory disturbances after the onset of HZ are not well understood. These two papers report on results from a comprehensive study of the natural history of HZ, including sensory and anatomical observations, conducted to learn more about the differences between patients who experience acute and persistent pain from HZ.

In this cohort study, patients with HZ at increased risk for PHN were followed for 6 months after onset of HZ. All patients were immunocompetent, in stable health, and had cervical, thoracic, lumbar, or sacral HZ outbreaks. Four study visits occurred within 2–6 weeks after rash onset, at 6–8 weeks, at 3 months, and at 6 months. These two papers report on sensory and pain testing within the entire cohort and a subgroup of patients who consented to skin biopsies (n = 57).

Of the full study cohort, 97% of patients who eventually had PHN at 6 months maintained an area of altered sensation compared with only 57% of patients with no pain at 6 months. There was only a 16% reduction of PHN patients with allodynia at 6 months compared with a 69% reduction in the no-pain group. The areas of allodynia were also larger and resolved more slowly in the PHN group. PHN patients also had more sensory deficits to temperatures at study entry compared with the no-pain patients. In the smaller subgroup study, epidermal nerve fiber density measurements were sig-

nificantly lower in HZ skin compared with unaffected control skin and remained lower for up to 6 months.

Interpretation

Acute HZ and PHN are severe acute and persistent pain problems, respectively. Interfering with the development of PHN in patients with acute HZ is a laudable long-term goal. In these studies, the authors demonstrate epidermal nerve fiber loss associated with PHN. Pain tended to resolve before anatomical innervation recovered. Sensory recovery was also not a requirement for resolution of pain. The studies suggest that the severity of nerve injury and nerve deficit predict PHN, and recovery is not necessarily related to reinnervation.

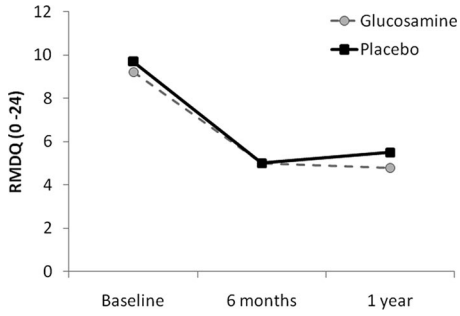
Effect of glucosamine on pain-related disability in patients with chronic low back pain and degenerative lumbar osteoarthritis: A randomized controlled trial. JAMA 2010; 304: 45–52

Glucosamine and the ongoing enigma of chronic low back pain. JAMA 2010; 304:93–4

Chronic low back pain (LBP) is the second most common concern of patients in primary care. Degenerative lumbar osteoarthritis may contribute to chronic LBP; however, the etiology and therefore potential treatments remain elusive. Glucosamine, a cartilage precursor, has been used in patients with multiple arthritic conditions, but the results have been inconsistent.

The authors conducted a randomized, double-blind, placebo-controlled trial seeking more conclusive data on the effect of glucosamine in patients with chronic LBP (at least 6 months) and degenerative lumbar osteoarthritis. Patients (n = 250) 25 years of age or older received either 1,500 mg oral glucosamine daily or placebo for 6 months, and pain-related disability was measured using the Roland Morris Disability Questionnaire at 6 months and 1 yr after the intervention period.

Patients had a mean age of 48.5 yr with LBP for a mean duration of 159.9 months. There was no significant difference between treatment and placebo groups at any time point, and the incidence of adverse events was similar between groups.



Interpretation

Chronic LBP associated with degenerative disease is a common clinical pain problem. Many degenerative osteoarthritic conditions are treated with therapies of indeterminate benefit, such as glucosamine. Treatment with glucosamine failed to improve pain-related disability in this well-designed trial. The editorial highlights the importance of large clinical trials for common diseases such as chronic LBP.