

Preoperative Labs: Wasted Dollars or Predictors of Postoperative Cardiac and Septic Events in Orthopaedic Trauma Patients?

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Background/Purpose: As US health-care expenditures continue to rise, avenues to reduce costs must be explored. Studies have estimated that over 70% of routine labs may be unnecessary, adding over \$250 per patient per day in hospitals. For orthopaedic trauma patients, very little data exist in the utility of preoperative labs in predicting postoperative adverse events. In this study, we used the large, multicenter, prospective American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database to determine whether preoperative labs significantly predict postoperative cardiac and septic complications in orthopaedic trauma and hip fracture patients.

Methods: From 2005-2013, 361,402 patients were identified in the NSQIP database using Current Procedural Terminology (CPT) codes. Of these, 56,336 (15.6%) patients were identified as orthopaedic trauma and 27,441 patients (7.6%) were identified with hip fractures. Preoperative labs included sodium (normal: 135-145 mEq/L), BUN (blood urea nitrogen; normal: 7-20 mg/dL), creatinine (normal: 0.5-1.2 mg/dL), albumin (3.4-5.4 g/dL), bilirubin (normal: 0.3-1.9 mg/dL), SGOT (serum glutamic oxaloacetic transaminase; 10-34 IU/L), alkaline phosphatase (44-147 IU/L), white count (4.5-10K/mcL), hematocrit (38%-54%), platelet count (150-400 K/mcL), prothrombin time (11-13.5 seconds), INR (international normalized ratio; 0.8-1.1), and partial thromboplastin time (25-35 seconds). For each of these labs, patients were deemed to have normal or abnormal values. Patients were noted to have developed cardiac or septic complications if within 30 days after surgery they sustained (1) myocardial infarction (MI) (2) cardiac arrest, or (3) septic shock. Separate regressions with patient characteristics including age, gender, and preoperative comorbidities labs were run for orthopaedic trauma patients to determine whether preoperative labs predicted cardiac or septic outcomes. Only patients with complete data were included in the regressions.

Results: For all orthopaedic trauma patients, 1.3% (749/56,336) developed cardiac complications and 0.6% (311/56,336) developed septic shock. 2.2% (541/27,441) of hip fracture patients sustained cardiac events and 0.9% (322/27,441) developed septic shock. After multivariate regression, abnormal preoperative platelet values (odds ratio [OR]: 11.107, P = 0.036) were significantly predictive of postoperative cardiac arrest, and abnormal bilirubin levels (OR: 8.487, P = 0.008) were predictive of septic shock in trauma patients (Figure 1). For hip fracture patients, abnormal partial thromboplastin time (OR: 15.083, P = 0.046) was significantly associated with postoperative myocardial infarction, and abnormal bilirubin (OR: 58.674, P = 0.002) significantly predictive septic shock (Figure 2).

Conclusion: This study is the first of its kind to demonstrate the utility of preoperative labs in orthopaedic trauma and hip fracture patients in predicting cardiac and septic adverse events. Particular attention should be made to hematologic labs (platelets, partial thromboplastin) and bilirubin values.

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.

