

Title: ELIMINATION OF UNNECESSARY PREOPERATIVE LABORATORY TESTS

Authors: E.B. Kaplan, M.D., A.S.Boeckmann, M.S., M.F. Roizen, M.D.,
L.B. Sheiner, M.D.

Affiliation: Departments of Laboratory Medicine, Medicine, Pharmacology and
Anesthesia
University of California, San Francisco
San Francisco, California 94143

Introduction: Surgical patients routinely undergo numerous preoperative blood tests. To eliminate unnecessary tests without sacrificing quality of care, we devised a method of determining which indications for a test were most accurate in predicting surgically significant abnormalities.

Methods. We obtained institutional approval to study four data sources: (1) results of 60,000 preoperative blood tests on 2,000 patients undergoing elective surgery (excluding obstetrics, renal transplant and pediatrics) from October 1980 to January 1981; (2) demographic data on these patients; (3) a list of discharge diagnoses and procedures for these patients and (4) patient charts. We first determined how many of these tests were indicated. We used decision limits (laboratory values requiring a decision as to patient care) and indications (common causes of abnormalities in such tests) based on clinical experience and the literature. By examining one data set, randomly selected, we then determined how many abnormalities had occurred in patients with no indications. Using this information, we modified our decision limits and indications and retested them on another patient population. We determined the percentage and dollar value of preoperative tests performed without indication, and the percentage and number of unindicated tests that produced results beyond decision limits.

Results. Very few abnormal results were produced by tests performed without the most common indications of need (e.g., diabetes for blood glucose testing). However, for the sake of completeness, we also analyzed the data using broader indications: e.g., for the SMA6 (1) known use of diuretics; (2) known chronic renal disease; (3) age of 60 yrs or more; (4) other known abnormalities in fluids or electrolytes; and (5) other associated abnormalities (seizures). Decision limits were 130-150 mEq/l for sodium, 3.2-5.8 mEq/l for potassium and 0-1.5 mg % for creatinine. Using these broader indications and decision limits, we found that 41% of tests had been performed without indication of need and that of this group, only one abnormality had been uncovered (41 yr old with a creatinine of 1.8 mg % undergoing anal sphincter repair). Savings per year would have been \$41,000 for this patient group. The percentage of tests that were unindicated and the number of unindicated abnormalities for the six most common tests (CBC, protime, PTT, platelets, SMA6, glucose) is listed in

in Table 1.

Discussion. This methodology can be used to analyze the cost-benefit ratio of laboratory testing for different sets of indicators, patient populations, and sample sizes. The consequences of missing abnormalities that might have been revealed by tests consist of medicolegal liability and potential patient harm. The former must be weighed against the liability now incurred when abnormalities revealed by tests are not acted upon, or even noted, as is common now. The latter is judged at most to be one death per 100 years at our institution (per test). In times of economic difficulty, our analysis will aid in determining which tests could be eliminated with least impact on patient care

TABLE 1.

| | Decision Limits(2) | No. of Tests Examined | Percent of Unindicated Tests | No. of Unindicated Abnormal Tests |
|------------------|--------------------------------------|-----------------------|------------------------------|-----------------------------------|
| PT ¹ | 10-13 | 201 | 61% | 0(0%) |
| PTT ¹ | 20.5-41.5 | 199 | 81% | 0(0%) |
| PLT | 115-800 | 407 | 92% | 1(.2%) |
| HGB | 10-18 | 610 | 46% | 0(0) |
| WBC | 2-15 | 610 | 62% | 1(.2%) |
| DIFF | PMN<1.5 or >1 abn cell | 390 | 87% | 0(0%) |
| SMA6 | Na:130-150 K:3.2-5.8 Cr: 0-1.5 | 514 | 41% | 1(.2%) |
| GLUCOSE | 50-180 | 464 | 77% | 2(.4%) |

1. PT/PTT Samples are small as a program to decrease testing has already been implemented.
2. PT/PTT decision limits are reported in secs; PLT in K/mm³; HGB in gm/dl; WBC in K/mm³; DIFF: PMN in K/mm³ and abn cells in % ; Na in mEq/l; K in mEq/l; Creatinine in mg/dl; Glucose in mg/dl.