Hospital Practice
Rational preoperative evaluation

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Summary: Clinical data from two hundred consecutive patients undergoing surgical procedures at the Salt Lake City VA Hospital form the basis of this study. Results of nine commonly ordered preoperative tests (blood count, differential, electrolytes, chemistry panel, urinalysis, prothrombin time, partial thromboplastin time, electrocardiogram, and chest X-ray) were matched with the preoperative history and physical examination and the outcome of surgery in each patient. Each test was examined by (1) the frequency with which it was ordered, (2) the frequency with which it was abnormal, and (3) the frequency with which the abnormal result affected preoperative care. A prevalence of medical illness was found in this population, with 47.5% having a major cardiovascular diagnosis, 35.5% a metabolic or endocrine disease, and 28% a major pulmonary diagnosis.

A total of 1271 tests were performed, with 477 (35.5%) showing some abnormality. However, only 76 (5.9%) changed the patient's management before surgery. All but five of these abnormalities were predictable from the clinical evaluation and these five were minor. The overall postoperative complication rate was 9%. No complication was attributed to the omission of a preoperative test. No surgical cases were cancelled during the study period based solely on a preoperative test. We conclude that many preoperative tests can be safely eliminated by ordering only those based on a specific abnormality in the history or physical examination, resulting in more cost-effective surgical care.

Introduction

The contemporary surgeon must find a balance between minimizing the risks to his or her patients and containing the cost of surgical care. Since an operative complication results in an unacceptable monetary and corporal cost, some preoperative tests will be inexcusable. The identification of these tests is the principal aim of this investigation.

Materials and methods

Clinical data from 200 consecutive patients undergoing surgical procedures at the Salt Lake City Veterans Administration Hospital form the basis of this study. This patient population is a useful one for studying preoperative evaluation, as the patients have a high prevalence of significant medical illnesses. Results of nine commonly ordered preoperative tests (blood count, differential, electrolytes, chemistry panel, urinalysis, prothrombin time, partial thromboplastin time, electrocardiogram, and chest X-ray) were matched with the preoperative history and physical examination and the outcome of surgery in each patient. Each test was examined by (1) the frequency with which it was ordered, (2) the frequency with which it was abnormal, and (3) the frequency with which the abnormal result affected preoperative care.

Results

A high prevalence of medical illness was found in this population, particularly involving the cardiovascular, pulmonary, and metabolic systems of the patients. Results are summarized in Table I. The mean age of the group was 56 years, with a mean cigarette consumption of 32 pack years.

A total of 1271 tests were performed, with 477 (35.5%) showing some abnormality. However, only 76 (5.9%) changed the patient's management before surgery. All but 5 of these were predictable from the clinical evaluation and these five were minor. A summary of the tests performed and their yield is provided in Table II. All 5 were urinalyses indicating the presence of bacteria in asymptomatic patients. The conditions which produced abnormal studies resulting in a change in preoperative therapy are summarized in Table III.

One hundred and eleven patients had general anaesthetics, 52 regional, and 37 local. The general surgery service performed 58 of the 200 procedures, ortho-

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Complications occurred in 18 patients giving an incidence of 9%. There was no mortality. Cardiovascular complications were most common, with 7 patients involved. All had preoperative electrocardiograms which were unchanged from previous tracings. Five patients suffered wound infections, three of whom had a perforated viscus. All three patients with pulmonary complications had chest X-rays which were interpreted as normal in two cases, with the third patient having a carcinoma of the lung. There were three vascular graft thromboses related to technical errors. No complications were predictable from preoperative testing. No operative cases were cancelled during the period of this study due to unsuspected laboratory abnormalities.

### Discussion

Despite the fact that 35.5% of the 1271 tests performed displayed some abnormality, only 76, or 5.9%, of the tests actually affected the care of the patient before operation. Of the 76 tests affecting care, only 5 were unsuspected on the basis of clinical history and physical examination.

The remaining 71 tests which resulted in clinical decisions were predictable from the presenting history and physical examination.

Clinicians may argue that laboratory tests detect potentially dangerous but clinically silent abnormalities. Sandler (1979) found routine blood counts and urinalysis helpful in less than 1% of medical outpatients presenting for diagnosis. Kaplan et al. (1982) found no haemoglobin abnormalities, one platelet, and one white blood cell abnormality in 610 blood counts in healthy subjects. Robbins & Rose (1979) found no unpredicted partial thromboplastin times in 1025 studies. Eisenberg et al. (1982) found one patient in 480 who may have benefited from routine prothrombin and partial thromboplastin screening. Delahunt & Turnbull (1980) found 63 unpredicted

### Table II  Summary of laboratory, X-ray and electrocardiogram results

<table>
<thead>
<tr>
<th>Test</th>
<th>Number ordered</th>
<th>%</th>
<th>Number abnormal</th>
<th>%</th>
<th>Abnormal results changing therapy</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete blood count</td>
<td>199</td>
<td>99.5</td>
<td>121</td>
<td>60.8</td>
<td>18</td>
<td>9.0</td>
</tr>
<tr>
<td>White cell differential count</td>
<td>155</td>
<td>57.5</td>
<td>54</td>
<td>34.8</td>
<td>8</td>
<td>5.1</td>
</tr>
<tr>
<td>SMA†</td>
<td>117</td>
<td>58.5</td>
<td>77</td>
<td>65.8</td>
<td>24</td>
<td>20.5</td>
</tr>
<tr>
<td>SMA20†</td>
<td>108</td>
<td>54.0</td>
<td>88</td>
<td>81.4</td>
<td>9</td>
<td>8.3</td>
</tr>
<tr>
<td>Urinalysis</td>
<td>174</td>
<td>87.0</td>
<td>39</td>
<td>22.4</td>
<td>9</td>
<td>2.6</td>
</tr>
<tr>
<td>Prothrombin time</td>
<td>128</td>
<td>64.0</td>
<td>5</td>
<td>3.9</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Partial thromboplastin time</td>
<td>126</td>
<td>63.0</td>
<td>5</td>
<td>3.9</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Electrocardiogram</td>
<td>145</td>
<td>72.5</td>
<td>53</td>
<td>36.5</td>
<td>2</td>
<td>1.3</td>
</tr>
<tr>
<td>Chest X-ray</td>
<td>119</td>
<td>59.5</td>
<td>35</td>
<td>29.4</td>
<td>6</td>
<td>5.0</td>
</tr>
</tbody>
</table>

†See Table III; SMA = sequential multiple analysis.
abnormalities in 1792 blood and X-ray tests in routine surgical cases, none of which affected the care of the patient.

Seymour et al. (1982) and Loder (1978) support the use of routine chest radiography in elderly patients, citing their value in detecting unsuspected disease and their value as a baseline. However, the National Study by the Royal College of Radiologists (1979), involving 10,619 preoperative chest films, found that preoperative chest radiography had no effect on preoperative decision making regardless of the abnormality detected. No ‘baseline’ value was detectable. Several reviews (Eddy, 1980; Frause & Carlson, 1975; Task Force on the Periodic Health Examination, 1979; Breslow & Somers, 1977) have found chest X-rays unnecessary as screening devices.

Recommendations on the preoperative electrocardiogram vary widely. Ferrer (1978) advocates one routinely in patients of all ages. Paterson et al. (1983), Elston & Taylor (1984) and Seymour et al. (1983) prefer a selective approach to preoperative electrocardiography. Rabkin & Horne (1983) found that even in patients with documented new abnormalities compared to previous tracings, there appeared to be no impact on the scheduling or conduct of the procedure.

Conclusion

While previous studies have reviewed healthy patient groups, our study examines a highly diseased patient population to test the hypothesis that significant clinical abnormalities are best detected by the history and physician examination. Our results indicate that extensive routine preoperative testing has no screening or baseline value. Certainly some preoperative investigations are appropriate, if they are based on the finding of a specific clinical abnormality, and if the result of the test might affect the care of the patient before or during the operation. This approach requires a most careful evaluation by the physician, but the resultant cost savings and decreased stress to the patient are the reward.

References


THE TASK FORCE ON THE PERIODIC HEALTH EXAMINATION: Periodic (vs. yearly) health exam. Canadian Medical Association Journal, 121, 1.