Duplicated Laboratory Tests: A Hospital Audit

To the Editor:

Rising healthcare costs are unlikely to be sustainable in the current healthcare environment. Reducing costs is a major effort of governments and policymakers (1). One component of these costs is the wide range and overwhelming number of diagnostic tests (2). Laboratory testing of hospitalized patients can be redundant when multiple providers order the same or similar tests for the same patient, contributing needlessly to the total healthcare costs (3–5).

We evaluated the frequency of duplicate ordering of 6 in-house laboratory tests (Table 1) in hospitalized patients over a 12-month period and analyzed the costs associated with this practice. Research questions for this study included the following: (a) In this sample of hospitalized patients, what was the prevalence of duplication of the selected laboratory tests over twelve months, and (b) what were the costs associated with duplication of these laboratory tests?

A retrospective descriptive design was used to evaluate the prevalence that selected tests were duplicated. We chose these 6 tests because a medical need to have 2 results for these tests during a single hospitalization was unlikely. This study was carried out in a large tertiary care organization in central Florida and used a sample of all patients admitted to the hospital who were older than 18 years and had an order for any of these tests between January 6, 2010 and December 31, 2010. Patients were excluded if they were discharged less than 24 h after admission or if their medical record was incomplete. Appropriate Institutional Review Board approval was obtained. An unnecessary repeated test was identified if it was performed more than once during the same hospitalization and if a final result was present in the electronic medical record before the second test was ordered.

We used proportions as descriptive statistics to summarize the ordering and duplication of these selected tests. The annual cost for unnecessary duplication was estimated from the actual 2012 charge for each test paid to the vendor by the hospital to run the test. The cost did not include the charge to the patient or secondary payer and did not reflect reimbursement. The formula used for calculating total costs for 1 year was:

\[
\text{Annual costs} = \frac{\text{Yearly costs}}{\text{Number of duplicated tests}}
\]

For the 6 tests examined, 53,351 tests were ordered, 10,375 of which were cancelled. Of the remaining 42,976 tests that were conducted, 4.6%–8.7% of the tests were redundant, depending on the specific type of test. The total yearly direct cost to the hospital system of redundant testing for these 6 selected tests was estimated to be $33,531 (Table 1).

We observed an overall redundancy of 7.7% for these 6 common laboratory tests. The total cost associated with these redundancies was substantial and indicates that redundant testing may have a large impact on both hospital revenue and the overall efficiency of patient care. One could easily reason that if this rate of duplication occurred for a wider range of tests than those we examined, the costs of test duplication could affect overall hospital revenue considerably. Multiply this finding by the thousands of hospitals across the US, and it is clear that test duplication can encumber an already burdened healthcare system and contribute needlessly to inflated healthcare costs.

This study had several limitations. First, the study was conducted in a single tertiary care organization, which may limit generalizing our findings to other facilities or settings. Second, the list

<table>
<thead>
<tr>
<th>Test</th>
<th>2012 Cost of test paid to vendor</th>
<th>Ordered tests, n</th>
<th>Cancelled tests, n</th>
<th>Final test results, n</th>
<th>Redundant tests, n</th>
<th>Yearly costs a</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHPb</td>
<td>$19.49</td>
<td>3355</td>
<td>768 (22.9%)</td>
<td>2514</td>
<td>196 (7.8%)</td>
<td>$3820</td>
</tr>
<tr>
<td>ANA</td>
<td>$15.13</td>
<td>3035</td>
<td>441 (14.5%)</td>
<td>2594</td>
<td>120 (4.6%)</td>
<td>$1816</td>
</tr>
<tr>
<td>B12/folate</td>
<td>$15.34</td>
<td>7229</td>
<td>1355 (18.7%)</td>
<td>5874</td>
<td>396 (6.7%)</td>
<td>$6075</td>
</tr>
<tr>
<td>TSH</td>
<td>$8.00</td>
<td>27 475</td>
<td>5880 (21.4%)</td>
<td>21 595</td>
<td>1893 (8.7%)</td>
<td>$15 144</td>
</tr>
<tr>
<td>Ferritin</td>
<td>$7.51</td>
<td>6099</td>
<td>928 (15.2%)</td>
<td>5171</td>
<td>384 (7.4%)</td>
<td>$2884</td>
</tr>
<tr>
<td>Iron/TIBC</td>
<td>$12.00</td>
<td>6158</td>
<td>1003 (16.3%)</td>
<td>5155</td>
<td>316 (6.1%)</td>
<td>$3792</td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td>53 351</td>
<td>10 375 (19.4%)</td>
<td>42 903</td>
<td>3305 (7.7%)</td>
<td>$33 531</td>
</tr>
</tbody>
</table>

a Rounded to the nearest dollar. 

b AHP, acute hepatitis panel; ANA, antinuclear antibodies; TSH, thyroid-stimulating hormone; TIBC, total iron-binding capacity.
of selected laboratory tests was small, and the clinical information regarding why the test was duplicated was not evaluated. The third limitation was related to using the 2012 charge for each test paid to the vendor by the hospital for determining the costs associated with unnecessary duplication. To accurately assess the total cost of performing redundant laboratory tests would require that the costs for both reagents and associated resources (i.e., staff, equipment, test tubes, and so forth) be included in the calculation. This study did not take into account the costs of duplicate testing to patients or secondary payers. The cost of the test the hospital pays to the vendor is considerably less than the cost of the test billed to the patient or secondary payer. Thus, the larger problem of such inefficiencies as duplicate testing and the resulting financial burden to patients—and more largely the healthcare system—should be taken into consideration.

It would also be important to determine if initiation of computerized alerts, with evidence-based, test-specific time intervals, would reduce redundant laboratory testing. We would encourage others to replicate this study in their facilities by examining their own electronic medical records to determine what increased efficiencies could be possible with the elimination of duplicate testing.

Author Contributions: All authors confirmed they have contributed to the intellectual content of this paper and have met the following 3 requirements: (a) significant contributions to the conception and design, acquisition of data, or analysis and interpretation of data; (b) drafting or revising the article for intellectual content; and (c) final approval of the published article.

Authors’ Disclosures or Potential Conflicts of Interest: Upon manuscript submission, all authors completed the author disclosure form. Disclosures and/or potential conflicts of interest:

Employment or Leadership: S.A. Bridges, Orlando Health.
Consultant or Advisory Role: None declared.
Stock Ownership: None declared.
Honoraria: None declared.
Research Funding: None declared.
Expert Testimony: None declared.

References

Sharon A. Bridges1*
Linda Papa2
Anne E. Norris3
Susan K. Chase3

1 Orlando Health Physician Group
Orlando Health
Orlando, FL
2 Department of Emergency Medicine
Orlando Health
Orlando, FL
3 College of Nursing
University of Central Florida
Orlando, FL

*Address correspondence to this author at:
OH Inpatient Medical Group
7350 Sandlake Commons Blvd.,
SU 1102, MP 452
Orlando, FL 32819
E-mail Sbridges5@live.com

Previously published online at DOI: 10.1373/clinchem.2012.185264