Laboratory test utilization in Microbiology: where do we begin?

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Disclosure - COIs

I participate in laboratory research sponsored by Abbott Laboratories Ltd.

Honoraria:

- Abbott Pharmaceuticals
- University of Alberta
- University of Calgary
- Alberta Society of Clinical Chemists
- Ontario Society of Clinical Chemists
- LifeLabs
- McGill University
- Alberta Society of Pharmacists
- Consulting: KPMG, Abbott Laboratories Ltd.

- Other: Stock in Merus Labs, Tekmira
- Book on appropriate lab testing
Chemistry/hematology tests
Vitamin D in Alberta
Objectives

• To identify goals: getting the most bang for your buck
• To emphasize the importance of the laboratory-physician partnership
• To describe the challenges and gains experienced in the course of laboratory utilization projects
Caveats

• High level overview

• Based on my involvement with:
  – Choosing Wisely Canada
  – Choosing Wisely Alberta
  – Alberta Laboratory Utilization Office
  – Clinical labs, Alberta Health Services
  – New research
Calgary Volumes - All Micro Tests

The graph shows the trend of NumSpec over the years from January 2011 to January 2015. The line graph includes observed data, fit, upper control limit (UCL), and lower control limit (LCL). The forecast line is also marked for potential future trends.
Calgary Positivity Rate for All Microbiology Tests

Number of Specimens vs. Positivity Rate (%)

- Blue line represents the number of specimens (# SPEC).
- Red line represents the positivity rate (%).

Timeline: January 2012 to December 2014.
Question and answer

• How have test volumes changed over time in your lab?
Getting the most bang for your buck

• Which utilization management strategies work?
• Which physician groups should be targeted?
• Which tests should be targeted?
What does the literature say?

• Many gaps
• Small sample sizes
• Uncontrolled studies
• Not enough quality studies for meta-analysis
• No direction as to why some studies worked and others didn’t
What can you expect?

• Education: 1-5%
• Audit and feedback: 10%
• Administrative interventions: 10-20%
  – Test restrictions: 50%+
  – Vitamin D: 97% in Alberta
Which physicians groups to target?

• High utilizers
• Greatest practice variance
Total expenditures by specialty

• Naugler C, Thomas R, Turin TC, Guo M, Vaska M. Am J Clin Pathol in press
Laboratory testing costs by physician

Number of family doctors

Yearly cost of laboratory tests ($CDN)
Which tests to target

- Most common
- Most expensive
- Greatest practice variance
- Where CPGs exist
Question and answer

• What tests would you target?
The laboratory-physician partnership

• Usually physicians are not involved in lab utilization decisions
• Very little data on knowledge and attitudes of physicians
• Very little data on which approaches are most acceptable to physicians
Q1: How important do you consider the issue of laboratory test overuse?
Q4: Who is responsible for addressing issues regarding appropriate laboratory utilization? Please check all that apply.

- Individual Medical Doctors (MDs) 96.69%
- Alberta Medical Association (AMA) 66.89%
- Provincial Government (Alberta Health Services, Alberta Health) 71.52%
- Diagnostic laboratories 78.81%
- Patients 57.62%
Q5: Which of the following are acceptable approaches to improving the quality of laboratory testing (ie. Reducing unnecessary and duplicate testing)? Please check all that apply.

<table>
<thead>
<tr>
<th>Approach</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuing education for healthcare providers (ie. Guidelines and recommendations for different laboratory tests)</td>
<td>98.03%</td>
</tr>
<tr>
<td>Audit and feedback of test ordering practices to individual physicians</td>
<td>84.21%</td>
</tr>
<tr>
<td>User pay for certain tests</td>
<td>50.66%</td>
</tr>
<tr>
<td>Restricting certain tests to specific specialist groups</td>
<td>38.16%</td>
</tr>
<tr>
<td>Specialized test requisition forms for certain tests</td>
<td>45.39%</td>
</tr>
<tr>
<td>Modifying the format of test requisition forms (ie. Removal of certain tests)</td>
<td>51.32%</td>
</tr>
<tr>
<td>Restricting the test frequency of certain tests</td>
<td>55.92%</td>
</tr>
<tr>
<td>Pathologist approval required for certain tests</td>
<td>36.18%</td>
</tr>
<tr>
<td>Positive incentives (&quot;gain-sharing&quot;) for changes in test ordering practices</td>
<td>34.87%</td>
</tr>
</tbody>
</table>
The challenge of identification of inappropriate tests

• What data is available?
• Probably secondary lab data:
  – Who is being tested?
  – Who is ordering tests?
  – What is the variance of test ordering in similar circumstances?
  – What is the compliance with CPGs?
  – What is the positivity rate?
PSA testing in the city of Calgary

Colon Cancer Screening

- There is marked variation in screening rates throughout Calgary, related to a number of sociodemographic factors

Redundant laboratory tests

- Morgen E, Naugler C. Am J Clin Pathol in press
The challenge of measurement

• Not as simple as it sounds
• Two superimposed patterns:
  – Long term (year over year) trend
  – Short term (seasonal) trend
Linear Regression Model

\[ y = 100.66x + 13624 \]

\[ R^2 = 0.34 \]
Provincial Test Volume Prediction
Calgary Volumes - Urine Cultures
Calgary Volumes - Blood Cultures
The winning conditions step 1

• Pick a test to address
  – High volume
  – High cost
  – High variance
  – Gather data
  – Tie to published recommendations where possible
    • Choosing Wisely Canada
    • CPGs
The winning conditions step 2

• Buy-in from:
  – Physician champions (content experts, professional groups)

• Demonstrate practice gaps and variation

• Demonstrate harm of over-testing
  – Misuse of public funds
  – Direct patient harm
  – Misdirected clinical effort
The winning conditions step 3

• Present a united front to administrators and politicians
  – Laboratory
  – Physician groups
  – Health department
The winning conditions step 4

• Be prepared for push-back
  – Politicians
  – Physicians
  – Public
Question and answer

• What has worked or not worked in your lab?
Questions?
This is your laboratory test utilization report card for: 09.28.2013 - 01.03.2014

Summary

Site: [Site Name]
Number of pay periods: 7
Total number of hours worked: 327.50

This is your confidential lab utilization report. If you have questions, please speak to your medical director or Dr. Christopher Naugler, AHS Laboratory Utilization Office medical/scientific director.

Individual laboratory test volumes and costs

<table>
<thead>
<tr>
<th>Test</th>
<th>Cost/50h</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBC</td>
<td>$188/50h</td>
</tr>
<tr>
<td>Chem Panel 7</td>
<td>$116/50h</td>
</tr>
<tr>
<td>Liver Panel</td>
<td>$108/50h</td>
</tr>
<tr>
<td>Urine Culture</td>
<td>$275/50h</td>
</tr>
<tr>
<td>Urinalysis</td>
<td>$73/50h</td>
</tr>
<tr>
<td>PT/PTT</td>
<td>$98/50h</td>
</tr>
<tr>
<td>Strep Throat</td>
<td>$186/50h</td>
</tr>
<tr>
<td>Troponin I</td>
<td>$15/50h</td>
</tr>
<tr>
<td>D-Dimer</td>
<td>$34/50h</td>
</tr>
<tr>
<td>Chlamydia/GC</td>
<td>$89/50h</td>
</tr>
</tbody>
</table>

Total laboratory costs incurred by pay period

![Graph showing test costs incurred by pay period with pay periods from Sep/28-Oct 11 to Dec 21 - Jan 3. The graph compares individual scores (blue) with peer group averages (purple) and standard deviations from average (yellow).]
Testing algorithm example

- >1000 flow cytometry tests on peripheral blood for lymphocytosis
- An algorithm incorporating Age, CBC and Ferritin can eliminate 25% of flow cytometry tests with >97% specificity
- Healey R, Naugler C, De Koning L, Patel J. Leuk Lymphoma, in press