LABORATORY STEWARDSHIP: TAKING THE FIRST STEPS TO DOWNSTREAM SAVINGS

ANDREW FLETCHER MD
Background

- 13 Billion test performed
- 70% decisions based
- 10-30% unnecessary
Background

3 most significant causes of patient harm
- Ordering the wrong test
- Failing to retrieve a test result
- Misinterpreting a test result
the frequency of unnecessary tests and procedures is a very or somewhat serious problem

that even if they know a medical test is unnecessary, they order it if a patient insists

the average medical doctor prescribes an unnecessary test or procedure at least once a week

their patients ask for an unnecessary test or procedure at least once a week
Trends in Healthcare

- Laboratory Stewardship
- Radiology Utilization management
- Blood Utilization
- Pharmacy Utilization management
- Antimicrobial Stewardship
Creating Successful Laboratory Stewardship

1/3 of labs have a stewardship program

1/2 of those labs have a productive and progressing committee

Success Factors

- Data Analysis
- Formal Governance
- Evidence-Based Recommendations
- IT Engagement and Support
- Project Management
- Measurement and Reporting
Transforming Laboratory Utilization Review into Laboratory Stewardship: Guidelines by the PLUGS National Committee for Laboratory Stewardship

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Appropriate utilization of clinical laboratory services is important for patient care and requires institutional stewardship. Clinical laboratory stewardship programs are dedicated to improving the ordering, retrieval, and interpretation of appropriate laboratory tests. In addition, these programs focus on developing, maintaining, and improving systems to provide proper financial coverage for medically necessary testing. Overall, clinical laboratory stewardship programs help clinicians improve the quality of patient care while reducing costs to patients, hospitals, and health systems. This document, which was created by a new multistitutional committee interested in promoting and formalizing laboratory stewardship, summarizes core elements of successful hospital-based clinical laboratory stewardship programs. The core elements will also be helpful for independent commercial clinical laboratories.

Pathology and laboratory medicine have transformed the practice of medicine by providing tests and services for diagnosis, treatment, monitoring, and prevention of disease and advancing the fields of medicine. Laboratory testing is the single highest-volume medical activity with an estimated 12 billion tests performed in the US each year.1 In addition, about 70% of downstream medical decisions are based on pathology and laboratory medicine results.2

The most significant causes of patient harm related to laboratory services are ordering the wrong test, failing to retrieve a test, and misinterpreting a test result.3 A number of studies, as well as review of insurance claims, reveal that 10%–30% of laboratory tests performed in the US are either unnecessary or inappropriate.4 About 50% of genetic test orders are inappropriate (3), and about 5% of genetic test orders are frank medical errors (6). About 7% of test results are never retrieved or retrieval is significantly delayed (7). Like all medical interventions, inappropriate laboratory test ordering and interpretation have serious effects, including delayed...
Where to Start?

Three Initial areas of Focus

Test Consolidation
How many reference labs do you use?

Reference test formulary
Creation & Implementation

In-House Testing
Daily recurring labs
Inappropriate test intervals
Test Consolidation

How many reference laboratories do you use?

1. Is there a primary Vendor?
2. Why are tests sometimes not consolidated?

- Physician Request
- Patient Request
- Insurance requirement
- Easier process for lab staff

<table>
<thead>
<tr>
<th>Free Phenytoin at Lab X</th>
<th>$106</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free Phenytoin at Primary Lab vendor</td>
<td>$13</td>
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Where to Start?

Three *Initial areas of Focus*

**Test Consolidation**

How many reference labs do you use?

**Reference test formulary**

Creation & Implementation

**In-House Testing**

Daily recurring labs

Inappropriate test intervals
Test Formulary

**Review**
- all send out testing performed in 1 year

**Eliminate**
- test listing in menu if ordered <4 times in 1 year

**Review**
- remaining test on menu to see if reasonable
POE Optimization

**Vitamin D**
- 1,25-Dihydroxy vitamin D
- 25-Hydroxy vitamin D

**Folate**
- Folate (RBC)
- Folate (serum)

**Flu**
- Flu PCR
- Flu respiratory viral panel
- Flu screen

**Gonorrhea**
- Gonorrhea culture
- Gonorrhea DNA probe
POE Optimization

- CELIAC SEROLOGY (REF, $$, 3d)
- IMMUNOGLOBULIN E (IGE) (REF, $$, 5d)
- LEVETIRACETAM LEVEL (REF, $$, 2d)
- PROTEIN C/S PANEL, FUNCTIONAL (REF, $$, 3d)
- RENIN (REF, $$, 2d)
- THYROID Abs (REF, $$, 2d)
- ALPHA-FETOPROTEIN (AFP) (REF, $$, 3d)
- B2 GLYCOPROTEIN I ABS IGG IGM (REF, $$, 3d)
- BUPRENORPHINE and METABOLITES, URINE (REF, $$, 5d)
- CARDIOLIPIN Abs (IgG, IgM, IgA) (REF, $$, 2d)
- GLUTAMIC ACID DECARBOXYLASE AB (REF, $$, 4d)
- ISLET CELL (REF, $$, 4d)
- LAMOTRIGINE LEVEL (REF, $$, 2d)
- OXCARBAZEPINE (TRILEPTAL) (REF, $$, 3d)
- THYROID STIMULATING IMMUNOGLOB (REF, $$, 3d)
- THYROXINE BINDING GLOBULIN (REF, $$, 3d)
- TISSUE TRANSGLUTAMINASE IGA AB (REF, $$, 3d)
- TOPIRAMATE (TOPRAMAX) LEVEL (REF, $$, 3d)
- TPMT ENZYME (REF, $$, 2d)
- VON WILLEBRAND MULTIMERIC PANEL (REF, $$, 4d)
- ACTIVATED PROTEIN C RESISTANCE (REF, $$, 5d)
- ADRENOCORTICOTROPHIC HORMONE (ACTH) (REF, $$, 3d)
- ALDOSTERONE, SERUM (REF, $$, 5d)
- ALDOSTERONE/RENIN ACT RATIO (REF, $$, 6d)
<table>
<thead>
<tr>
<th>Description</th>
<th>Pre Formulary</th>
<th>Post Formulary</th>
<th>Percent Decrease</th>
<th>Monthly Savings</th>
<th>Yearly Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly average of Inpatient Reference</td>
<td>$31,054</td>
<td>$20,028</td>
<td>35%</td>
<td>$11,026</td>
<td>$132,309</td>
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</table>
Commonly Misordered Testing

Test Removal & Reflex Path Implementation

- MTHFR 2 Mutations: 85%
- Factor V Leiden: 86%
- APC w/reflex to Factor V Leiden
Where to Start?

*Three Initial areas of Focus*

**Test Consolidation**
- How many reference laboratories do you use?

**Reference test formulary**
- Creation & Implementation

**In-House Testing**
- Daily recurring labs
- Inappropriate test intervals
Daily Orders

Don’t perform repetitive CBC and chemistry testing in the face of clinical and lab stability.

Don’t order diagnostic tests at regular intervals (such as every day), but rather in response to specific clinical questions.
Intervention Methods

Proactive
- Appropriate order sets
- Order management
- Preference list management
- Physician education
- Physician report cards

Reactive
- Duplicate alerts
- Formulary restriction alerts
- Best Practice Alerts
- Physician education
Order placed for the procedure in last 30 days

Order # 76548965
Ordered: 76548965
By: Zyne Cotopaxi, MD
Resulted: 09/04/2016 15:47
Collected: 09/04/2016 13:00

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
<th>Units</th>
<th>Flag</th>
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<tr>
<td>Thyroid Stimulating Hormone</td>
<td>4.0</td>
<td>IU/mL</td>
<td></td>
</tr>
</tbody>
</table>

Continue placing order?

Yes  No
Summary

Justification for Stewardship

NCLS Recommendations

Three Initial areas of Focus:

Test Consolidation
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  Creation & Implementation

In-House Testing
  Daily recurring labs
  Inappropriate test intervals
13 Billion laboratory tests performed annually in the U.S.

70% of medical decisions are influenced by laboratory data

3% of U.S. healthcare expenditures spent on Laboratory Services
Downstream impact

- Length of stay
- Pharmacy
- Radiology
- Others...
Troponin orders and Chest Pain LOS
Identify order mechanisms that drive the repeat interval

Modify the repeat time to be 3-6 hours after

Improve the time-to-decision by improving the test interval by up to 3 hours
TROPOININ I

1. Identify order mechanisms that drive the repeat interval
2. Modify the repeat time to be 3-6 hours after

**Improve** the time-to-decision by improving the test interval by up to **3 hours**
Downstream impact

- Length of stay
- Pharmacy
- Radiology
- Others...
Downstream Impact on Pharmacy

IVIG
Argatroban
Remicade
Downstream impact

- Length of stay
- Pharmacy
- Radiology
- Others......
Radiology Services
CT PE Protocol
American College of Chest Physicians and American Thoracic Society

View all recommendations from this society

Released October 27, 2013

Don't perform chest computed tomography (CT angiography) to evaluate for possible pulmonary embolism in patients with a low clinical probability and negative results of a highly sensitive D-dimer assay.

Clinical practice guidelines for pulmonary embolism indicate that the cost and potential harms of CT angiography (including radiation exposure and the possibility of detecting and treating clinically insignificant pulmonary emboli with anticoagulation) outweigh the benefits for patients with a low pre-test probability of pulmonary embolism. In patients with a low clinical prediction score (e.g., Wells or Geneva score) followed by a negative D-dimer measured with a high sensitivity test (e.g., ELISA), pulmonary embolism is effectively excluded and no further imaging is indicated for pulmonary embolism evaluation.

Patient Materials
- Search patient-friendly resources by Consumer Reports.
D-Dimer and CT PE Protocol

Well's Criteria for Pulmonary Embolism

- Clinical Signs and Symptoms of DVT
  - yes +3
- PE is #1 Diagnosis, or Equally Likely
  - yes +3
- Heart Rate > 100
  - yes +1.5
- Immobilization at least 3 days, or Surgery in Previous 4 weeks
  - yes +1.5
- Previous, objectively diagnosed PE or DVT
  - yes +1.5
- Hemoptysis
  - yes +1
- Malignancy w/ Treatment within 5 mo, or palliative
  - yes +1

Well's Criteria Score for PE: 3
Moderate probability of PE - 16.2% prevalence. A negative D-dimer may be useful to rule out PE; however, false positives occur with pregnancy, advanced age, trauma, recent surgery, hospitalized patients, liver disease, high rheumatoid factor, inflammation, and malignancy.
Average percent of patients receiving CT PE scan in months prior to Aug 2015 (n=7) = 4.58%

Average percent of patients receiving CT PE scan in months after Aug 2015 (n=15) = 3.14%
(two sample t-test, p<0.05)
23% ↓
CT Scans =
45,000 chest x-rays
23%↓ CT Scans = $34.20 per scan
23% ↓

CT Scans

= 

$10,260

cost saving
23%↓
CT Scans = $1,445,400 savings for patients
23% ↓
CT Scans
= 360 hrs
reduction in LOS
Downstream impact

- Length of stay
- Pharmacy
- Radiology
- Others...
Laboratory Stewardship: Taking the First Steps to Downstream Savings

Andrew Fletcher MD