Appropriate Utilization of Laboratory Tests Through a Diagnostic Management Team: Clinical and Financial Benefits

Michael Laposata, M.D., Ph.D.
Professor and Chair
Department of Pathology
University of Texas Medical Branch-Galveston

The Activity of a Diagnostic Management Team:

To Make Certain Everyone Knows the Basics From the Start

Instead of “throwing test results over the wall to treating physicians”

The DMT puts together the diagnostic puzzle and generates a diagnosis or short list of diagnostic options and provides the information to the treating healthcare provider.

Conventional Approach

Isolated Diagnostic Bits of Data - Assembly by Ordering Physician Minimally Trained in Test Selection and Interpretation

Diagnostic Management Team Approach

Caring for More Patients While Diagnostic Puzzle is Being Assembled

Diagnostic Management Team Approach

Receives Accurate Diagnosis Quickly as a Completed Puzzle

There is No Wall Between the Ordering Doctors and the Diagnostic Doctors
Instead of providing information that is a set of numbers, difficult to understand abbreviations of test names, or simple “positive” or “negative” answers, an understandable narrative report is delivered.

Data Presentation in the Medical Record for Coagulation Studies Prior to Initiation of the Patient-specific, Expert-driven Coagulation Interpretation

June 30, 2010


Report in the Medical Record After Initiation of the Daily Rounds to Interpret All Complex Evaluations from the Special Coagulation Laboratory

July 1, 2010

This patient has an elevated PTT, with a normal PT/INR and normal thrombin time.

A PTT mixing study failed to correct into the normal range. These results were consistent with the presence of an inhibitor (such as a lupus anticoagulant) in the sample.

The Dilute Russell Viper Venom time (dRVVT) is used for detection of Lupus Anticoagulant, and the test was positive, indicating the presence of Lupus Anticoagulant.

Taken together, this is a patient with a prolonged PTT based upon the presence of a lupus anticoagulant. There is no increased bleeding risk in this patient, despite the prolonged PTT.

Official Definition: Diagnostic Management Team (DMT)

Unless all four of the following are met, a group cannot be designated as a DMT

1. Team must meet frequently and regularly and provide patient specific reports with no request required to provide an interpretation

2. Report must be delivered before or during the time when treatment decisions are made
Official Definition: Diagnostic Management Team (DMT)

3. Report must consider the clinical context in which the diagnostic tests are ordered, and attempt to synthesize all relevant diagnostic test results.

4. Report must be entered into the patient’s medical record.

Thousands of departments have clinical service lines outside of traditional anatomic pathology and radiology that meet two or three of these criteria.

It is a Diagnostic Management Team Activity of Just a Case Conference?

A True DMT:

- All Current Cases Discussed & Have a Narrative Interpretation Generated & Entered in Patient’s Record
- All Cases Discussed with Charted Narratives & Optimized Test Selection
- All Cases Discussed with Narratives in Chart and Optimized Test Selection in Place
- All Cases Discussed with Continuous Enhancement

Besides providing a patient-specific, expert-driven narrative of a complex clinical evaluation, what else does a DMT accomplish?

The Diagnostic Management Team Greatly Optimizes Lab Test Utilization

Questions to be Addressed:

- How does the DMT impact overutilization and underutilization of laboratory results?
- Is a group of experts valuable to physicians who have little current expertise in test selection?
Questions to be Addressed:

- Is overutilization or underutilization of laboratory tests more costly considering the total patient encounter?
- How is the cost of overutilization assessed and is that accurate?
- How is the cost of underutilization assessed and how precise can this assessment be?

Diagnostic Management Team Activities Optimizing Lab Selection

Take Clinical Context and Diagnostic Goals

Obtain the Correct Diagnosis Rapidly And Using All the Necessary Tests to Reduce Underutilization and No Unnecessary Tests to Reduce Overutilization

Survey Response Concerns of Ordering Physicians on Clinical Laboratory Issues

Concerned about overtesting patients 42.6%
Concerned about undertesting patients 18.7%

Can You Decide About Appropriateness of Utilization (Over or Under) if You Are Not an Expert in the Specialty for a Case?

The Big Subjective Gray Zone Must know many details to decide if there was overutilization or underutilization of tests Each case takes much time to evaluate

The determination whether overutilization or underutilization of laboratory tests has occurred is (for the most part) made as a general conclusion by individuals who are perceived, or perceive themselves to be, EXPERTS.
Even Among Experts, Controversy Exists Regarding Test Utilization for the Questions:

- Is Factor XII testing necessary?
- How many lupus anticoagulant tests should be performed?
- Are both Anticardiolipin and Anti-Beta 2 Glycoprotein I tests redundant?
- Should Factor XI testing only be performed for patients of Ashkenazi Jewish descent?

And at least 10 more …

It is difficult, especially for non-experts, to decide if overutilization or underutilization has occurred.

To obtain the most meaningful decisions on whether over or underutilization has occurred, experts must make a conclusion in clinical context and real time for individual cases.

Comparison with Studies on Overutilization vs. Underutilization

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Overutilization</td>
<td>16%</td>
<td>20.6%</td>
<td>Did Not Measure</td>
</tr>
<tr>
<td>Underutilization</td>
<td>44%</td>
<td>44.8%</td>
<td>45.1%</td>
</tr>
</tbody>
</table>

Only 55% of the patients received appropriate quality care because of underutilization of diagnostic tests.

Initial Analysis by Experts in Real Time Regarding Test Utilization in Coagulation

<table>
<thead>
<tr>
<th>Total Patient Cases Analyzed</th>
<th>200 cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic errors</td>
<td>155</td>
</tr>
<tr>
<td>No errors</td>
<td>45</td>
</tr>
</tbody>
</table>

Frequency of Diagnostic Errors

The Cost of Overutilization

Overutilization

Underutilization

Only 55% of the patients received appropriate quality care because of underutilization of diagnostic tests.
### Routine Tests

**Eliminate 25% of Complete Blood Tests**

If this equals 25k tests per year  
If the total cost to the lab is $10 per test

This $250k per year so  
For a lab budget of $25M

This is a savings of 1% of the laboratory budget

### Expensive Send-out Tests

**Eliminate 10% of genetic tests, which have a rapidly growing number of indications**

If this equals 500 tests per year  
If the charge to the Laboratory/Institution is $5k per test

This is $2.5M per year  
So, for a lab budget of $25M,  
This is a savings of 10%

---

Therefore, the send-out budget is a better financial target, but the arguments against excess routine testing are strongly evidence-based

---

At the same time, “the diagnostic odyssey” of exome analysis for patients, especially neonates, is being increasingly shown to reduce mortality

---

If this grows, does the lab budget go up while the total cost of care goes down?

---

Five years ago, who would have thought a total exome sequence to evaluate a floppy baby made any sense?

**It is now almost a standard of care.**
What was once considered overutilization may become a problem of underutilization.

Underutilization:

Failure to order tests to establish diagnosis

This counts as a diagnostic error: **Delayed** or Missed Diagnosis

Why the Cost of Underutilization is Large and Unknown

<table>
<thead>
<tr>
<th>What is underutilized?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clinical History</strong></td>
</tr>
<tr>
<td>Inadequate questioning of patient (saves ten minutes of encounter time: $100-250)</td>
</tr>
<tr>
<td><strong>Lab Tests</strong></td>
</tr>
<tr>
<td>No D-Dimer Ordered (saves $25-50)</td>
</tr>
<tr>
<td><strong>Imaging Study</strong></td>
</tr>
<tr>
<td>No compression ultrasound (saves $250-500)</td>
</tr>
</tbody>
</table>

The immediate effect is a savings of $375 to $800

But what are the costs?

Impossible to know but possible to estimate.

What are the Possible Outcomes in Care and Cost for this Scenario?

Deep vein thrombosis accounts for leg swelling. Patients mainly 20 years of age and older

Options 1 and 2

Option 1:
- Clot stays in leg
- Active fibrinolysis and clot dissolves on its own
- Cost: < $2000

Option 2:
- Small embolism-asymptomatic
- Cost: < $2000
Options 3 and 4

**Option 3:**
- DVT enlarges inducing permanent post-phlebitic syndrome
- Cost: $100k to 150k/yr for up to 2-3 years and $20-50k for decades

**Option 4:**
- Symptomatic pulmonary embolism: Major lung infarction
- Cost: $100k to 200k/yr for 2-3 years, and $20-50k for decades

Options 5 and 6

**Option 5:**
- Patient has patent foramen ovale (PFO)
- DVT goes to brain instead of lungs
- Minor-to-moderate stroke
- Cost: $100k to 200k/yr for 2-3 years and $20-50k for decades

**Option 6:**
- Patient has PFO
- Large embolus produces major disabling stroke
- Cost: $200-500k/yr for 2-3 years, and $50-100k for decades

Options 7 and 8

**Option 7:**
- Lethal pulmonary embolism
- One time cost: < $2000

**Option 8:**
- Lethal stroke
- One time cost: < $2000

Approximate Financial Analysis for 500 Bed Hospital with One DVT Complication

Options 3, 4, and 5
- 182 events x $50k/year = $9,100,000

Option 6
- 12 events x $500k/year = $6,000,000

Total: $15,100,000

If 10% of Complications are Prevented, $1,500,000 Saved – Could Hire 6-8 Experts
A $200k/yr per DMT Expert

This centers the target for major cost benefits
Along with the obvious clinical outcome benefits
On underutilization of lab tests rather than overutilization

Does the patient’s death help the bottom line?

However,
Mortality statistics are likely to create a bad safety score that indirectly cause loss of revenue
The cost evaluation varies by institution.

Which Budget Changes When An Extra Necessary Test is Ordered to Make an Accurate Diagnosis Quickly?

Before and After Coagulation DMT:
What is the Impact of the Length of Stay in the Hospital for Pulmonary Embolism and Intracranial Hemorrhage?

R. Lawrence Van Horn, Ph.D, MPH, MBA
Assoc. Prof. of Economics and Management Exe. Dir. Of Health Affairs
The Owen Graduate School of Business Administration
Director, Office of Sustainable Health Care Finance
Institute of Medicine & Public Health
School of Medicine
The Identified Obstacles to DMT Creation:

The Roadmap to Institute Improved Care at Lower Cost

Problem #1
Not Enough Experts?

- The problem specific to the US is the inordinate financial incentive for pathologists to perform only surgical pathology and cytopathology
- Today, there are few “true” pathologist experts in the US in laboratory medicine knowledgeable enough to lead a DMT

So, why has there been no emphasis, except from a limited number of motivated individuals, to create DMTs?

Especially when they are desirable to treating healthcare providers who are unfamiliar with costly and complex diagnostic tests?

When Anatomic Pathology Earns $300-400k, and Clinical Pathology Earns $100k, Keep in Mind:
“Most pathologists enter the workforce owing at least $140,000, and plenty owe far more. It is not uncommon for 2-physician couples to accrue more than half a million dollars in loans during their training years.”

Because of this, there are simply not enough pathologists, even in many academic medical centers, to form DMTs. There must be at least two leaders in an individual service line to provide DMT services on a daily basis, due to vacations and travel.

**Problem #1**

**Proposed Solution**

If experts from healthcare systems, which involve many hospitals are also considered, virtually every system has enough individuals in all of the diagnostic areas to staff multiple, frequently used DMTs.

The experts may be MD/DO or non-MD.

**Problem #2**

**Little or No Payment for DMT-directed Test Utilization or More Rapid and Acute Diagnoses**

A major problem in the US and other countries where private insurance companies determine activities which are deserving of payment, is that the provision of a patient-specific, expert-driven interpretation of laboratory tests merits an insignificant payment or no payment at all.

In addition, **only** MD pathologists, even if they are not experts in a particular field, are allowed to bill for consultative services related to the selection of tests and the interpretation of test results.

While true non-MD experts are not paid.

Hospital leaders who do not know clinical medicine are more likely to be influenced by a revenue stream of $100k than a saving opportunity of $1M

**Thereby**

Undervaluing experts who save dollars by actively managing test use.
This greatly limits the participation of non-MD true experts which can substantially contribute to the generation of a rapid and accurate diagnosis.

In countries where healthcare is supported by the government, this consideration is irrelevant.

**Problem #2**

**Solution**

Payment for optimized test selection and improved speed and accuracy of a diagnosis must be reimbursed, independent of the degree of the expert, incentivize experts to perform this critical task.

Does this payment come from the hospitals? Insurance companies?

A fair and consistent payment mechanism must be identified.

**Problem #3**

**Increased Liability for Medical Care**

- A major problem, particularly in the US, involves the high number of lawsuits directed at healthcare providers.

- Countries in Western Europe, by and large, understand the fallibility of healthcare providers in a way that reduces the litigious climate of medical practice.

**Solution**

It is a fact of life in the US:

Learn how to provide evidence-based conclusions and accept you will be challenged when a patient has a bad outcome.

**Problem #4**

**Lack of Interest in a DMT Role by True Experts**

What keeps the non-MD laboratory directors from leadership roles in DMTs?

Is there concern if these roles are avoided that such individuals will be excluded from faculty level service roles in hospitals?

**Looking Ahead**

What is the future for Laboratory Directors, MD and non-MD, who do not lead a DMT?
A recent report regarding the value of clinical chemistry training in pathology training programs in the US suggests that if leaders in clinical chemistry, mostly non-MD individuals, do not pursue leadership in DMTs, that their roles will be lost in medicine.

Pathology’s Stepchild
Richard E. Horowitz, M.D.
Sarah M. Bean, M.D.

“Clinical chemistry isn’t very alluring!”

“Participating in a . . . type of diagnostic management team during training would be an excellent experience for subsequent community hospital practice.”

Many reasons have been offered as to why pathologists and non-MD laboratory experts do not want to create and lead DMTs.

Why Lab Leaders Do Not Start a DMT?

1. Not comfortable making a final diagnosis
2. Unwilling to accept call on nights and weekends
3. Worry about loss of court case as a non-expert
4. Would limit my research program
5. Would not be compensated

Why Lab Leaders Do Not Start a DMT?

6. No one to fill in when I am out of town
7. Need to see DMT process at least once
8. As a generalist, I cannot know everything asked of me
9. My personality is not suited to comfortable communication with treating physicians
Can Non-MD Experts Lead a DMT?

A major problem is that non-MD experts feel uncertain about their knowledge of clinical medicine.

The perception by non-MDs that MD experts have in-depth knowledge into all clinical presentations and all diagnostic procedures is incorrect.

Can Non-MD Experts Lead a DMT?

Expert level information can be learned by non-MDs in a matter of months, and then as more cases are encountered, the expertise grows.

Problem #4

Solution

Take whatever you feel you know the best and start a DMT for that group of patients however limited it may be.

Problem #5

DMTs are Not Relevant to Anatomic Pathology Practice

Why has there never been wide dissemination of DMTs that involve consideration of anatomic pathology findings alongside findings in radiology and genetic testing?

Examples

Thyroid test abnormalities in pregnancy, instead of all thyroid disorders

Toxicology for pain management, instead of all of toxicology
Most anatomic pathologists enjoy an income sufficient enough to discourage them from developing additional content knowledge outside of traditional anatomic pathology.

In the US at least, there is no incentive to provide a synthetic report that includes histologic and radiologic findings, and when relevant, genetic findings.

What is Changing Right Now in Anatomic Pathology?

- 10 years ago: Review Microscopically only
- Now: GI Biopsy
- 5 years from now: Microscopic Review
- Some Genetic Testing
- Digital Scan of Biopsy
- Much Genetic Testing
- Microscopic Review

Problem #5 Solution

Use the latest technology and provide for more than recognition of an image through a microscope

A New Role for the DMT: The Diagnostic and Management Autopsy (DMA)

A New Kind of Autopsy for the 21st Century

Arch Pathol Lab Med 141:887-888, 2017
My good friend’s husband died several days ago.

He had coronary artery disease with a thrombosed stent demonstrated by coronary angiography just 8 days before he passed away at home.

When he died, the medical examiner asked his family whether there was interest in an autopsy because her office did not require one.

His wife was pleased to avoid an autopsy.

I wanted to know more about his thrombosed stent and treatments, especially as they pertain to my expertise with antiplatelet agents.

I also wanted to know why it seemed he could wait up to “a couple of months” before undergoing a coronary artery bypass.

In addition, did his caregivers consider pharmacogenomic studies to determine whether he was sensitive to Plavix to maintain stent patency, or was he resistant as a result of a mutation in the CYP2C19 gene affecting 15% of people receiving this medication?
Finally, I wanted a small piece of liver from a postmortem biopsy, not an autopsy, to be retained for future genetic studies should we learn of new heritable syndromes associated with atherosclerosis in the future.

My questions are not the focal point of a traditional autopsy, which does not routinely involve consulting with a group of experts in vascular disease and coagulation.

The DMA would involve an expert-driven review of the patient’s diagnostic studies to determine if there was underutilization of the necessary tests.

The editorial suggests that a “diagnostic and management autopsy” (DMA) by DMT experts should accompany virtually every death.

The Diagnostic Management Team
A Group of Experts in One or More Diseases

Overutilization of Diagnostic Tests
Underutilization of Diagnostic Tests
Diagnostic Errors from Misinterpretation of Test Results
Diagnostic and Management Autopsy

The Emergence of the Pathologist in Health Care is Happening Now

Concluding Thoughts

Department of Pathology
### When You Are a Patient, Which One Do You Want?

<table>
<thead>
<tr>
<th>Diagnosis without a DMT</th>
<th>Diagnosis with a DMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-experts Providing Most of the Care, Faced with Hundreds of Tests Unfamiliar to Them and with No One To Advise Them</td>
<td>Experts Directing Diagnostic Testing and Knowledgeably Interpreting Test Results</td>
</tr>
</tbody>
</table>