Advising Clinicians on Laboratory Test Selection and Results Interpretation with a Diagnostic Management Team

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Outline of the Presentation

1. Presentation of the Clinical Problem
2. The Diagnostic Management Team at Vanderbilt : What it does and how it was created
3. The Existing and Planned Diagnostic Management Teams at Vanderbilt
4. Coagulation Rounds : An example of the DMT in action
5. Concluding Thoughts

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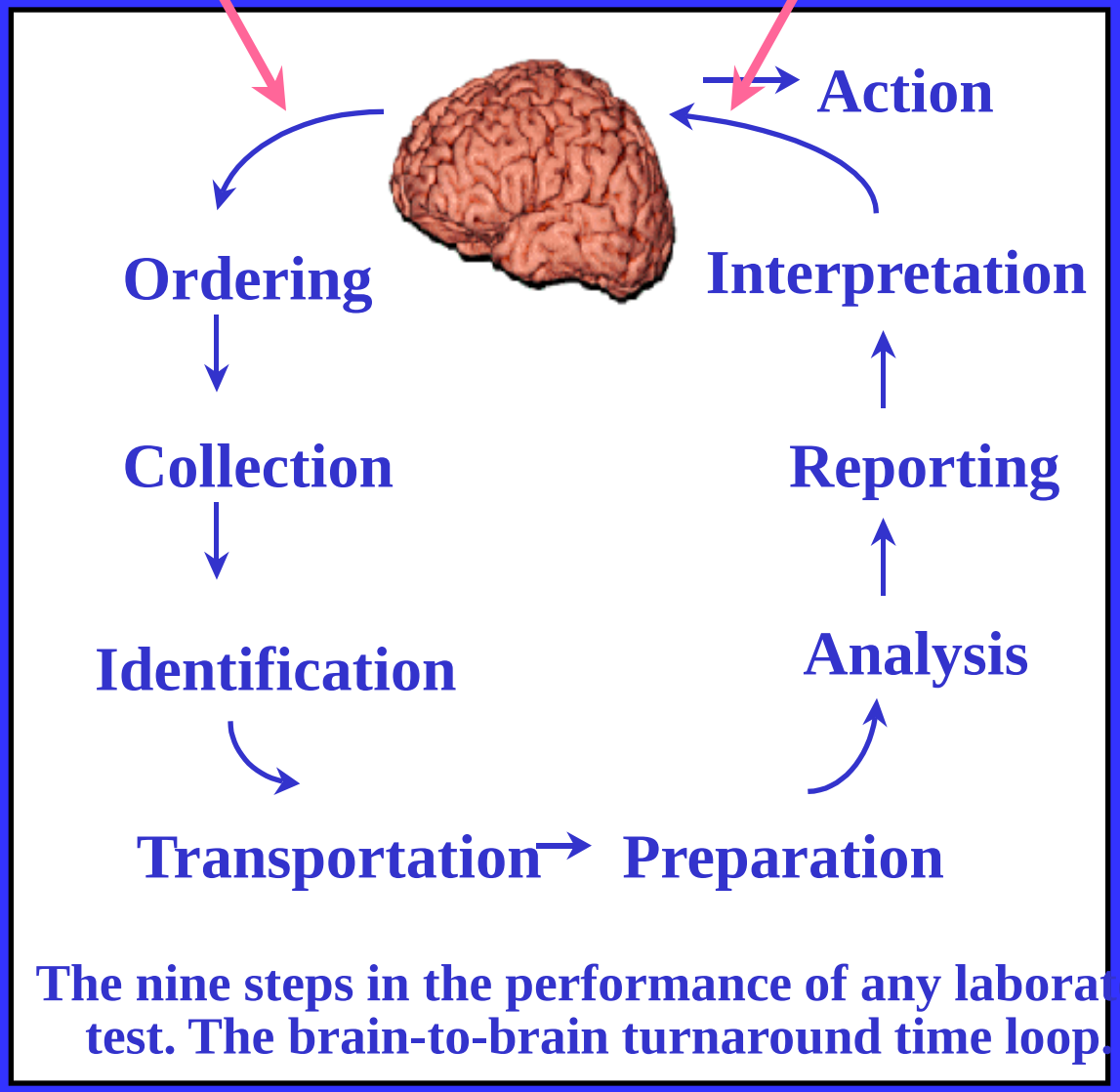
Has the right test been ordered?

Error between result receipt and action?



The nine steps in the performance of any laboratory test. The brain-to-brain turnaround time loop.

Lundberg , 1981

Survey of US Medical Schools

Brian Smith MD, PhD and the CLIHC group at the CDC – Preliminary Data from the Survey

Number of hours spent by medical students learning anatomic pathology : 60 – 300 is the range

Mean number of hours spent by medical students learning laboratory medicine : 9

And there is most often no test for the laboratory medicine coursework, and the teaching is often done by individuals with no laboratory medicine training

The Use of Pathology Services in Practice

Number of hours spent by clinicians doing anatomic pathology : None – it is done by anatomic pathologists

This is what is taught in medical school

Frequency with which a clinician orders and interprets laboratory tests : Daily

This is what is barely taught in medical school

2012

How challenging is it for the clinician to establish a diagnosis quickly and accurately?

Radiology: Dozens of imaging modalities

Lab Medicine: Test Menu > 2000 Assays without the impending thousands of genetic tests

Anatomic Pathology: Autopsy / Biopsy / Surgical Pathology / Cytopathology

Why not have all the diagnostic specialists convene and synthesize their findings and establish a diagnosis for the clinician – especially in complex cases?

Consequences of the Vast Array of Testing Options

Doctors pick unnecessary tests or miss the necessary ones

Dozens of approaches emerge for diagnosis of the same condition – some better than others

The correct diagnosis may be achievable promptly, but it is missed or very commonly delayed, with adverse clinical consequences to the patient and/or adverse financial consequences to the institution

The landscape is changing rapidly

Is the interpretation for coagulation testing rarely needed ?

How many patients have coronary artery disease and have a stent placed?

Many thousands in the US!

Plavix keeps the stent open and the patient alive –

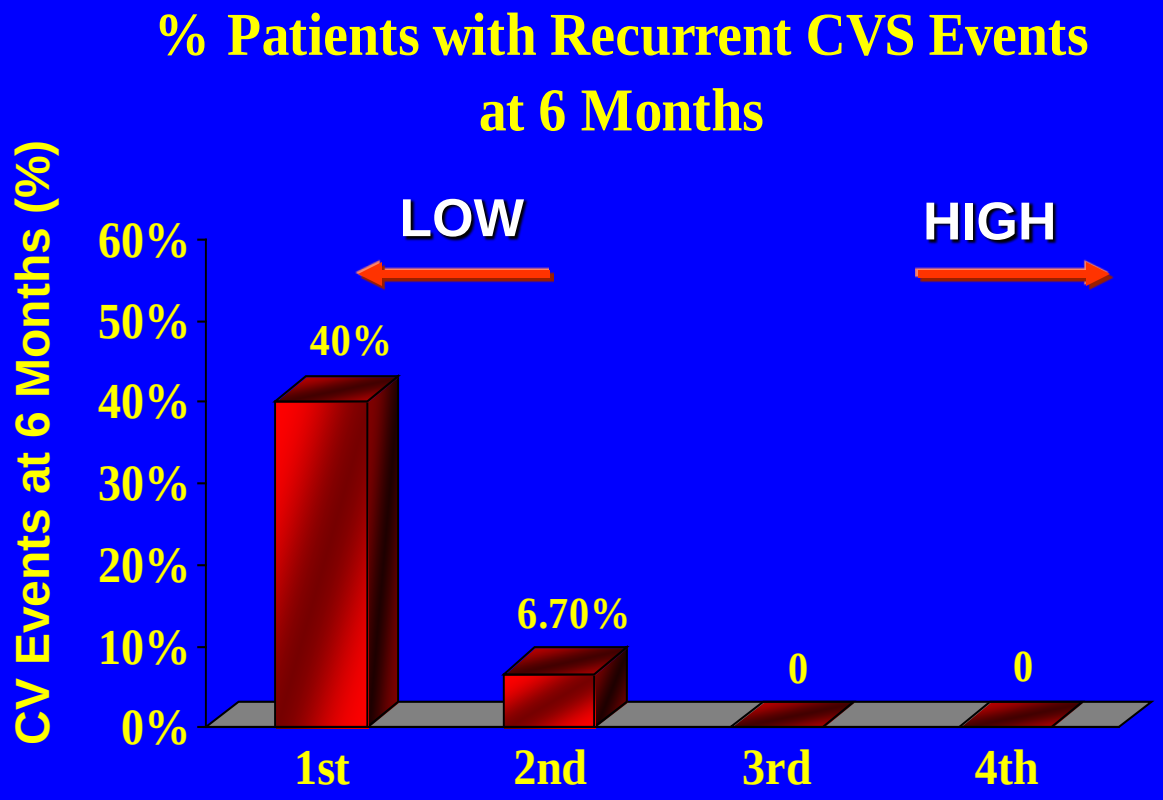
Is lab testing important?

Are the results complex?

EFFECTIVENESS OF CHRONIC PLAVIX THERAPY

Response to Plavix

Clopidogrel nonresponsiveness is associated with increased risk of thrombotic events and correlates to poorer clinical outcomes



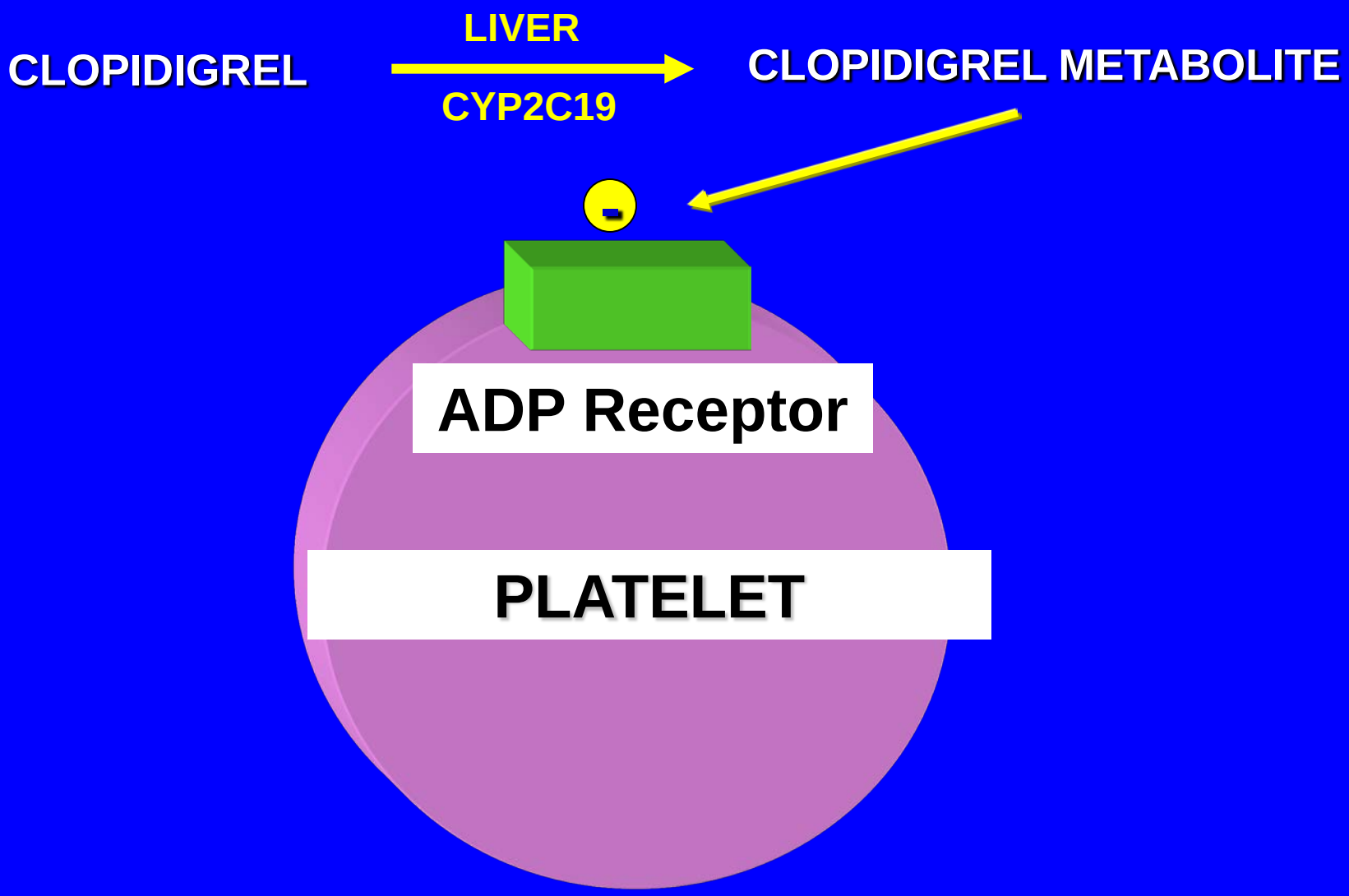
Matetzky et al. Circulation 2004; 109:3171-3175

INDIVIDUAL RESPONSE TO PLAVIX IS VARIABLE

- **Patients exhibit variable response to clopidogrel**
- **Patients may also experience variable return of platelet function after clopidogrel is withdrawn prior to surgery**

Serebruan et al. J Am Coll Cardiol 2005;45:246-51
Hochholzer et al. Circulation 2005; 111:2560-4

INHIBITION OF PLATELETS BY CLOPIDIGREL: INHIBITION AT THE ADP RECEPTOR



Genetic Studies

for Cyp2C19 loss of function alleles in the liver –

that convert Plavix to its active metabolite – can identify patients who do not have an anti-platelet effect from Plavix

N Engl J Med 360: 363, 2009

Following the Warfarin Experience, Pharmacogenomics for Plavix is Introduced to a Skeptical Audience of Potential Users and Laboratory Directors

For patients being treated with Plavix, there is a an opportunity to reduce the risk for thrombosis by performing pharmacogenomics testing to determine if Plavix is likely to be effective

and

the change to a more effective antiplatelet agent can be performed at no extra cost

Who is Being Tested for CYP2C19 at Vanderbilt ?

All patients who are receiving a coronary artery stent by interventional cardiology

and now in addition

Patients seen in primary care who are expected to require a coronary artery stent – and will need Plavix after it is placed – so that the appropriate antiplatelet drug is selected in advance

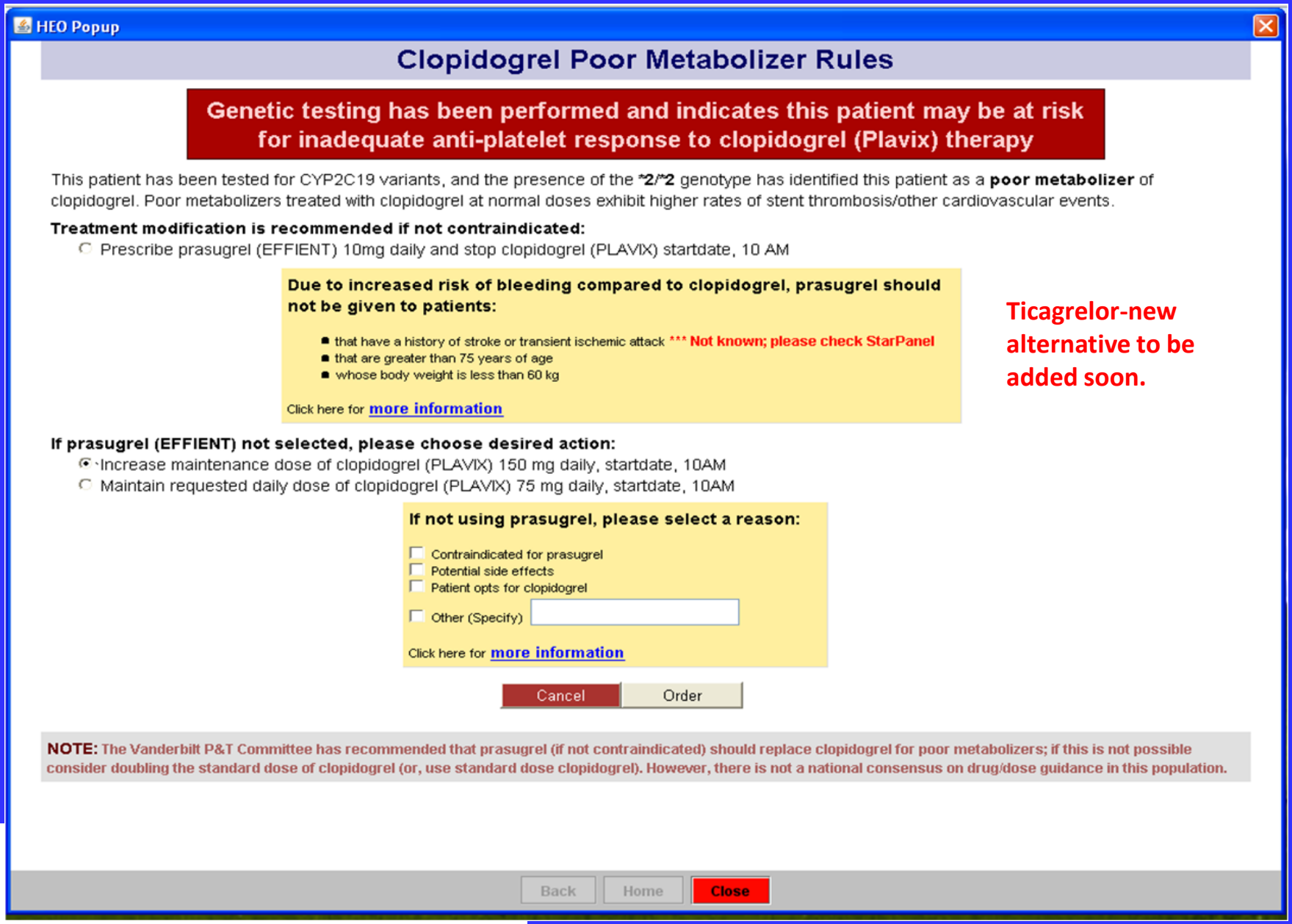
Patients chosen for this testing qualify by a complex formula based upon clinical and laboratory findings

Many Alleles for CYP 2C19 – Plavix metabolism May Be Difficult to Assess

Allele Name	Comments
CYP 2C19*1	Wild-type/normal
CYP 2C19*2	nonfunctional
CYP 2C19*2B	nonfunctional
CYP 2C19*3	poor metabolism of compounds like proguanil - with implications for malaria prophylaxis
CYP 2C19*4	nonfunctional
CYP 2C19*5	poor metabolizer
CYP 2C19*6	nonfunctional
CYP 2C19*7	nonfunctional
CYP 2C19*8	nonfunctional
CYP 2C19*17	ultra-rapid metabolizer

SNPedia, 2011

Clopidogrel *2/*2 Decision Support



Ticagrelor-new alternative to be added soon.

Even with this level of automatic decision support,

Doctors still want the test results interpreted by an expert in clinical context

We learned more than 10 years ago that practicing physicians greatly benefit from

patient specific, expert driven, and timely

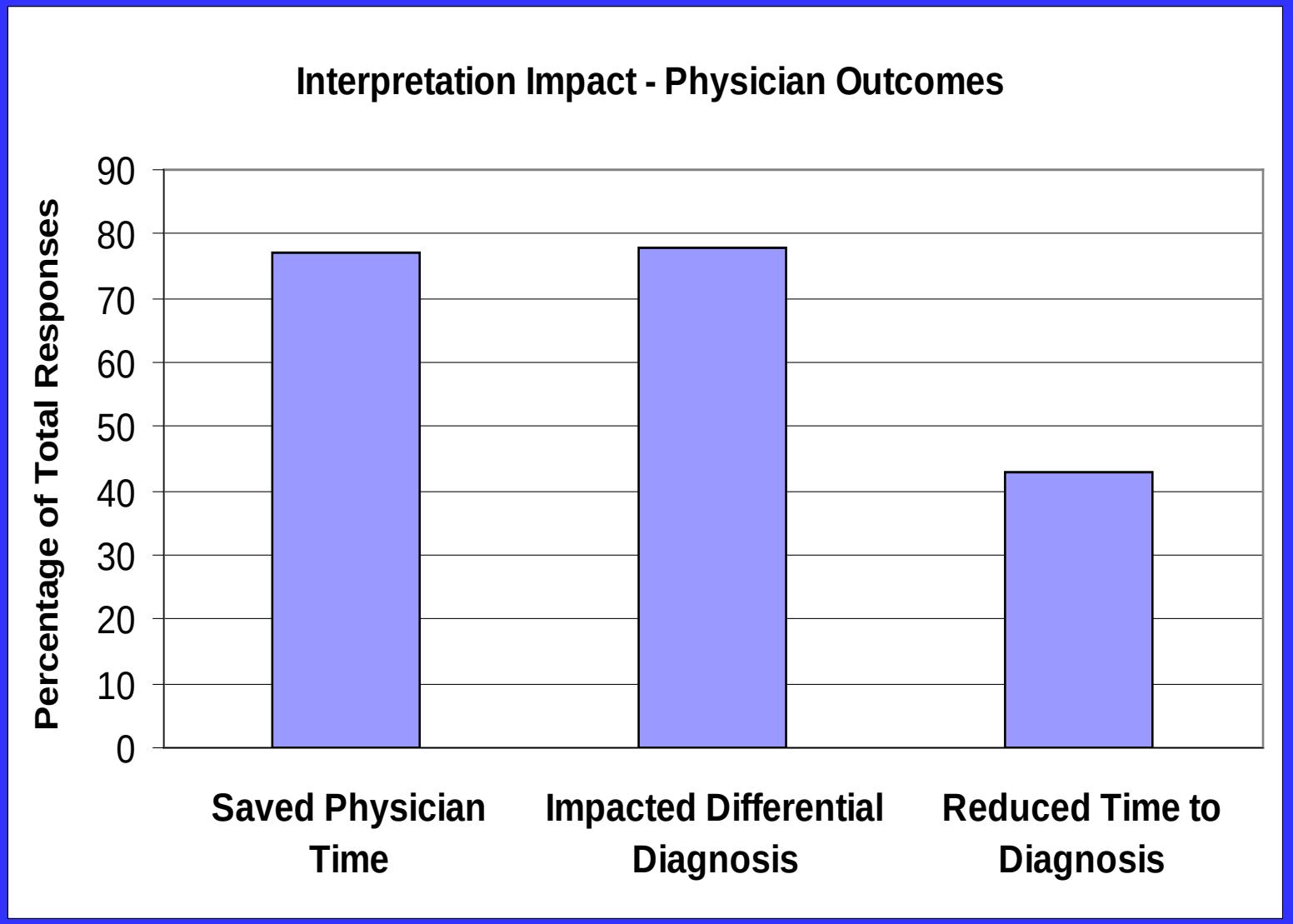
interpretations of coagulation tests

2000 Survey of MGH physician experience with narrative interpretations of complex laboratory evaluations in coagulation

Ordering physicians electronically sent a narrative interpretation of one their own cases

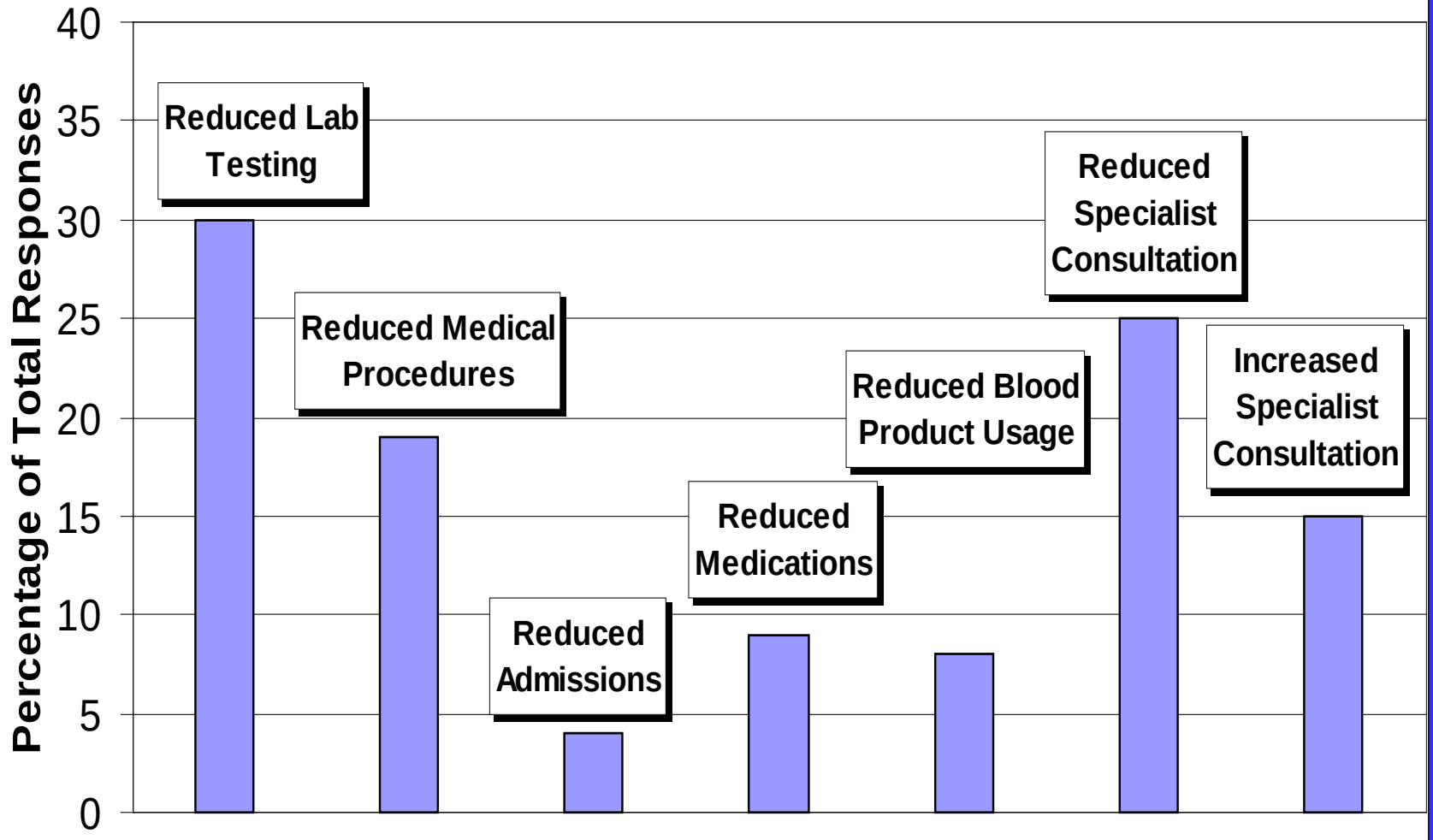
Clinicians asked to respond electronically to several questions about the interpretation

100 of 100 surveys returned



Arch. Pathol. Lab. Med. 2004. 128:1424-1427

Interpretation Impact
Medical Utilization



Arch. Pathol. Lab. Med. 2004. 128:1424-1427

Comments from Physicians in a Behind the Glass Survey about Use of the Clinical Laboratory : A CLIHC Project

"You don't talk to a Radiologist or Pharmacist in a hospital, you talk to a colleague. You talk to a lab, it's a black box…"

"I don't think about say calling the clinical pathologist. They have not made themselves available to help me; I don't know who they are"

"Getting through the maze on the telephone [with the laboratory] is difficult."

So clinicians across the US are asking why pathologists aren't helping them select tests and interpret test results?

What is the answer?

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The Diagnostic Management Team at Vanderbilt :

What it does

How it was created

What does a diagnostic management team do

and

what is not a diagnostic management team activity ?

It is not a diagnostic management team activity if any of the following are true

- **The interpretation does not consider clinical information**
- **The service does not meet on a regular schedule**
- **The interpretation is not written or not included in the medical record**
- **The interpretation is so self evident that it is not clinically valuable for the treating physician**

For example : The interpretation only provides a report of tests results as abnormal but fails to explain why

Barriers to Diagnostic Management Team Creation

And how they have been overcome at Vanderbilt

Why Are National Barriers Not Barriers At Vanderbilt?

Failure of institutions to recognize the clinical and financial benefits of advice on test selection and result interpretations on the total patient encounter.

Anatomic pathology interpretation **: Professional fee pays $300**
Clinical laboratory interpretation **: Professional fee is $0 and the savings from a more rapid and more accurate diagnosis is $3000**

Almost no one understands this in 2012

Why Are National Barriers Not Barriers At Vanderbilt?

The initial development of informatics that assists in the creation of the interpretations requires substantial expertise and resources from informatics, which is in most institutions inadequate.

Vanderbilt is a national leader in medical informatics, and informaticians are heavily invested in the development of enablers for this clinical service

If it takes too long to sign out a case, a DMT is impossible.

An informatics solution to efficiently and carefully review relevant clinical and lab data is absolutely necessary.

Why Are National Barriers Not Barriers At Vanderbilt?

Too few classically trained experts in laboratory medicine are to provide clinically useful advice.

Vanderbilt has made certain that there is a large group of local experts in laboratory medicine –
The main criterion for hiring a lab director is NOT the degree (MD, PhD, DCLS?) – it is the ability to increase the speed and accuracy of diagnosis – the professional fee for the interpretation is irrelevant to the DMT concept

If payment for the consult is less relevant than the savings from a quick and accurate diagnosis,

all qualified individuals should be invited to help establish the correct diagnosis

Why Are National Barriers Not Barriers At Vanderbilt?

The difficulty in quantifying financial benefit for advice of test selection and result interpretation, with underestimation of benefit.

Vanderbilt has involved health economists to determine the financial and clinical benefit of the diagnostic management team output

No one was asked to prove that a microscopic interpretation of a biopsy for cancer makes a clinical difference before the service was started -

and no one asked was asked to prove that an MRI is valuable before it became widely available

And in both of these cases, expensive tests were added but the outcomes for patients improved

SO - Why do <u>even pathologists</u> ask whether interpretation of test results for the most complex areas of lab medicine is needed?

Because pathologists do not get paid for this activity and most do not have the content knowledge to be effective in advising fellow doctors about clinical laboratory test selection and result interpretation

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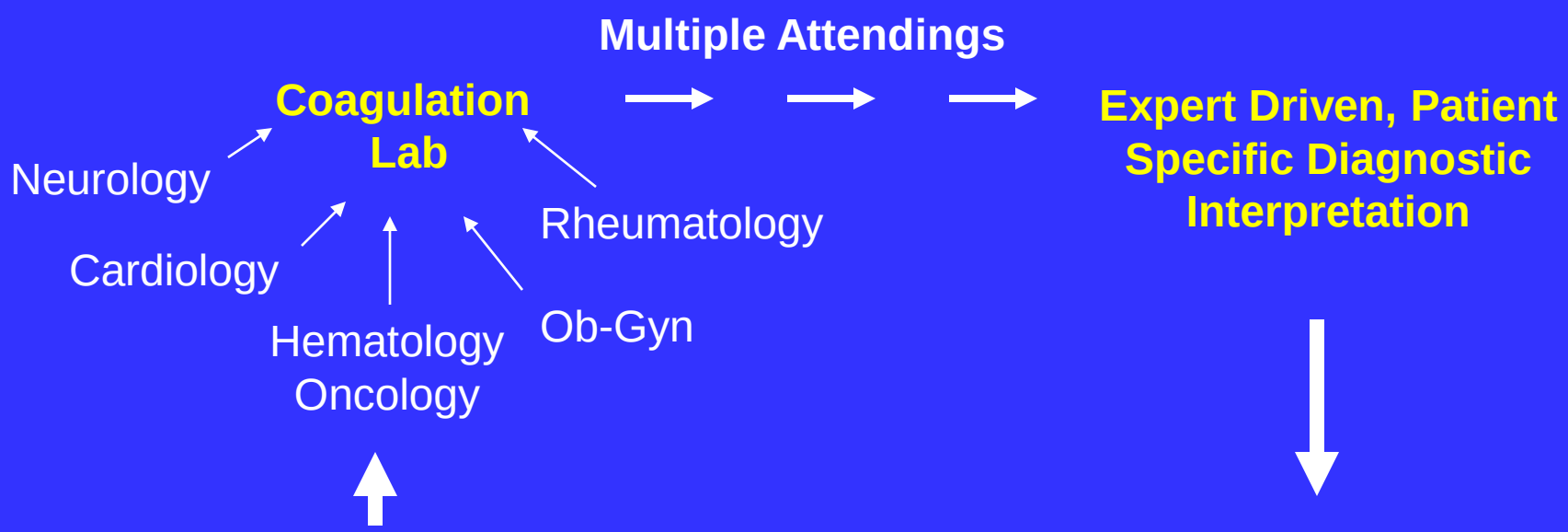
The Existing and Planned Diagnostic Management Teams --

at Vanderbilt

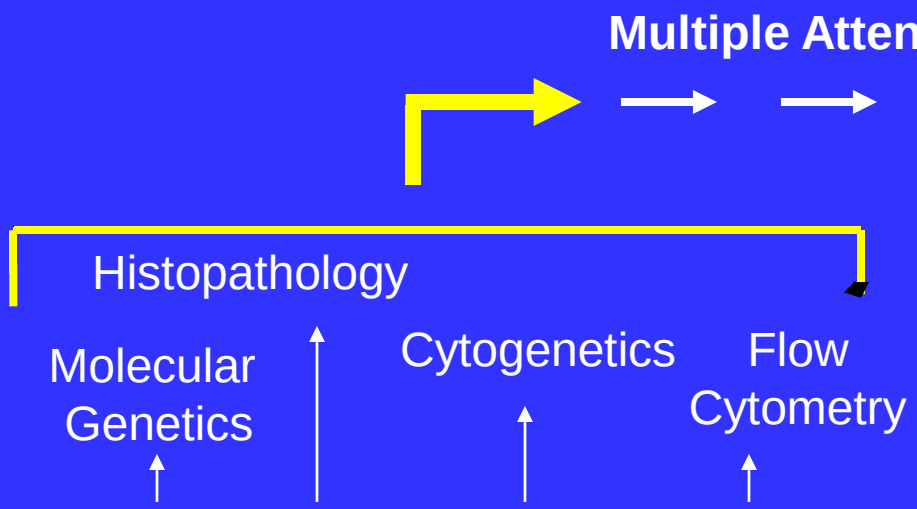
Coagulation Rounds



Is this just an issue for laboratory medicine / clinical pathology?

It now involves classical anatomic pathology

Hematopathology Rounds



Diagnostic Test Selection by Hematopathologists

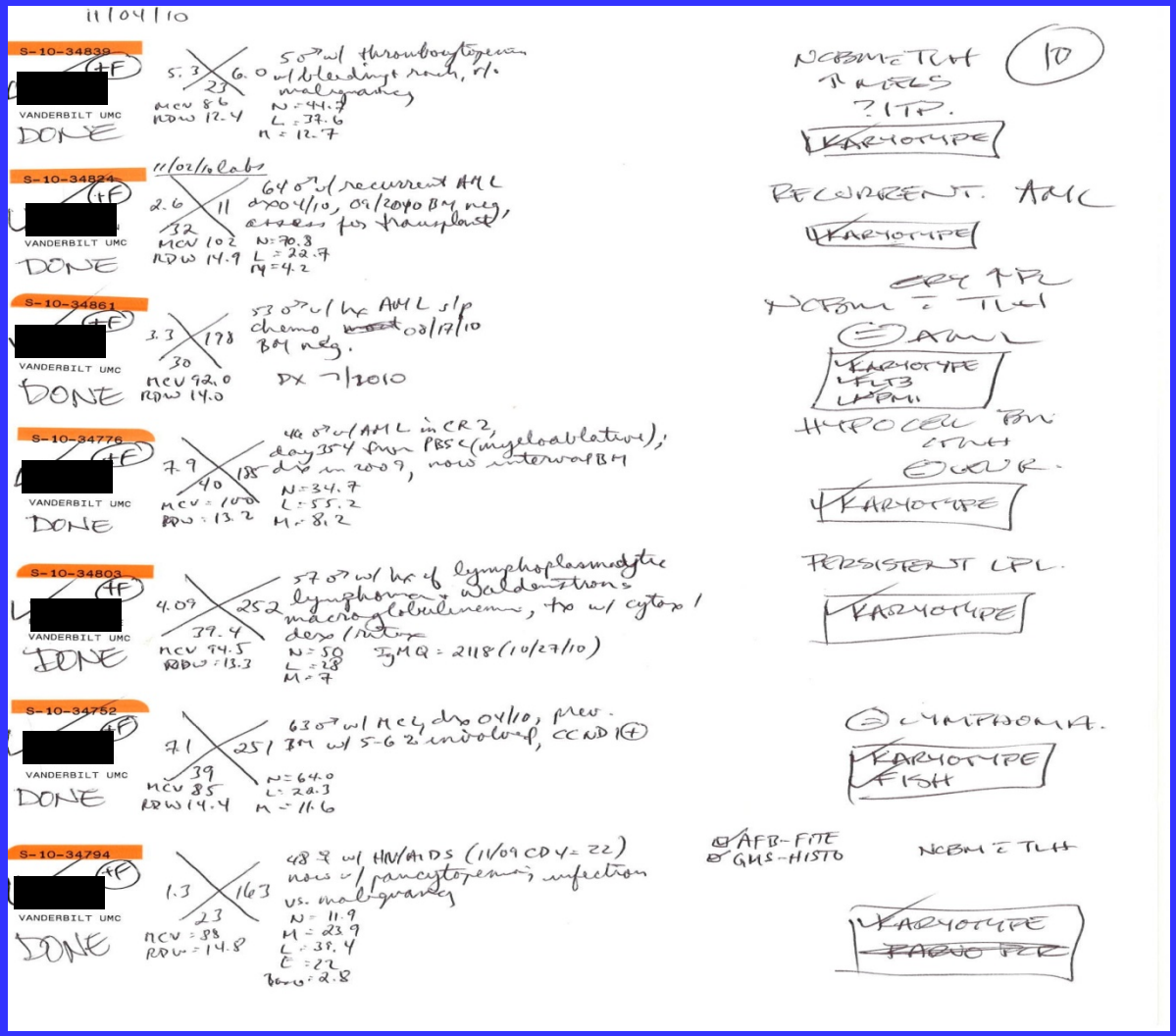
Hematologic-Oncologists Presented With Case of Hematologic Malignancy

Expert Driven, Patient Specific Interpretation of Tests From Multiple Laboratories Synthesized by the Hematopathologist

Financial Benefits: Easily Quantifiable for Test Selection

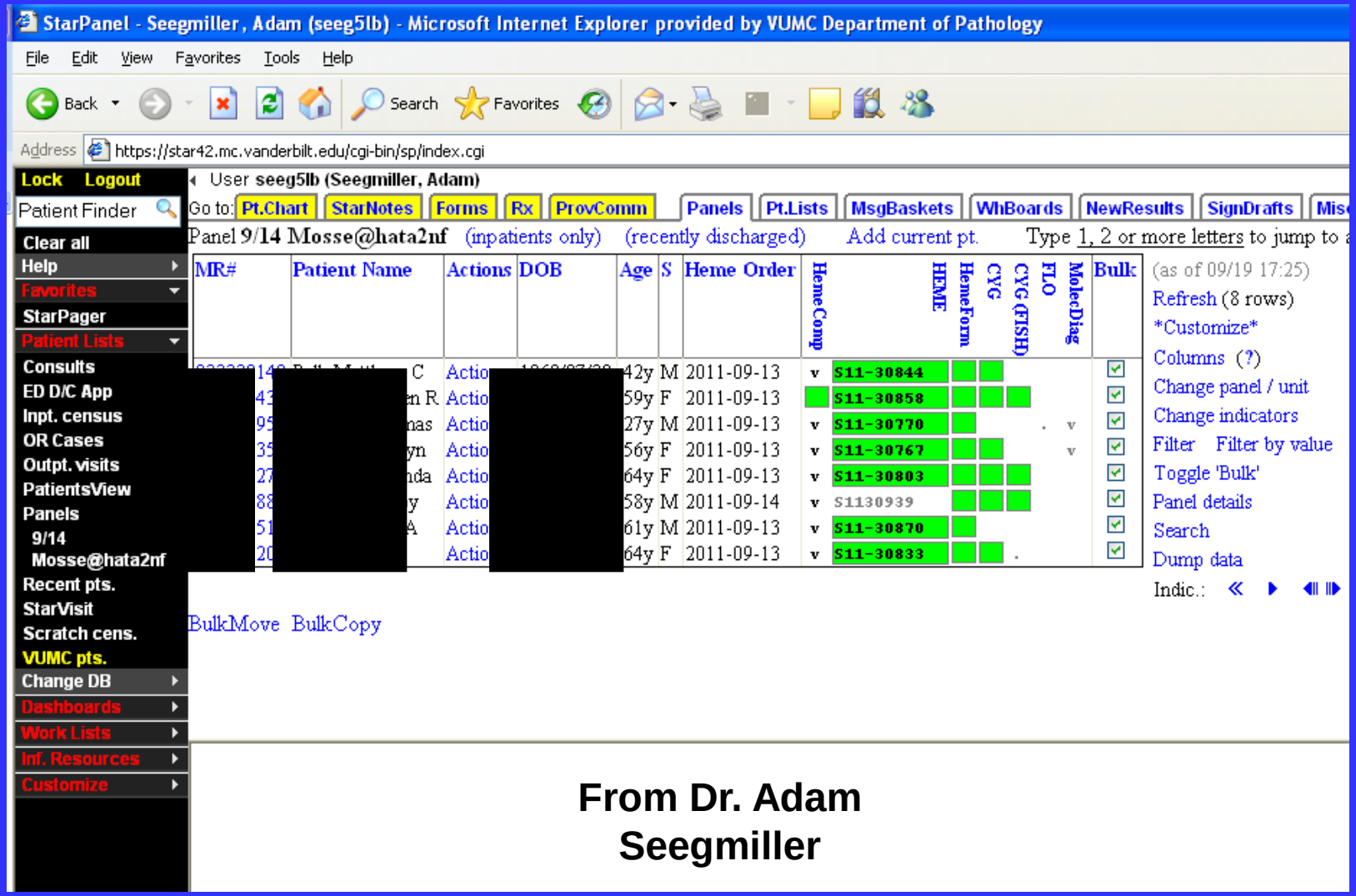
Less Easily Quantifiable for Improved Diagnostic Speed and Accuracy

Hematopathology Dashboard: Pre-historic (ca. 2010)



From Dr. Adam Seegmiller

Hematopathology Dashboard: Modern Version

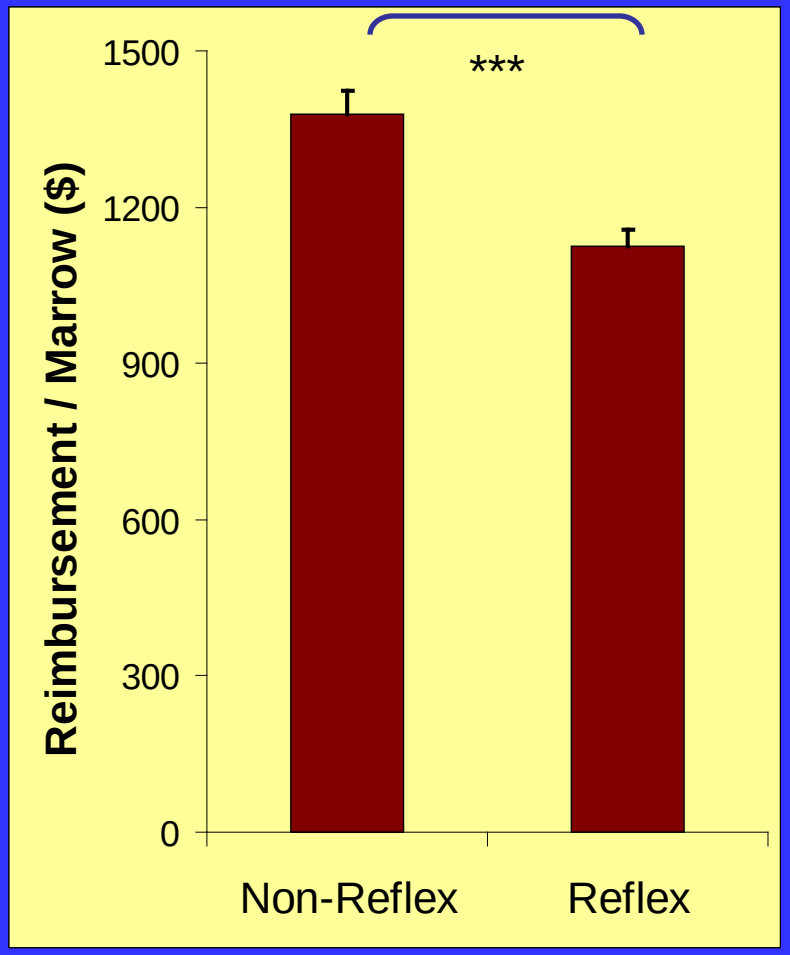


From Dr. Adam Seegmiller

Reflex Testing in Hematopathology

- At the time of bone marrow biopsy, the oncologist orders “bone marrow testing panel”
- Pathologist:
  - Consults electronic medical record and patient flowsheet for history and previous test results
  - Reviews bone marrow morphology
  - Orders appropriate cytogenetic and molecular tests
- The oncologist retains the option to order tests “a la carte”

Significant Savings with Reflex Testing in Hematopathology



- Cost per marrow is $284 less for reflex testing.
- Yearly savings (>1800 bone marrows) exceeds $450K.

Microbiology Rounds

Multiple Attendings

Microbiology Laboratories
(Including Virology and
Molecular Infectious Disease)

All Clinical Services Evaluating
Patients for Infectious Disease –
With Infectious Disease
Division as Prominent User

Expert Driven,
Patient Specific Interpretations
(With Regular Follow Up by DMT)
For Clinically or
Diagnostically Complex Cases –
Define Ad Hoc Now and
Formally With Increased Experience

Financial Benefits:
Improved Use of Antibiotics
Could be Quantified

Less Easily Quantifiable
for Improved Diagnostic
Speed and Accuracy

Interpretations by the Microbiology Diagnostic Management Team

- Clinically significant combinations of pathogen and site of detection
- Unusually virulent pathogen or strain
- MDR antimicrobial susceptibility pattern
- Unexpected antimicrobial susceptibility or resistance
- Findings suggestive of treatment failure
- Infection control or public health issues
- Findings suggestive of underlying pathology
- Concern for rapid disease progression
- Conflicting, confusing, or ambiguous results
- Any result that a technologist considers atypical or concerning with respect to patient well-being

From Dr. Jim Chappell

Transfusion Medicine Rounds

Blood Bank → Multiple Attendings → Expert Driven, Patient Specific Interpretations on Appropriateness of Transfusion, Adverse Events Associated With Transfusion, and Identify Underlying Diagnosis

All Clinical Services Providing Blood Products – With Dominant Users Including Surgery/Anesthesia, Hematology/Oncology, Emergency Department

Future : A Review of all Preoperative Cases with a Positive Bleeding History, Prolonged PT or PTT or Low Platelet Count to Establish Diagnosis and Develop Treatment Plan for Excess Bleeding

Financial Benefits:
Improved Utilization Of Blood Products Easily Quantified

Less Easily Quantifiable for Improved Diagnostic Speed and Accuracy

Transfusion Medicine Rounds

The Predominant Case Material

The expert driven consult is provided as a note in the chart for the majority of these cases

It is NOT a curbside consult

Transfusion Medicine Rounds – Predominant Case Material

Transfusion Reactions

What are the results from the tests performed in the evaluation of a transfusion reaction ?

What is necessary going forward to effectively transfuse the patient who experienced the transfusion reaction?

Transfusion Medicine Rounds – Predominant Case Material

RBC Antibody Identifications

What are the results from the cell panel that resulted in the identification of a specific red blood cell antibody ?

What is the availability of blood products for this patient, given the presence of the newly identified antibody ?

Transfusion Medicine Rounds – Predominant Case Material

Massive Transfusion Protocol Review

What was the clinical indication for the massive transfusion protocol?

How many products were utilized in the massive transfusion protocol?

Were any of the products in the cooler for the massive transfusion wasted?

Transfusion Medicine Rounds – Predominant Case Material

Case discussions about patients receiving out of group platelet transfusions to determine the need for Rh Immune globulin

If an Rh negative patient has received an Rh positive product, should Rh immune globulin be transfused to prevent the development of an antibody to the Rh antigen?

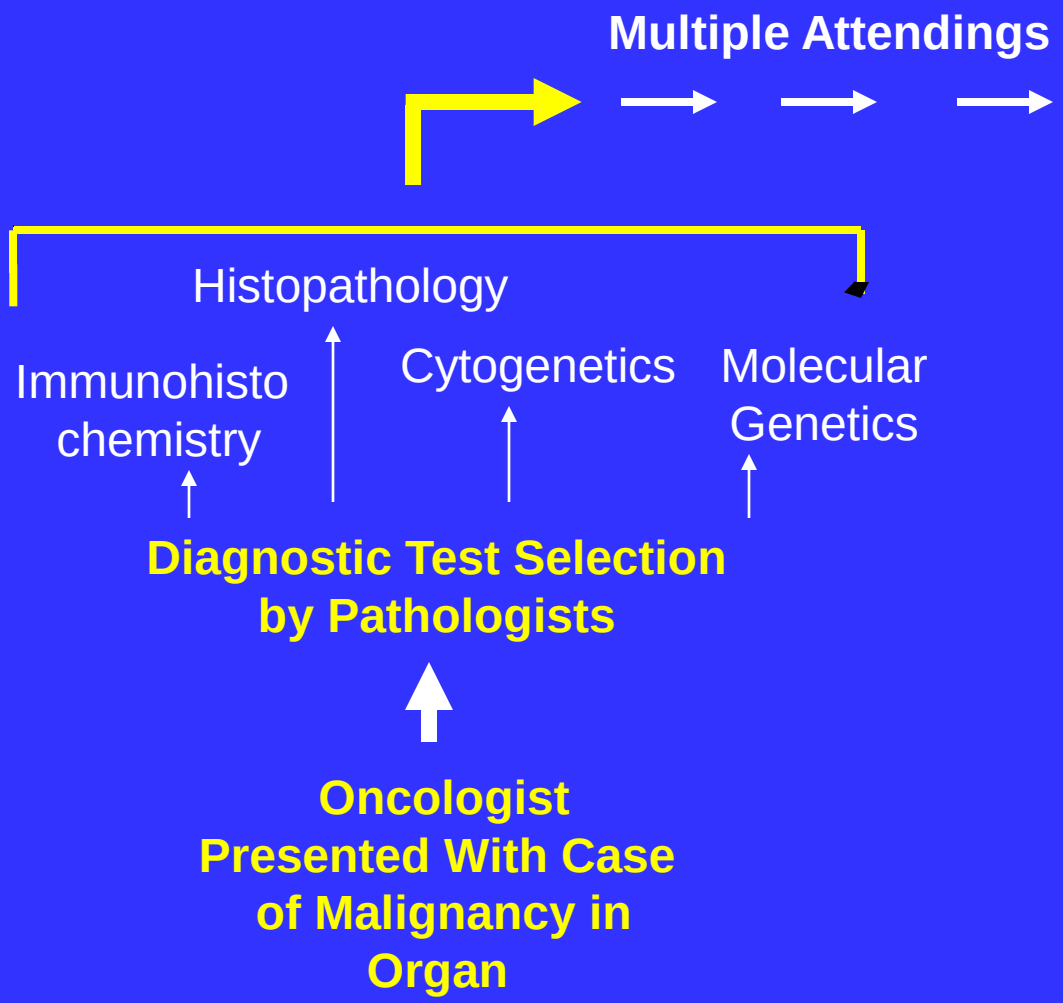
Transfusion Medicine Rounds – Predominant Case Material

Real time review of errors related to cases with transfusions

If an error was associated with a test performed in the transfusion medicine laboratory or in association with the transfusion, what was the cause of the error?

What systems can be implemented to prevent the recurrence of this error?

On The Drawing Board For Anatomic Pathology: The Diagnosis of Cancer in Multiple Organs and Tissues



Expert Driven, Patient-Specific Interpretation of Tests From Multiple Areas – Synthesized by the Pathologist

Financial Benefits: Increased Diagnostic Speed and Accuracy May be Highly Recognized by Oncologists

The landscape within the current vision at Vanderbilt – a 3 year plan for the clinical laboratory DMTs

- Coagulation
- Transfusion Medicine
- Microbiology
- Endocrinology
- Toxicology
- Autoimmunity

The landscape within the current vision at Vanderbilt – a 3 year plan for the anatomic pathology DMTs

- Hematopathology
- Breast Cancer
- Neuropathology
- Renal Pathology
- Lung Cancer
- Other cancers – GI, Prostate, Others with valuable molecular and genetic testing that directs therapy

With highly successful performance according to section in the clinical labs, should DMTs be implemented for standardizing and linking care among different disciplines for :

- **Obesity**
- **Diabetes**
- **Lower Back Pain**
- **Cardiovascular Risk**

Cancer is addressed by the existing and planned anatomic pathology DMTs

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Coagulation Rounds

Logistics

Case Material

The Logistics of Coagulation Rounds

Early AM:

Resident on service confers with special coagulation technologist to identify cases for evaluation

Early AM till 4 PM:

Resident reviews lab data as it becomes available and clinical details for all patients being evaluated; follows up with clinical or laboratory questions for these cases as necessary; creates preliminary interpretation.

The Logistics of Coagulation Rounds

4 PM:

Attending, coagulation resident, other trainees discuss each case – with relevant teaching points made by attending – and interpretation finalized. Result into patient's electronic record immediately.

Data presentation in the medical record for coagulation studies prior to initiation of the patient specific, expert driven coagulation interpretations

JUNE 30, 2010 VANDERBILT UNIVERSITY

Pat-PT: 13.9 **PT-inr**: 1.1 **PTT-pt**: **43.6*** **PoolNP**: 28.1 **P+N0Hr**: 38.3 **P+N1Hr**: 36.2 **P+N2Hr**: 35.9 **Pat-TT**: 15 **F8Act**: 95 **F9Act**: 102 **RVVT**: **1.5*** **DRVVT**: Lupus Anticoagulant Confirmed **DMX**: 1.3 **F11Act**: 96 **F12Act**: 54

It evolved to this “canned” comment – Is this helpful ?

Unedited “canned” comment

The Dilute Russell Viper Venom time (dRVVT) is used for detection of Lupus Anticoagulant. Hemolysis, deficiencies or inhibitor of Factors II, V and X, high Factor VIII level (>200%), Heparin level >1 IU/ml, some LMWH, Coumadin and other Vitamin K antagonists may interfere with test results. In order to determine etiology of prolonged dRVVT, a mixing study was performed showing no dRVVT correction, indicating the presence of Lupus Anticoagulant.

NEVER AT VANDERBILT UNIVERSITY

Report in the medical record after initiation of the daily rounds to interpret all complex evaluations from the special coagulation laboratory

JULY 1, 2010 VANDERBILT UNIVERSITY

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.

Attendees at the Coagulation DMT and their responsibility

- **The trainee(s) – usually a pathology resident and occasionally a hematology-oncology fellow or a medical student under the guidance of a resident or fellow**

  Reviews the medical record for each case to collect information relevant to coagulation issues

  And provide a draft patient specific interpretation of the laboratory test results in clinical context

Attendees at the Coagulation DMT and their responsibility

- **The attending laboratory director**

  Reviews presented cases and interpretations drafted by the trainee,

  For immediate inclusion into the medical record when finalized at rounds

Attendees at the Coagulation DMT and their responsibility

- **The Medical Technologist**

  Provides input on interpretation of test results when there is a relevant question such as :

Result is influenced by the methodology

Sample was partially compromised

Attendees require education about assay

A series of suspicious results suggest the possibility of a laboratory error

Role of the Information Scientist in the DMTs

- **Information scientist is in attendance 2 times per week at the coagulation DMT**
- **The activity is to provide patient-centered, expert-driven, evidence-based medicine literature support to the DMTs when relevant clinical questions arise**
- **DMT database tool contains the answers to questions posed at the DMT rounds and is constructed for reuse and distribution of information to others**

Provided by Tracy Shields

Question : What is recommended in the literature for treatment of superficial venous thrombosis ?

Home > Evidence-Based Resources

Provided by Tracy Shields

Diagnostic Management Team Database

The **Diagnostic Management Team Database** provides filtered evidence summaries and expert search strategies created by Knowledge Management Information Scientists to inform the interpretation of genetic and complex laboratory evaluations for VUMC Diagnostic Management Teams. (more)

Search the Database | Submit a Question | Most Used Resources | Disclaimer

Topic Database Search

Superficial Venous Thrombosis | Search

Browse Topics | Browse by DMT | Browse by Category

Superficial Venous Thrombosis (Coag DMT)

I. Superficial Thrombophlebitis, Lower Extremities Overview - Expert Searches

UpToDate® (Database) (Search Database)

Completed Question

- **What is recommended in the literature for treatment of superficial venous thrombosis?** (Apr. 2011)

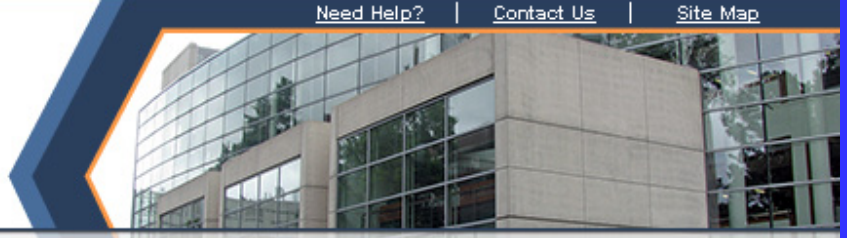
Summary

References

PubMed (Database) (Search Database)

Every topic has curated, expert-derived searches in selected resources, such as PubMed and UpToDate

For those topics with related clinical questions, summaries are noted



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Topic Database Search

Search

Browse Topics | Browse by DMT | Browse by Category

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z 0-9 (View All)

Displaying titles 1 - 62 of 62

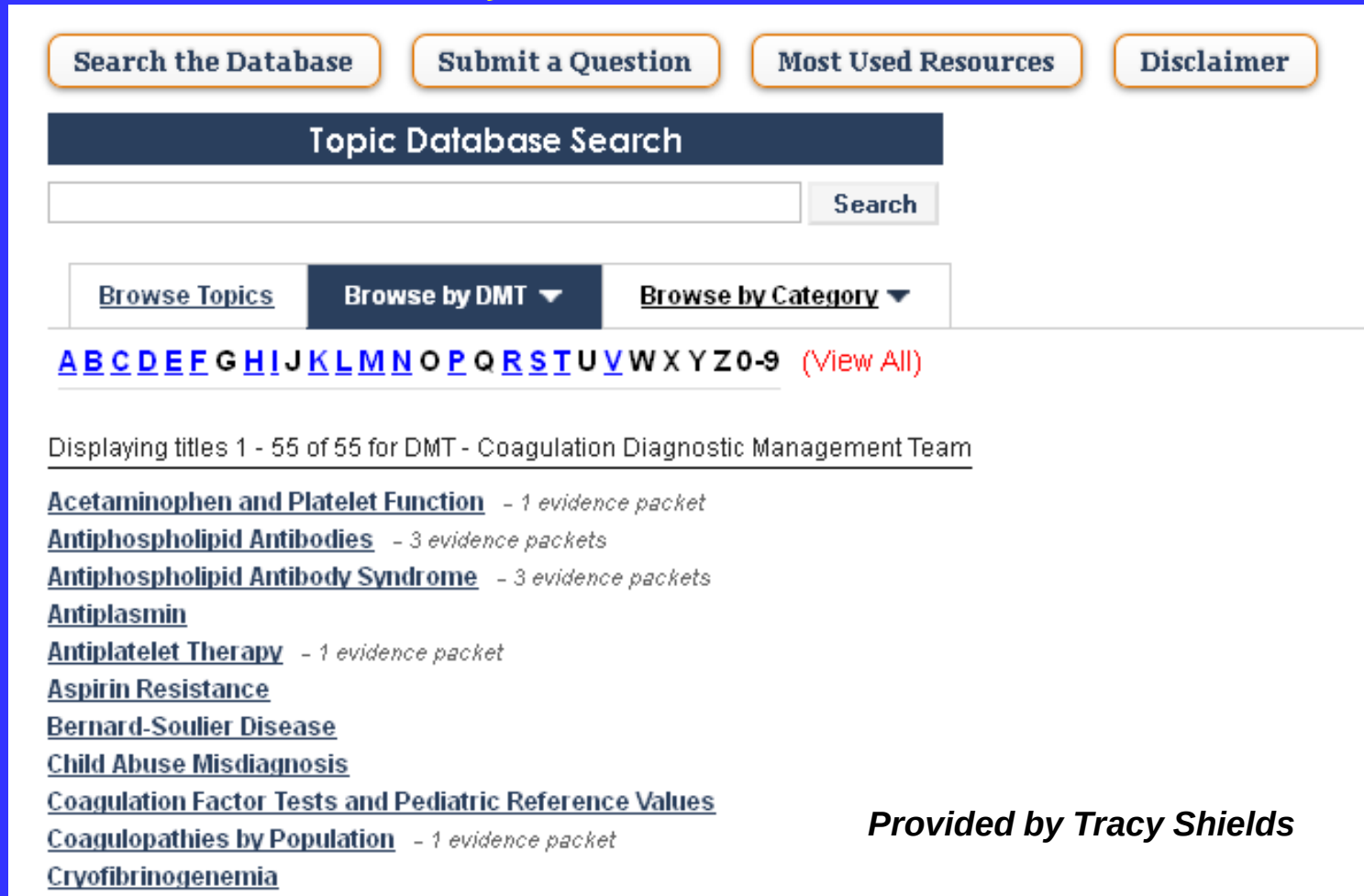
Acetaminophen and Platelet Function (Coag DMT) - *1 evidence packet*
Antiphospholipid Antibodies (Coag DMT) - *3 evidence packets*
Antiphospholipid Antibody Syndrome (Coag DMT) - *3 evidence packets*
Antiplasmin (Coag DMT)
Antiplatelet Therapy (Coag DMT) - *1 evidence packet*
Aplastic Anemia (Hematology Pathology DMT)
Aspirin Resistance (Coag DMT)
Bernard-Soulier Disease (Coag DMT)
Child Abuse Misdiagnosis (Coag DMT)
Chronic Myelogenous Leukemia (Hematology Pathology DMT)
Coagulation Factor Tests and Pediatric Reference Values (Coag DMT)
Coagulopathies by Population (Coag DMT) - *1 evidence packet*
Cryofibrinogenemia (Coag DMT)

Provided by Tracy Shields

Search or browse for a topic

Two ways to ask clinical questions or suggest topics:
1) through the electronic medical record, and
2) through the DMT tool

Selected list of library resources



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Summary

Download PDF for Full Summary and References

Guidelines from a chapter of the American College of Chest Physicians Evidence-Based Clinical Practice Guidelines (8th Edition) include the following recommendations for the treatment of superficial vein thrombosis (Kearon et al. 2008):

> "For patients with spontaneous superficial vein thrombosis, we suggest prophylactic or intermediate doses of LMWH [low molecular weight heparin – ed.] (Grade 2B) or intermediate doses of UFH [unfractionated heparin – ed.] (Grade 2B) for at least 4 weeks. We suggest that as an alternative to 4 weeks of LMWH or UFH, VKA [vitamin K antagonist – ed.] (target INR, 2.5; range, 2.0 to 3.0) can be overlapped with 5 days of UFH and LMWH and continued for 4 weeks (Grade 2C). We suggest that oral NSAIDs should not be used in addition to anticoagulation (Grade 2B). We recommend medical treatment with anticoagulants over surgical treatment (Grade 1B).
>
> Remark: It is likely that less extensive superficial vein thrombosis (ie, where the affected venous segment is short in length or further from the saphenofemoral junction) does not require treatment with anticoagulants. It is reasonable to use oral or topical NSAIDs for symptom control in such cases."

These guidelines cite numerous other studies and a Cochrane review of treatment of superficial thrombophlebitis (Di Nisio et al. 2007). Other authors (Carnero-Vidal et al. 2010; Kitchens 2011) note other existing factors such as site and concurrent deep vein thrombosis for consideration with regard to treatment selection. Kitchens (2011) notes that "I treat the majority of patients with a clinical diagnosis of SVT [superficial venous thrombosis – ed.] on an equal footing as patients with other VTE [venous thromboembolism– ed.]."

A randomized, placebo-controlled, double-blind trial (Comparison of Arixtra in Lower Limb Superficial Vein Thrombosis with Placebo [CALISTO]) published in 2010 compared fondaparinux to placebo in patients with acute, symptomatic lower-limb superficial vein thrombosis 5 cm or greater in length (Decousus et al. 2010). Treatment with fondaparinux (2.5 mg once daily) or placebo was administered for 45 days, and patients were followed for 30 days after discontinuing treatment. Incidence of symptomatic pulmonary emboli, deep vein thromboses,

Provided by Tracy Shields

Full summary includes:
1) links to cited (and some additional) references,
2) search strategies in applicable databases,
3) hyperlinks to full text access.

The Clinical Impact is Greatly Beneficial to Patients

A one minute overview of case material in the coagulation DMT

For the patient with a prolonged PT, PTT or both –

What is the explanation for the prolongation and what is the risk of bleeding or thrombosis?

Coagulation Rounds – Predominant Case Material

What is the likelihood of –

Heparin-induced thrombocytopenia (HIT)?

Thrombotic thrombocytopenic purpura (TTP)?

Both are life-threatening conditions if not identified promptly and treated correctly

Coagulation Rounds – Predominant Case Material

For the adult or pediatric patient with a deep vein thrombosis and or pulmonary embolism –

Is a hypercoagulable state contributory to the thrombotic event?

Do the test results suggest the need for lifelong anticoagulation?

Coagulation Rounds – Predominant Case Material

For the bleeding patient –

Does the patient have von Willebrand disease?

A platelet function disorder?

A coagulation factor deficiency and if so, what is the cause of the deficiency?

DIC?

Coagulation Rounds – Predominant Case Material

For thrombotic strokes –

Is there a hypercoagulable state

contributing to the cause(s) for stroke?

Is aspirin therapy enough or is warfarin needed?

Coagulation Rounds – Predominant Case Material

Obstetrics & Gynecology

For the woman with pregnancy losses –

Is there a hypercoagulable state to explain the fetal loss(es)

Coagulation Rounds – Predominant Case Material

For pre- renal transplant evaluation –

Is there a hypercoagulable state that would cause us to remove this patient from the transplant list?

Coagulation Rounds – Predominant Case Material

For the adult or pediatric patient with autoimmune disease –

Is there an antiphospholipid antibody that presents an increased thrombotic risk in this patient?

Coagulation Rounds – Predominant Case Material

For Pediatrics

In the bruised child – is there any evidence of a bleeding disorder to account for the bruising or is child abuse more likely?

How Can the Savings from Diagnostic Management Team Activity be Quantitated?

Better Diagnostic Test Selection

EASILY QUANTITATED SAVINGS

Improved Patient Outcomes

DIFFICULT TO QUANTITATE

Coagulation DMT Impact Review

****To be completed after the case is signed out****

Reviewer Name _____ **Date** _____

Patient: **Name (Last, First)** _____

Medical Record Number

_____

Data to follow are from 19 days of cases

In what *specific* ways has the interpretation made an impact?

Pre-analytical consultation	3
Explained previously unexplained clinical finding	20
Recommended testing to potentially explain an unexplained abnormality	31
Confirmation of previous diagnosis from OSH	4
Change from prior diagnosis	3
Ruled out the presence of a coagulation disorder	54

Confirmed the absence of a coagulopathy in a potential child abuse case	2
Determined the likely cause of platelet dysfunction	7
Change in antiplatelet or anticoagulant treatment	2
Reduced testing by avoiding tests of factors	1
Suggested therapy	3
Potential prevention of adverse events	2
Implications for family members	3
Raised concern for APL syndrome and suggested surveillance	2

Explained commonly misinterpreted lab values	3
Identified the ordering of an unnecessary test	2
Prevented misdiagnosis of hypercoagulable state and recommend retesting	3
Provided caution on establishing diagnosis too early	1

The Clinical Benefit to the Patients is Apparent to Physicians at Vanderbilt

To reduce diagnostic error and save money while improving patient outcomes -

“ Just DMT all of the

Pathology Services “

Preliminary Observations on Financial Impact of Coagulation DMT

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Analytic Approach

Interrupted Time Series

Examine differences in total charges and Length of Stay, pre / post implementation of DMT pilot

Test for statistically significant differences in total charges and length of stay in both parametric (t-tests) as well as non-parametric (Wilcoxon signed rank tests) due to the small sample sizes and non normal underlying distributions.

Changes in Length of Stay

Parametric Test of Mean Differences by MS DRG grouping CY 2010

			Length of Stay			
			Before	After		
			Jan - July	Aug - Nov		
MS DRG	Cases	MS DRG Description	Mean LOS		% Change	
175-176	101	PE w & w/o MCC	3.83	2.87	-25.1%	**
64-66	368	Intracranial Hemorrahge	5.49	5.47	-0.4%	ns
	49719	All inpatients	5.3	4.82	-9.1%	***

Non- Parametric Test of Median Differences by MS DRG grouping CY 2010

			Length of Stay			
			Before	After		
			Jan - July	Aug - Nov		
MS DRG	Cases	MS DRG Description	Median LOS		% Change	
175-176	101	PE w & w/o MCC	3	2	-33.3%	**
64-66	368	Intracranial Hemorrahge	4	3	-25.0%	*
	49719	All inpatients	3	3	0.0%	ns

“Diagnostic Latency” - I

- **Tests ordered when patient admitted on Monday.**
- **Results back Tuesday with several abnormal results.**
- **Action taken on Wednesday with further evaluation.**

“Diagnostic Latency” - II

- **Diagnosis and discharge plan on Thursday. Patient gone by 3 PM.**

Length of Stay: 4 days

No Diagnostic Latency - I

- **Tests ordered when patient admitted on Monday.**
- **Results to coagulation rounds with preliminary interpretation by coagulation resident Monday at 4:00 p.m.**
- **Patient specific, expert driven narrative completed by 6:00 p.m. Monday and into medical record.**

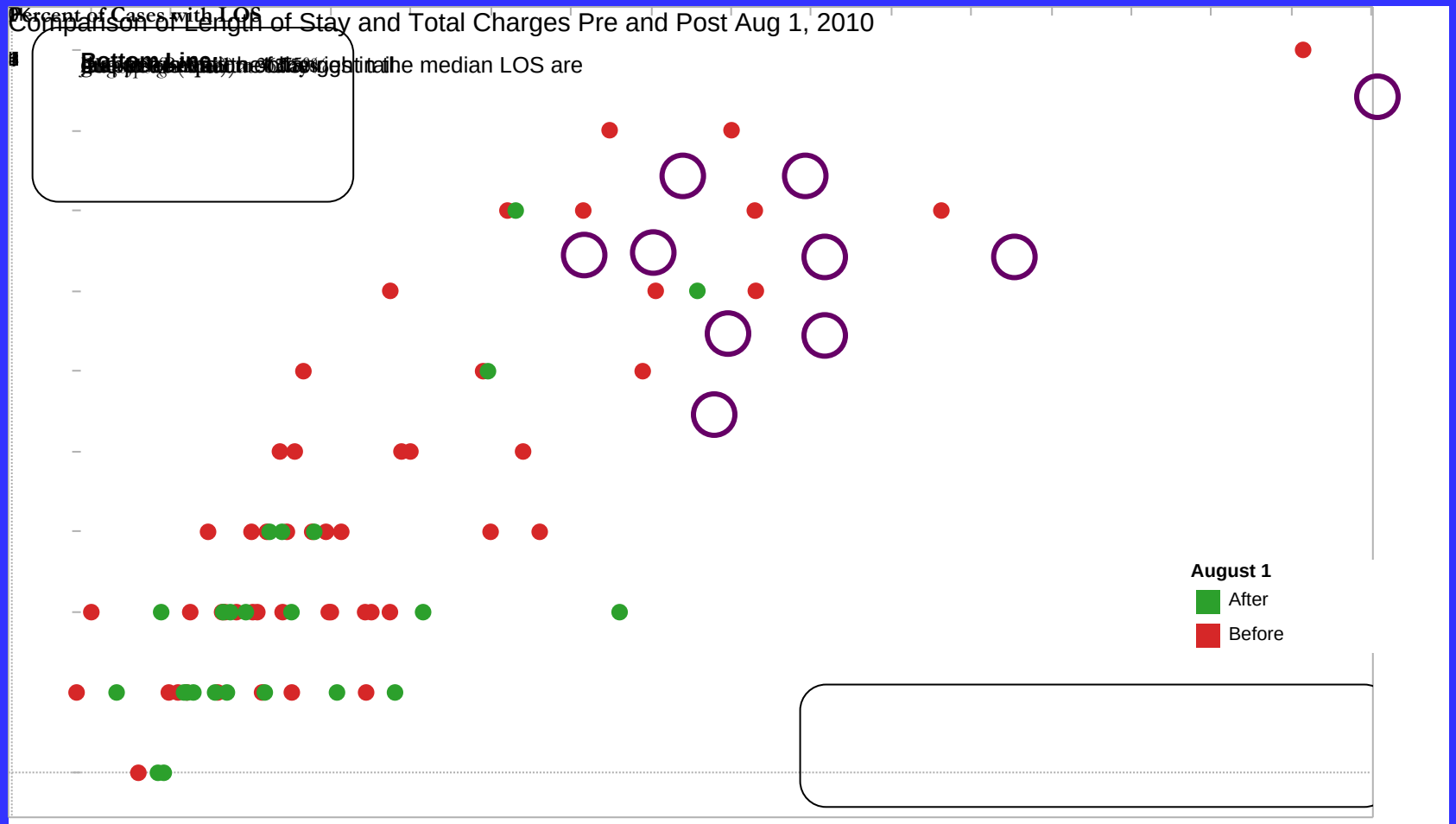
No Diagnostic Latency - II

- **Further evaluation Tuesday.**
- **Discharge on Wednesday.**

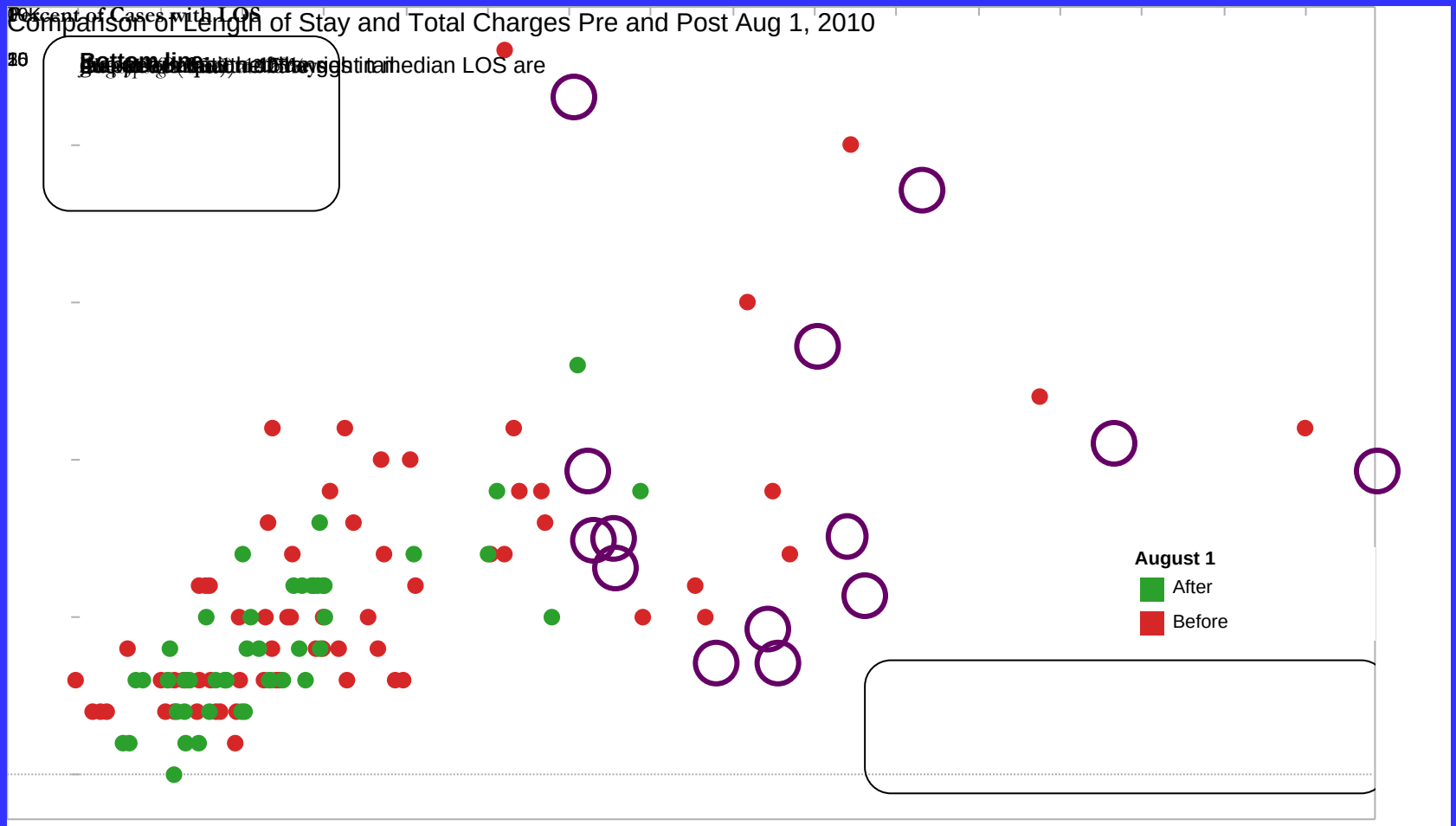
Length of Stay: 3 days

Limiting factor for some evaluations: Not all assays done daily Monday-Friday, delaying narrative and increasing length of stay.

MSDRG 176: PE


Comparison of Length of Stay and Total Charges Pre and Post Aug 1, 2010
August 1
After
Before

MSDRG 65 Intracranial Hemorrhage



Conclusion

- There is evidence that in coagulation sensitive DRGs an initiative is related to an observed change in LOS.

  This change was largely attributable to reducing long LOS outliers

If There Truly Is a Decrease in Length of Stay for Coagulation Related DRG's, Is It Because…

- Diagnostic latency is decreased?
- A dialogue between diagnostic and therapeutic doctors has been created?
- Expert diagnostic doctor increases visibility with increased continuing medical education of doctors in medical center?

If There Truly is a Decrease in Length of Stay for Coagulation Related DRG's, Is It Because…

- As treating doctors read dozens of coagulation interpretations their knowledge base on the significance of the test results grows continuously?

Outline of the Presentation

1. Presentation of the Clinical Problem
2. The Diagnostic Management Team at Vanderbilt : What it does and how it was created
3. The Existing and Planned Diagnostic Management Teams at Vanderbilt
4. Coagulation Rounds : An example of the DMT in action
5. **Concluding Thoughts**

Are pathologists in practice willing to provide advice on test consultation and result interpretation ?

If you make a handsome salary doing AP

If you have to learn a lot of new material –

Including genetic testing

Even in the presence of threats to the classical practice of mostly anatomic pathology in community hospitals -

because the threats have been present for some time

What are the signs that the change in pathology practice is really going to happen shortly ?

- The CAP has a strategy committee to discuss the issue and is putting member dues at risk for providing information that is not welcoming to most members
- Digital imaging in anatomic pathology is getting better
- There is a lot less money for healthcare from the government to hospitals
- Genetic testing at >$5000 per test is making pathology at least as expensive as radiology

If it is really the lack of reimbursement for advice on laboratory test selection and result interpretation -

Maybe nothing will happen until community hospital pathologists can no longer earn a living doing only anatomic pathology

A major learning curve among pathologists will be necessary, similar to what happened when hematology merged with oncology and hematologists had to learn how to manage cancer patients almost overnight

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DMT Attendings

Nearly 20 to date

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