



**PATHOLOGY
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Developing a Laboratory Formulary to Control Test Utilization

#4

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Peter Perrotta, MD

Objectives

“Control” & “Utilization”

- Describe history of medical “formularies”
- Understand the structure & functions of an electronic test formulary
- List ways test formularies could impact test utilization at your institution

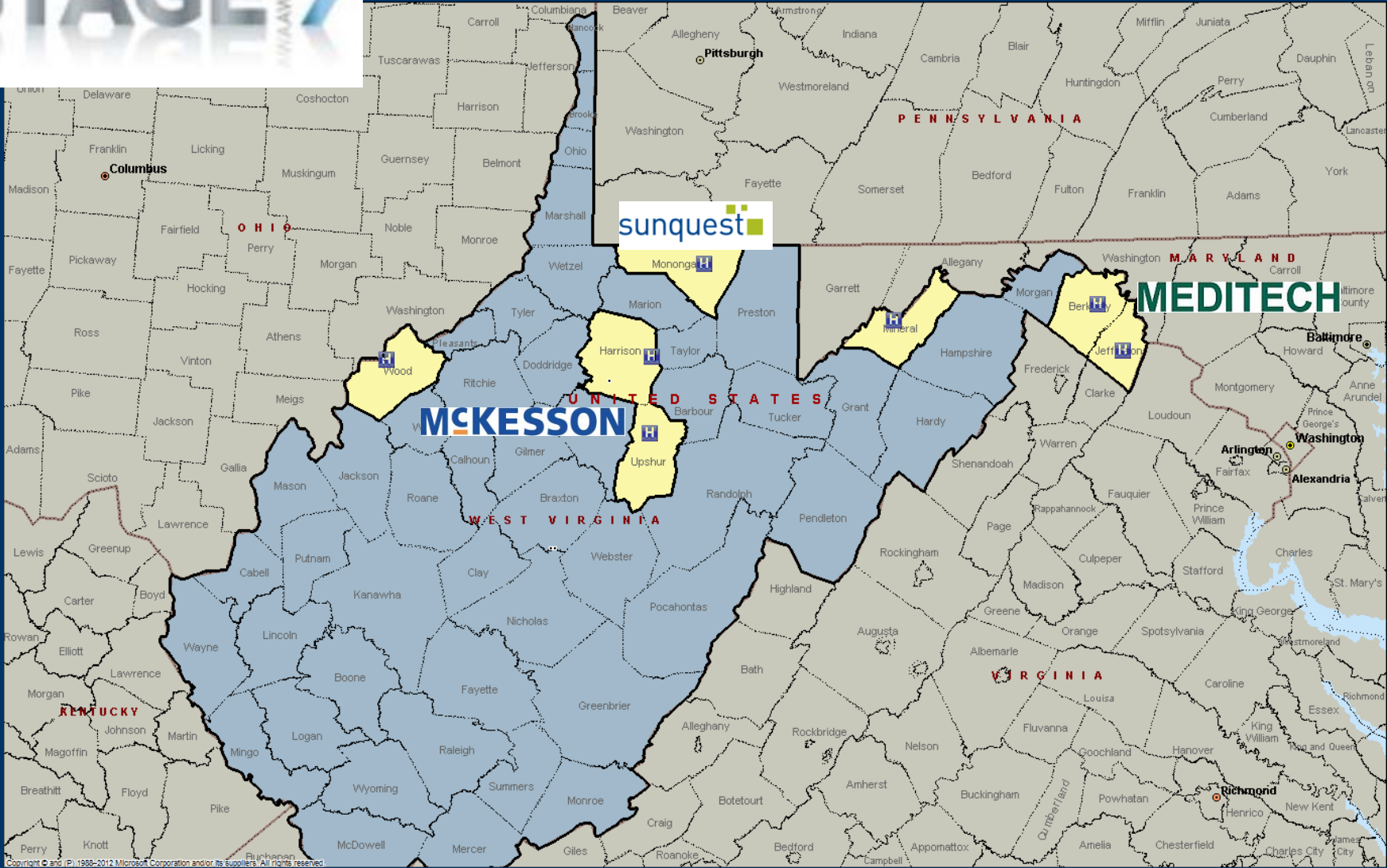
$$\textit{Value} = \textit{Quality}/\textit{Cost}$$

These organizations meet the criteria for "Advanced" in all areas of the Most Wired Survey. Characteristics include: stronger security systems and faster disaster recovery; electronic tools to improve business processes quality and patient safety; use of evidenced-based electronic order sets; automated review of CMS key indicators with compliance alerts; chronic disease management services for patients at home; and more. ●



HITSS
ANALYTICS

STAGE 7
AWARD



Relevant CLIA & CAP Requirements

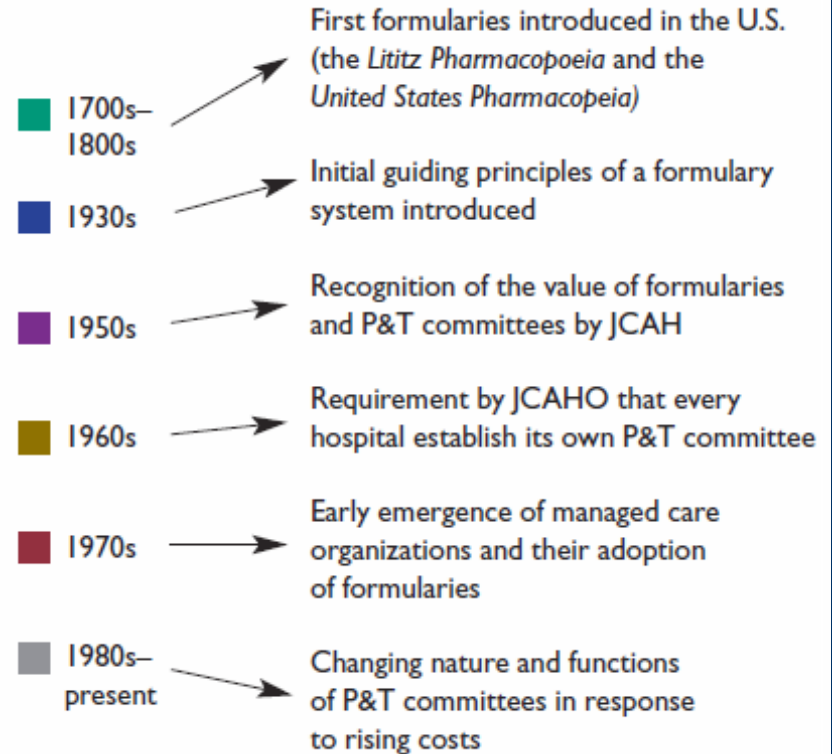
- **CLIA Federal Register OIG Compliance Program for Clinical Laboratories “Test utilization monitoring”**
 - Not just ensuring appropriate billing
 - Lab must not encourage or contribute to ordering of medically unnecessary tests
 - Monitor for “excessive” utilization of lab services (analyze patterns of utilization)
- **CAP TLC.10500: Lab director ensures communication of lab data & appropriate patient result reporting**
 - “Documented oversight of computer services & changes”
- **CAP Lab General Checklist & CFR**
 - Must ensure test results are reliably sent from point of data entry to final report destination (manual & electronically entered results)
 - Stipulates required test result elements

History of Formularies



Montserrat Museum
Babylon Tablet

Plants & drugs used to cure ailments



Evolution of Formulary Systems
and P&T Committees
(microbiologist)

Definitions

Test Formulary

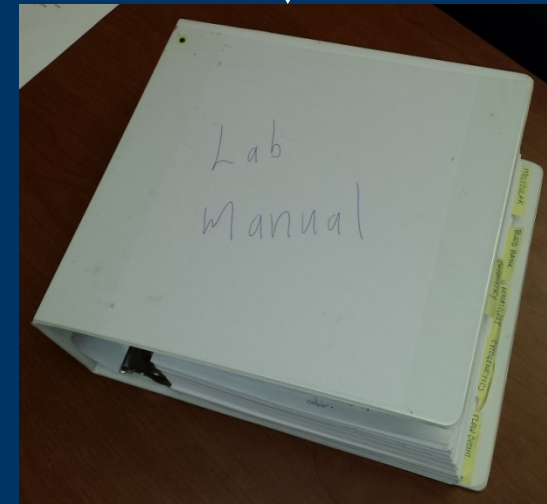
- Continually updated list of laboratory tests and related information
- Represents clinical judgment of physicians, laboratory specialists and other experts in the diagnosis and/or treatment of disease and promotion of health
- Health care leadership and physicians can draw analogies to “drug formularies”

Test Formulary System

- Ongoing process!
- Collaboration of physicians, lab specialists, and other health care professionals
- Establishes polices on the use of lab tests and products (blood) most medically appropriate and cost-effective to best serve health interests of a patient population

Paper Test Formulary

- Same test sent to different reference laboratories
- Non-traceable “miscellaneous” test codes
- Confused specimen processing staff
- Unhappy outreach clients
- Unhappy docs
 - Guess who they blame for ordering/resulting issues
 - But they think we can fix!
- Home-built electronic formulary difficult to develop & maintain



**ALANINE: GLYOXYLATE AMINOTRANSFERASE (AGXT) MUTATION ANALYSIS
(G170R) BY PCR: mayo AGXT/83643**

Lab: MAYO
Specimen Required: Lavender, 2 mL of whole blood, ambient. Send in original vacutainer if possible.
Alternate Specimen: Yellow ACD Tube
Reference Range: Provided with report
Turnaround Time: Performed Tuesdays at 2:00 pm
Mayo Test Code: 83643
Misys Test Code: **REFL**
CPT-4 Code(s): 83890,83892,83894,83898
Note: Must send "Molecular Genetics – Congenital Inherited Disease Patient Info Sheet" with specimen. Call Mayo to get form.

B VIRUS (CERCPITHECINE HERPESVIRUS 1)

Lab: Georgia State University
National B Virus Resource Center
Viral Immunology Center
50 Decatur Street
Atlanta, Georgia 30303
(404) 463-9951
<http://www2.gsu.edu/~wwwvir/>

Baseline Testing/Day of Injury or Serum Banked Specimen Prior to Injury – Stored in Micro

Test: B Virus IgG, Western Blot
Specimen Required: 0.5 – 2 mL serum, FROZEN from human or primate (order separately)
Misys Test Code: **REFL**
CPT-4 Code(s): 86790
Price:

Test: B Virus Viral Culture
Specimen Required: Swab from human or primate, stored in viral transport media, frozen at –60 (order separately).
Misys Test Code: **REFL**
CPT-4 Code(s): 87252
Price:

Test: B Virus PCR
Specimen Required: Swab from human or primate, stored in viral transport media, frozen at –60 (order separately).
Misys Test Code: **REFL**
CPT-4 Code(s): 87798
Price:

Follow-up (21 days post injury)

Test: B Virus IgG, Western Blot
Specimen Required: 0.5 – 2 mL serum, FROZEN from human or primate (order separately)
Misys Test Code: **REFL**
CPT-4 Code(s): 86790
Price:
Notes:
1. Go to <http://www2.gsu.edu/~wwwvir/> & fill out the submission form that needs shipped with the specimen.
2. Call lab to let them know the specimen is coming.
3. Ship FROZEN.
4. See CDC folder for packet with info. Folder is located on the "S" drive in the SP

Test Formularies vs. Menus

- Universe of Laboratory Tests
 - Every test performed at commercial or research lab
- Institutional Test Formulary (Database)
 - Subset of tests recognized by the institution
 - Includes just CLIA certified labs
- Provider Test Menu (Preference Lists)
 - Tests that are easily orderable through paper or electronic means
 - Includes test “panels”, “profiles” and tests with “reflex algorithms”: HIV, HCV, celiac disease
 - Components of some profiles may not be orderable individually (e.g. CK-MB)

Electronic Test Formulary Characteristics

- **Comprehensive: Leave no doubt**
 - Tests performed in your laboratory
 - Tests performed in other labs in your system
 - Reference lab tests
- **Job Aid for lab processing personnel**
 - Held responsible for adhering to information in manual
 - If not in manual, REFER to pathology
- **Current/Accurate/Easily updated: [Demo](#)**
- **Controlled (like a document): Limit who can change**
 - Consistent with lab policies & procedures
- **Include educational material**
 - Practice guidelines, algorithms, publications
- **Does it reduce calls to lab?**



The screenshot displays the WVU Healthcare website interface. At the top, the WVU Healthcare logo is on the left, and the text "West Virginia University Hospital, Inc." is on the right. Below the logo, there is a "Browse by Name" section with a grid of letters from A to Z and a "#". To the right of this is a "Search for Tests" section with a search bar and a "Search" button. The main content area features the WVU Healthcare logo and the text "West Virginia University Hospital, Inc. 1 Medical Center Drive Morgantown, WV 26506". Below this, there is an "Overview" section with a paragraph of text describing the laboratory services. On the left side of the main content area, there is a list of links including "Accreditation and Licensure", "Personnel", "Requests", "Policies-West Virginia University Hospitals (WVUH) Laboratories", and "WVU Healthcare Reflex Test List".

Maintaining Test Formulary to Assist Provider Test Ordering

- **Paper test order requisitions must be document controlled**
- **Organize tests by disease processes or common ordering patterns instead of alphabetically**
 - This structure is important for resulting (e.g. Oncology, Diabetes, Infectious Diseases, etc.) – don't care what lab performs test
- **Must implement without increasing provider workload**
 - Pop-up fatigue
 - Unnecessary information already in EHR

Laboratory Utilization/Formulary/Services Committee

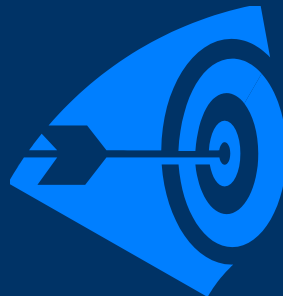
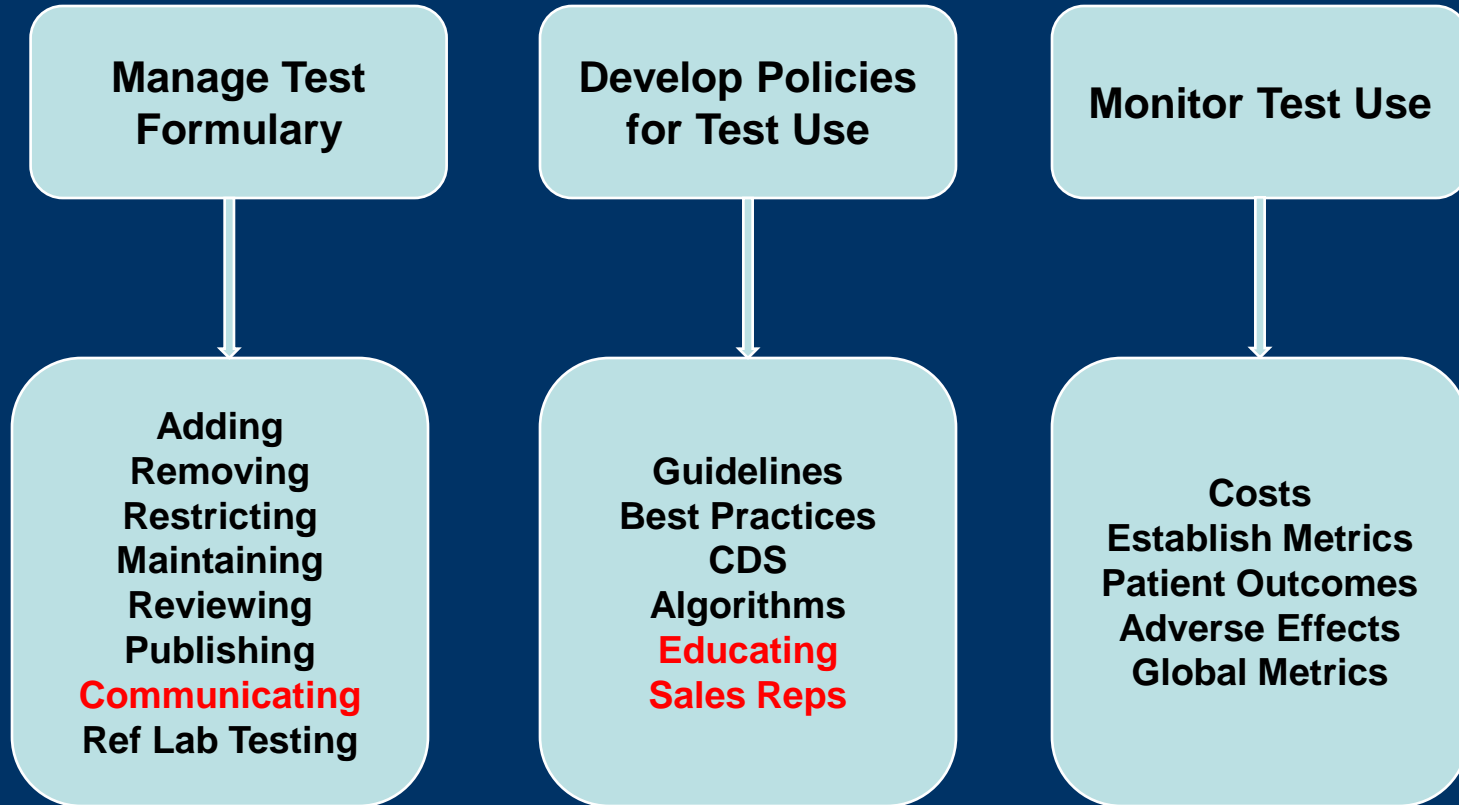
Structure

- Formal committee with charter and reporting to Medical Executive Committee
- Less formal working group
- Multiple related committees (POC, molecular, genetics, etc)
- Blood Utilization usually separate

Membership

- ❖ Medical Staff
 - Medicine, Pediatrics, Surgery, Oncology
 - Residents: PI Projects
- Hospital Administration
- Nursing Services
- Clinical Laboratory Director
- Anatomic Pathologist
- Informatics (e.g. CMIO)
- Finance

Test Utilization Committee Charges



Test Utilization Activities Related to Test Formulary

- ❖ **Removing outdated/antiquated tests from formulary**
 - Bleeding time, LAP, RBC folate
- ❖ **Approve new tests added to formulary**
- **Develop subsets of formulary for specialists**
- **Determine which tests should be restricted to specialty providers**
- **Designate tests that require specialist/pathologist approval**
 - Includes expensive, esoteric, misunderstood
 - The “consult nobody wanted”

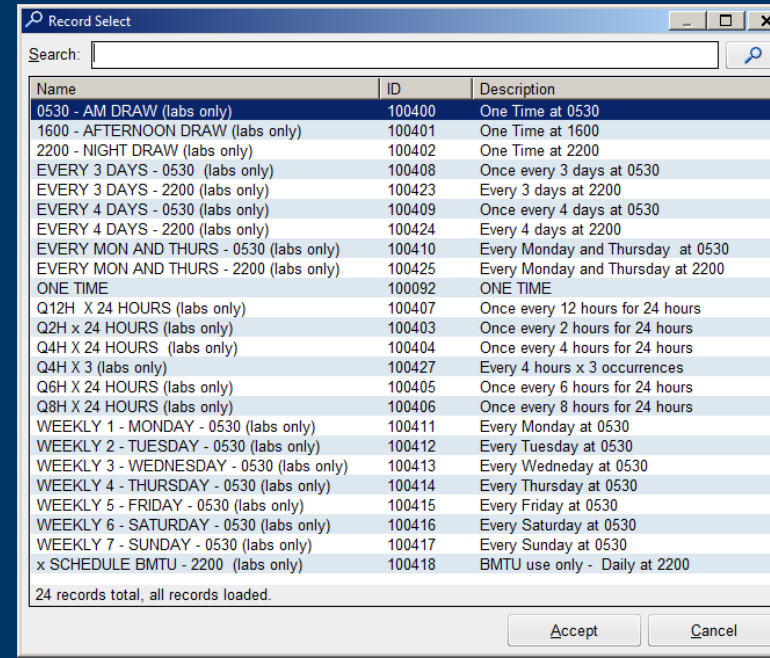
Test Costs in Formulary

- Provide in Electronic Formulary and/or Order Entry System
- Which to provide?
 - Lab cost, patient cost, CPT?
 - \$, \$\$, \$\$\$, \$\$\$\$
- Less outpatient tests ordered when test charges displayed (Tierney et al. 1990)
 - Effect does NOT persist when stop displaying charges
 - Study recently repeated (JAMA 2013), effect “modest”

Should we provide Value?

Lab Priorities

- Daily (and 100 other options) deleted
- Docs figure out how to beat system
- ICUs excluded
- Reduced daily CBC and BMET (ratio of inpatient tests/100 adjusted patient days) by only 10-12% (but it's a big #)
 - Little lab savings as most in-house tests automated with high fixed costs
- Good for patient satisfaction:
 - Less blood draws
 - Less follow-up tests
 - Less unnecessary intervention?
 - Less waking patients up (new draw times)



Record Select

Search:

Name	ID	Description
0530 - AM DRAW (labs only)	100400	One Time at 0530
1600 - AFTERNOON DRAW (labs only)	100401	One Time at 1600
2200 - NIGHT DRAW (labs only)	100402	One Time at 2200
EVERY 3 DAYS - 0530 (labs only)	100408	Once every 3 days at 0530
EVERY 3 DAYS - 2200 (labs only)	100423	Every 3 days at 2200
EVERY 4 DAYS - 0530 (labs only)	100409	Once every 4 days at 0530
EVERY 4 DAYS - 2200 (labs only)	100424	Every 4 days at 2200
EVERY MON AND THURS - 0530 (labs only)	100410	Every Monday and Thursday at 0530
EVERY MON AND THURS - 2200 (labs only)	100425	Every Monday and Thursday at 2200
ONE TIME	100092	ONE TIME
Q12H X 24 HOURS (labs only)	100407	Once every 12 hours for 24 hours
Q2H x 24 HOURS (labs only)	100403	Once every 2 hours for 24 hours
Q4H X 24 HOURS (labs only)	100404	Once every 4 hours for 24 hours
Q4H X 3 (labs only)	100427	Every 4 hours x 3 occurrences
Q6H X 24 HOURS (labs only)	100405	Once every 6 hours for 24 hours
Q8H X 24 HOURS (labs only)	100406	Once every 8 hours for 24 hours
WEEKLY 1 - MONDAY - 0530 (labs only)	100411	Every Monday at 0530
WEEKLY 2 - TUESDAY - 0530 (labs only)	100412	Every Tuesday at 0530
WEEKLY 3 - WEDNESDAY - 0530 (labs only)	100413	Every Wednesday at 0530
WEEKLY 4 - THURSDAY - 0530 (labs only)	100414	Every Thursday at 0530
WEEKLY 5 - FRIDAY - 0530 (labs only)	100415	Every Friday at 0530
WEEKLY 6 - SATURDAY - 0530 (labs only)	100416	Every Saturday at 0530
WEEKLY 7 - SUNDAY - 0530 (labs only)	100417	Every Sunday at 0530
x SCHEDULE BMTU - 2200 (labs only)	100418	BMTU use only - Daily at 2200

24 records total, all records loaded.

Accept Cancel

Default Test Order Behavior Affects Utilization

Allowable
Priorities

Default
Priority

Default
Frequency

HEPATITIS C ANTIBODY SCREEN WITH REFLEX TO HCV PCR
STAT, starting Today at 1342 Until Specified, Unit Collect

Priority:

Frequency:

For: Occurrences Hours Days Weeks

Starting:

First Occurrence:

First Occurrence: **Today 1342** **Until Specified**

There are no scheduled times based on the current order parameters.

Class:

Reference Links: 1. [Ruby Lab Manual](#)

Comments (F6): [Click to add text](#)

Hyperlink
Maintenance

Orphan
"Comments"

HEPATITIS C ANTIBODY SCREEN WITH REFLEX TO HCV PCR - West Virginia University Hospital, Inc. - Windows Internet Explorer

http://www.testcatalog.org/show/HCVAB

File Edit View Favorites Tools Help

WVUHealthcare West Virginia University Hospital, Inc. Sign In

Home Help

Search Tests **HEPATITIS C ANTIBODY SCREEN WITH REFLEX TO HCV PCR** Test Code HCVAB

Browse by Name

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	#			

Additional Test Codes
WVUH Merlin Code: LAB304734

Methodology
HCVAB: Chemiluminescent Immunoassay
HCVQR: Polymerase Chain Reaction (PCR)

Performing Laboratory
West Virginia University Hospital, Morgantown, WV

Specimen Requirements
Collect: One 7 mL lavender top tube
Minimum Collection Volume: 2 mL blood
Stability: Centrifuge within 2 hours after collection
Ambient: 3 days
Refrigerated: 7 days
Frozen: not specified
Required for Testing: 1.0 mL plasma
Collection Remarks: Avoid freeze-thaw cycling

Accreditation and Licensure
CAP Certificate
CLIA Certificate

Personnel
Requests

Duplicate Alert Maintenance

- Our story: Started too big, went too small, now just right?
- Autocancelling:
 - Be careful “Lab always cancels my orders”
 - Provider must be notified and provided reason for test cancellation

Procedure Category	Default	Exceptions	Time Limit (inpatient)
Bloods			
		CBC	24 hr
		BMP	24 hr
		Hgb A1C	90 days
		Type & Screen	72 hr
		Protein C Activity	24 hr
		Protein S total	24 hr
		Antithrombin III	24 hr
		HIT Platelet Antibody	24 hr
		Factor 8 Activity	6 hr
		D-dimer	24 hr
		FVL/Prothrombin Gene Mutation Analysis	99+ years
		Hereditary Hemochromatosis	99+ years

Duplicate HbA1c Testing

- Providers pressure to improve diabetes care lead to increased duplicate HbA1c testing (up to 10% for inpatients)
- More worried about not checking A1c than performing inexpensive test
- Limit every 3 months (per physiology & Medicare)
- Coordinated effort to decrease to <1% duplicates:
 - Alerts: Appeared more effective when embed previous results
 - Phlebotomy: Combining orders
 - Diabetes care managers

HGA1C (HEMOGLOBIN A1C WITH EST AVG GLUCOSE) Accept Cancel
Routine, ONE TIME First occurrence Today at 1430, System Default

Priority:

Frequency:

Starting: At:

First Occurrence: **Today 1430**

Scheduled Times: [Hide Schedule](#)

Class:


Reference: 1. Ruby Lab Manual

Links:

Comments (F6): [Click to add text](#)

Last Resulted: **Order #87983059**
Ordered: 11/6/13 9:16 AM
Resulted: 11/6/13 11:03 AM
Collected: 11/6/13 1:30 AM

	Component	Value	Units	Flag
1.	HEMOGLOBIN A1C	5.0	%	
2.	ESTIMATED AVERAGE GLUCOSE	97	mg/dL	



Best Practice Alerts (this wasn't easy)

BestPractice Advisory - Orders,Becca

Important (1 Advisory)

⚠ This test has been performed and **resulted as negative within the past 7 days**. Alternative etiologies of diarrhea should be considered. Test methods in use at WVUH have **high negative** predictive value; and, review of internal data has confirmed the low yield of repeat testing for C. difficile within a 7 day period.
Last CDIFFTOX=negative on 9/12/2013

BestPractice Advisory - Orders,Becca

Important (2 Advisories)

⚠ This test has been performed and **reported as positive within the past 14 days**. Please do NOT continue placing order for C DIFFICILE DETECTION. Current **guidelines recommend** against testing for cure; and, recurrent disease cannot be confirmed or excluded based upon repeat testing during this time interval.
Last CDIFFTOX=POSITIVE on 9/13/2013

BestPractice Advisory - Wvuhrxmaster,Colleen

⚠ Testing for Clostridium difficile is not recommended in this patient due to **recent laxative use**. Most patients infected with this organism experience diarrhea and do not require laxatives.

- Approximately 50% reduction in nosocomial infections reported to National Healthcare Safety Network (NHSN)
- Confounding factors: Bioquell, reduced fluoroquinolone use

Ordersets & Preference Lists

- Control: Or don't at your own risk
- Decide if provider-defined preference lists will be permitted
- Lab must review all ordersets
 - Ensure correct test is in orderset
 - Check mapping to middleware
 - Consistent with best or local practices
- Decide what is “autochecked”
 - Weak utilization tool
- Need better capabilities for maintaining ordersets

LABS		
<input checked="" type="checkbox"/>	CBC/DIFF	STAT, ONE TIME For 1 Occurrences, Collected
<input checked="" type="checkbox"/>	PT/INR	STAT, ONE TIME For 1 Occurrences, Collected
<input checked="" type="checkbox"/>	PTT (PARTIAL THROMBOPLASTIN TIME)	STAT, ONE TIME For 1 Occurrences, Collected
<input checked="" type="checkbox"/>	BUN	STAT, ONE TIME For 1 Occurrences, Collected
<input checked="" type="checkbox"/>	CREATININE	STAT, ONE TIME For 1 Occurrences, Collected
<input checked="" type="checkbox"/>	ETHANOL, SERUM	STAT, ONE TIME For 1 Occurrences, Collected
<input checked="" type="checkbox"/>	TYPE AND SCREEN	STAT, ONE TIME For 1 Occurrences, Collected, Specimens for type and screen are only good for three days. Please call blood bank at 74239 to see if there is a current specimen in lab, if so, do not draw this lab and discontinue the order. If over three days, please draw specimen. If you need further instructions, refer to the Laboratory Manual.
<input checked="" type="checkbox"/>	URINALYSIS	STAT, ONE TIME For 1 Occurrences, Unit Collect, Urine, This test includes ONLY a MACROSCOPIC urinalysis. A microscopic analysis will NOT be performed.
<input checked="" type="checkbox"/>	DRUG SCREEN, HIGH OPIATE CUTOFF, WITHOUT CONFIRMATION, URINE	STAT, ONE TIME For 1 Occurrences, Unit Collect, Urine
<input checked="" type="checkbox"/>	VENOUS BLOOD GAS/COOX/LYTES/LAC	Routine, ONE TIME, Starting today For 1 Occurrences, Collected Type of Specimen: Venous
<input type="checkbox"/>	ARTERIAL BLOOD GAS/COOX/LYTES/LAC	STAT, ONE TIME, Starting today For 1 Occurrences, Collected Type of Specimen: Arterial
SERUM PREGNANCY TEST		
<input checked="" type="checkbox"/>	HCG, SERUM QUANTITATIVE, PREGNANCY	STAT, ONE TIME, Starting today For 1 Occurrences, Collected, This is a sensitive quantitative test used to diagnose pregnancy, investigate suspected ectopic pregnancy, and to monitor invitro fertilization patients. For tumor marker testing please order LAB3041228 (HCG, SERUM QUANTITATIVE, TUMOR MARKER)

Monitoring Use of Non-Formulary “Miscellaneous” Tests

Procedures (1 Order)

HELP LAB ORDER ✓ Accept ✗ Cancel Remove

Order details

Process Inst: This order is to be used only to order lab tests that are not currently in Merlin. In the comments section, please type the lab test that you need and a contact number for questions.

Comments (F6): abc ↻ ? ? + Insert SmartText ↻ ↵ ↶ ↷ ↘

Class: Lab Collect **Lab Collect** Clinic Collect External

Performing Dept:

Status: Future Expected: Approx. Expires: 6/27/2016

▶ Additional Order Details ✓ Accept ✗ Cancel Remove

F7- Prev Order F8- Next Order

Weekly Help Lab Test Report

Physician	Receive Date	Acc Number	Order Comments
ETT,COURTNEYD,	4/20/2015	M41021	;PLEASE DRAW TWO GREEN TOP TUB
MANCHI,TARACH,	4/20/2015	M41607	;PLEASE SEND 3-;10 CC OF BLOOD
ZIANP,DONNAJ	4/21/2015	T14234	;AMNISURE-;36W3D WITH OLIGOHYD
IAN,MELISSAA	4/21/2015	T15234	;MUMPS IGM ANTIBODY
ETT,ROYGREGOR	4/22/2015	W52143	;6-;METHYLMERCAPTOPYRINE
ETT,COURTNEYD,	4/23/2015	H6668	;PLEASE RUN A CMP, NON FASTING
ER,DAVIDPETER	4/24/2015	F6354	;HORSE-;SPECIFIC SERUM IGE LEV
ETT,COURTNEYD,	4/24/2015	F6816	;CMV IGG AVIDITY

- Report monitored by processing & lab director
- Should test be built?
- Provide feedback to ordering providers
 - who provide feedback to director
- Minimize use/misuse

Test Restrictions & Test Formulary

Table 1

Categories of Reference Laboratory Testing at Our Institution

Category	Criteria and Approach	Example
Unrestricted	Predetermined CLIA laboratory, sent without review	Viral serologies or PCR, 5' nucleotidase, bone-specific alkaline phosphatase, therapeutic drug monitoring
Restricted	Predetermined CLIA laboratory, requires review	Many complex genetic tests, paraneoplastic antibody panels
Unauthorized	Tests that are categorically denied or replaced with the appropriate restricted or unrestricted test	All research use only or investigational use only tests
Undefined	No predetermined CLIA laboratory, requires review	New tests or tests requested to be sent to different reference laboratory than the predefined CLIA laboratory

Include Duplicate Testing Policy: Procop et al.

Test Build in EHR Process (SharePoint)

- **Should test be orderable?**
 - Inpatient, outpatient, or both?
 - Restrict to unit (e.g. ICU), service or provider level
 - Can be only lab orderable (LIS) to maintain electronic orders/resulting
- **Should result go to PHR?**
 - If so, should there be a delay?
- **Test name**
 - 3 letter search strategy
 - Less limitations on test name length

Can a test formulary help select the right test & Reduce Diagnostic Errors?

- **Outcome Studies Needed**
 - **Faster & more accurate diagnosis**
 - **Improved patient flow**
 - **Use of protocol orders in ED**
 - **Patient & physician satisfaction**
 - **Better treatment selections**
 - **Avoid misdiagnosis**
 - **Avoid adverse Rx consequences**

Table 2. Classification of causes of diagnostic error related to testing.^a

1. An inappropriate test is ordered.
2. An appropriate test is not ordered.
3. An appropriate test result is misinterpreted or misapplied.
4. An appropriate test is ordered, but is delayed or misrouted within the testing process and is not available where it is needed at the time it is needed.
5. The result of an appropriately ordered test is inaccurate.

^a Reproduced from Epner et al. *Worth et al. Clin Chem* 2015

Test Formulary can Help Select the Wrong Test

Right
test 1st

Code	Name	Pref List
LAB3041219	VITAMIN D, SERUM (25 HYDROXYVITAMIN D2 AND D3 BY MS)	WVU IP FACILITY PROCEDURE F
LAB536	VITAMIN D: 1,25 HYDROXYVITAMIN D	WVU IP FACILITY PROCEDURE F

Real-time
Information

Alternative Selection

VITAMIN D: 1,25 HYDROXYVITAMIN D: STAT, starting Today at 1507 Until Specified, Collected, This test is used to evaluate patients with renal failure and hypercalcemia.

VITAMIN D: 1,25 HYDROXYVITAMIN D test is RARELY indicated for select patient populations (i.e., end-stage renal failure, symptomatic calcium imbalance in absence of other abnormality, rare deficiencies of renal 1-alpha hydroxylase or end-organ resistance to 1,25-dihydroxy vitamin D).

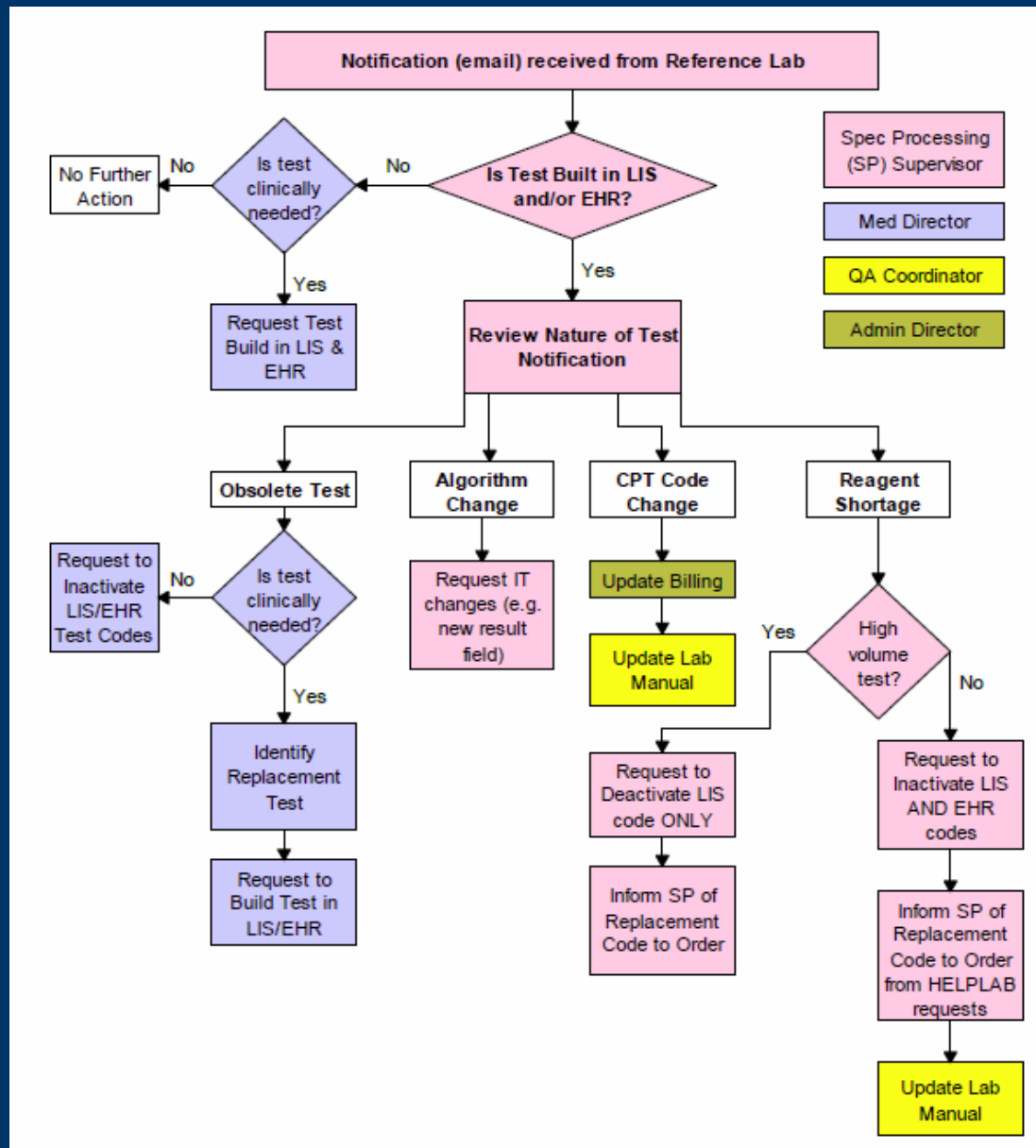
For ROUTINE vitamin D testing, select the order below.

Web Links
No additional information.

Alternative	Details	Cost
VITAMIN D, SERUM (25 HYDROXYVITAMIN D2 AND D3 BY MS)	Routine, ONE TIME, Starting 4/29/15, System Default	

Reduce user
burden

Managing Reference Lab(s) Test Formulary



Part of test formulary change process

IT Support for Utilization Efforts: Commitment Needed!

- ❖ Query appropriate databases (LIS, EHR, business operations/financial, etc.)
- ❖ Test volume data (by provider, clinic, inpatient vs. outpatient, hospital location, hospital service)
- ❖ Prepare meaningful reports
 - Report cards with provider/service comparisons
- Ordering/Resulting systems
- ✓ Electronic formulary development & maintenance
- IT user group to share knowledge/experience
- Familiar with laboratory workflow
- Integration into clinical decision support systems
- Standardize syntax & rules across system
- ✓ Statistical analysis (or at least extract in useable format)

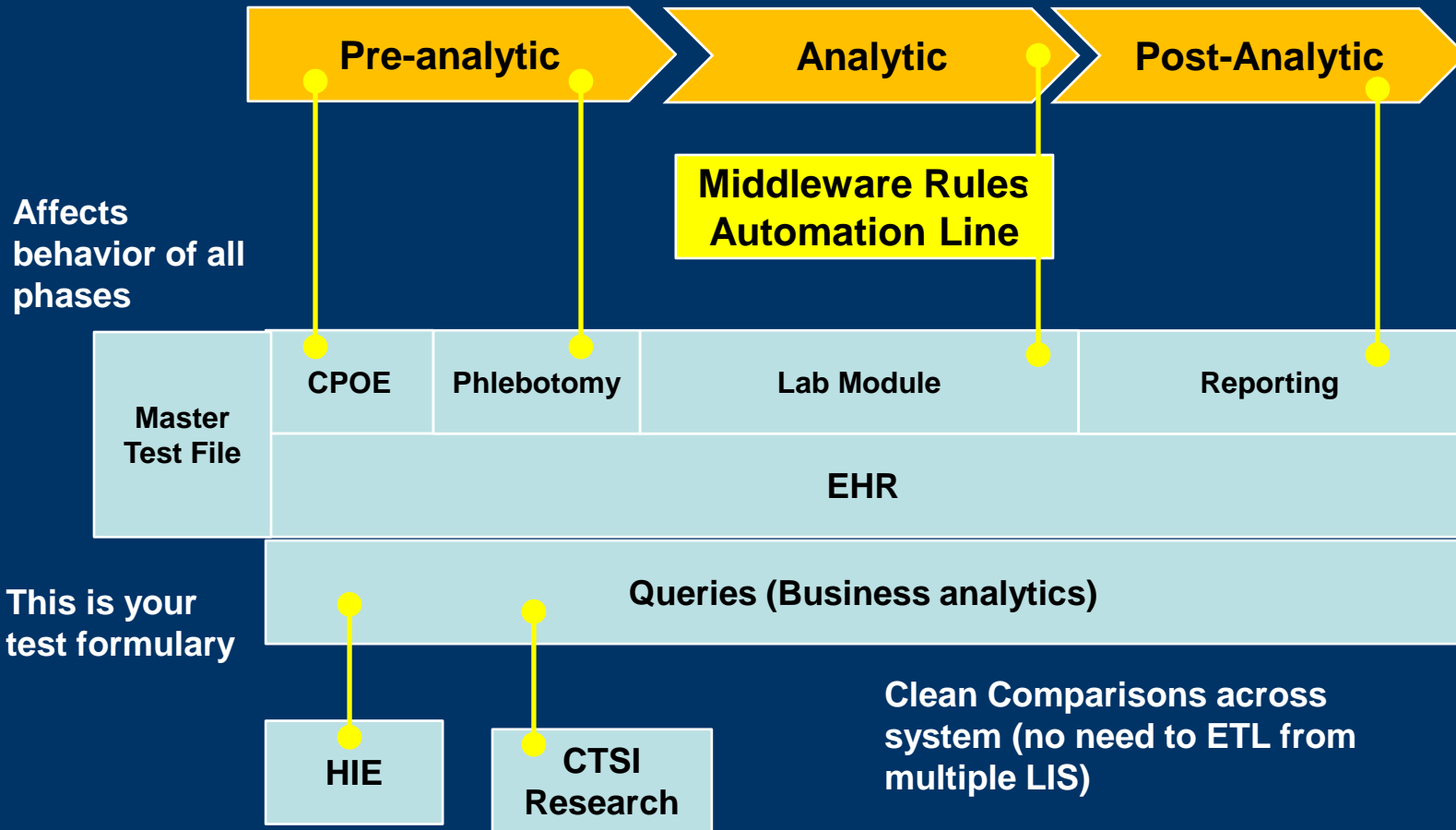
Laboratory System Formulary Integration & Consolidation

- **Lab consolidation should be part of system integration**
- **Assume clinicians want integrated clinical information**
 - Physicians work at other system facilities
 - Patients have services at >1 facility
- **Techniques:**
 - Consolidate to uniform LIS
 - Interface LISs
 - Interface each LIS to uniform HIS
 - Interface each LIS and/or HIS to HIE
 - Implement a system wide integrated EHR with lab functionality

Laying Groundwork For System Test Formulary Standardization

- Each lab cleans up current test formulary
- Consolidate reference lab testing
 - Minimize # of reference labs
- Move to same platforms for high-volume testing
- Standardize elements during test build (test names, resulting units, decimal places, CPT codes)
 - Less build
 - Less application maintenance
- Don't forget AP

Information Model



Conclusions: *We should*

- Continue to improve utilization of existing & new laboratory tests
- Identify new roles for laboratory professionals at the interface between IT and lab services
- Develop professional guidelines for test utilization activities
 - This includes *under* utilization of tests (retic counts, BNP)
- Designate key measures of effectiveness (metrics) of lab utilization activities
 - Includes outcomes-based and global metrics (including cost/case)

***Major product of clinical labs is Information & Knowledge
(not performing lab tests)!***