



**LABORATORY
STEWARDSHIP:
STILL A GOLDEN OPPORTUNITY
FOR IMPROVEMENT**

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ARUP CONSULTATIVE SERVICES

a bit about Rob...



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Learning Objectives

1. Understand the environmental factors that make laboratory stewardship such an attractive and rewarding option for optimizing test utilization.
2. Identify the key factors and steps that will lead to the successful implementation of a laboratory stewardship initiative.
3. Learn from case studies how to avoid common mistakes in implementing and sustaining a laboratory stewardship effort.

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Background

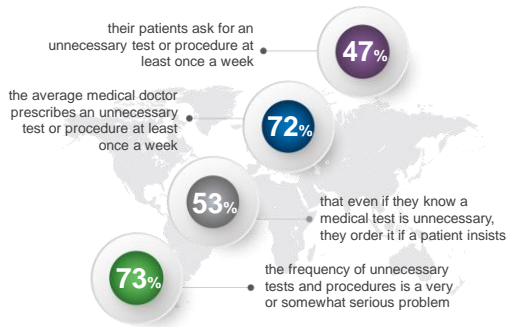
3 most significant causes of 13 Billion test performed patient harm

- 70% ordering the wrong test
- 10-30% retrieve a test result
- Misinterpreting a test result



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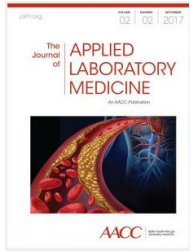
Trends in Healthcare



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NCLS Publication



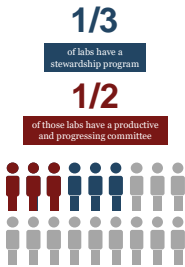
SPECIAL REPORT
Transforming Laboratory Utilization Review into Laboratory Stewardship: Guidelines by the PLUGS National Committee for Laboratory Stewardship
 Anne B. Beckman, PhD, Andrew B. Beckman, PhD, Thomas W. Heston, PhD, Paul J. Hoyle, PhD, Joseph D. Smith, PhD, Robert B. Cooper, PhD, William J. Baker, PhD, James C. Fort, PhD, Michael J. Ashby, PhD

Appropriate utilization of all types of laboratory services is important for patient care and resource stewardship. Laboratory utilization review (LUR) programs are well established, but the field is changing. This report provides a framework for transforming LUR into laboratory stewardship, which focuses on the quality of patient care while reducing costs to patients, hospitals, and health systems. The framework is based on a review of the literature and a survey of laboratory stewardship programs. The core activities of laboratory stewardship are: (1) identifying and eliminating unnecessary tests, (2) ensuring that necessary tests are performed in the most appropriate laboratory, and (3) ensuring that tests are performed in a timely and accurate manner. The framework is based on a review of the literature and a survey of laboratory stewardship programs. The core activities of laboratory stewardship are: (1) identifying and eliminating unnecessary tests, (2) ensuring that necessary tests are performed in the most appropriate laboratory, and (3) ensuring that tests are performed in a timely and accurate manner.

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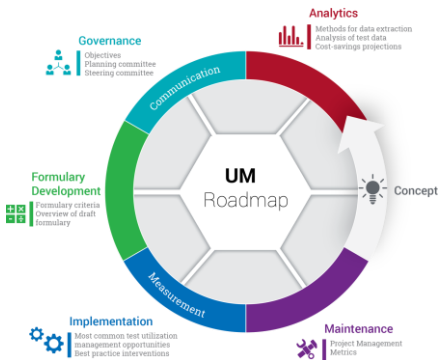


Creating Successful Laboratory Stewardship



- Success Factors**
- Data Analysis
 - Formal Governance
 - Evidence-Based Recommendations
 - IT Engagement and Support
 - Project Management
 - Measurement and Reporting

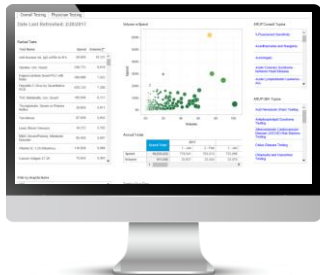
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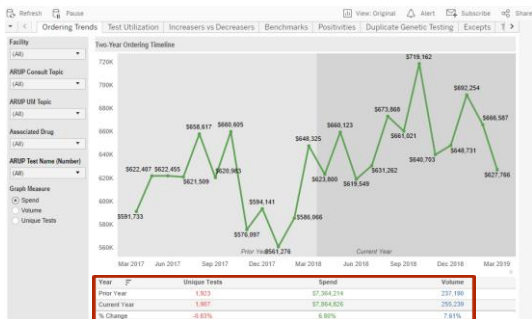
Analytics & Monitoring: Utilization Dashboards



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Analytics & Monitoring: Utilization Dashboards



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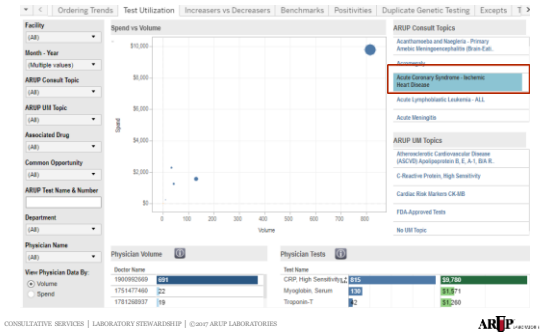
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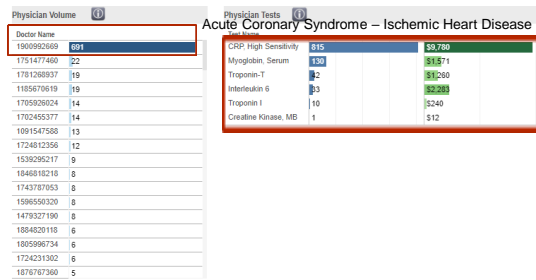
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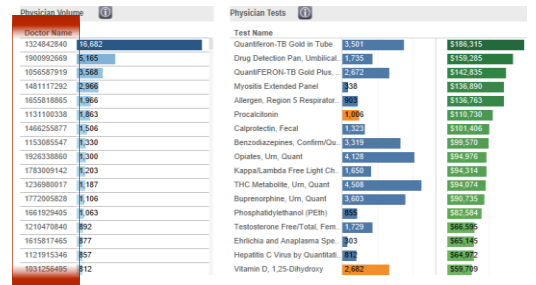
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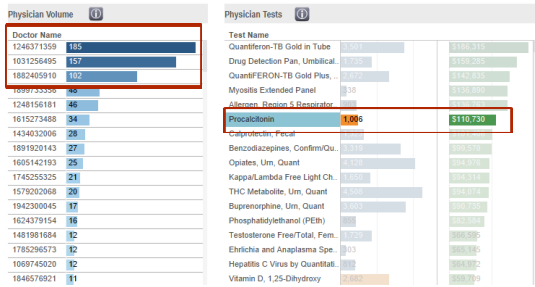
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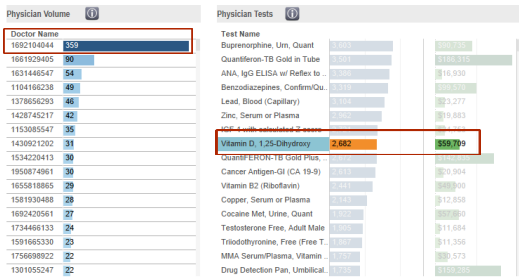
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Analytics & Monitoring: Utilization Dashboards



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Creating Successful Governance Structure



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Where to Start?

Three *Initial areas of Focus*

Test Consolidation

How many reference labs do you use?

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

Free Phenytoin at Lab X	\$106
Free Phenytoin at Primary Lab vendor	\$13

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Test Formulary

Reverse T3		Boutique genetics tests	TIER 3	<ul style="list-style-type: none"> • Obsolete tests • Tests w/o demonstrated clinical value • Tests w/o established reimbursement • Not orderable in CPOE 				
EBV PCR	HIV-1 Genotype	CYP2D6 Variants	TIER 2	<ul style="list-style-type: none"> • Sendout tests • Tests above a cost threshold • 2nd line testing • Test-specific restrictions 				
HIV 1,2 Screen	PTT	PT	BMP	TSH	UA	CBC	TIER 1	<ul style="list-style-type: none"> • 80% of test menu • >90% of testing volume • No restrictions

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Test Formulary

Review Eliminate Review



all send out testing performed in 1 year

test listing in menu if ordered <4 times in 1 year

remaining test on menu to see if reasonable

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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

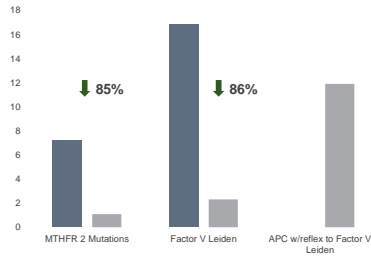
- Gonorrhea**
- Gonorrhea culture
 - Gonorrhea DNA probe

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Commonly Misordered Testing

Test Removal & Reflex Path Implementation



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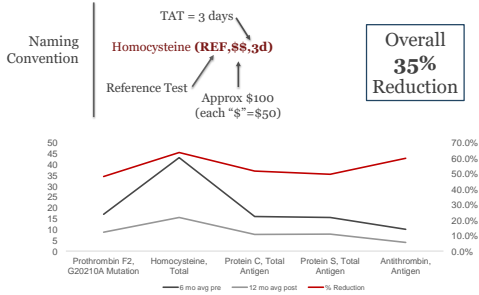
Clinical Decision Support in EMR

Range	Dollar Sign	% of built lab tests
\$0-\$150	\$	47%
\$151-\$300	\$5	23%
\$301-\$500	\$55	10%
\$501-\$1000	\$555	10%
\$1000+	\$5555	10%

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Test Price Transparency & More



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POE Optimization

- CELIAC SEROLOGY (REF, \$6,30)
- IMMUNOGLOBULIN E (IGE) (REF, \$6,50)
- LEVETIRACETAM LEVEL (REF, \$6,20)
- PROTEIN C/3 PANEL, FUNCTIONAL (REF, \$6,30)
- RENIN (REF, \$6,20)
- THYROID Abs (REF, \$6,20)
- ALPHA-FETOPROTEIN (AFP) (REF, \$6,30)
- R1 GLYCOPROTEIN I ABS IGG IGM (REF, \$6,30)
- BILIRUBINEMIA and METABOLITES, URINE (REF, \$6,50)
- CARDIOLIPIN Abs (IgG, IgM, IgA) (REF, \$6,20)
- GLUTAMIC ACID DECARBOXYLASE AB (REF, \$6,40)
- ISLET CELL (REF, \$6,40)
- LAMOTRIGINE LEVEL (REF, \$6,20)
- OXCARBAZEPINE (TRILEPTAL) (REF, \$6,30)
- THYROID STIMULATING IMMUNOGLOB (REF, \$6,30)
- THYROXINE BINDING GLOBULIN (REF, \$6,30)
- TISSUE TRANSGLUTAMINASE IGA AB (REF, \$6,30)
- TOPIRAMATE (TOPRAMAX) LEVEL (REF, \$6,30)
- TRYPT ENZYME (REF, \$6,20)
- VON WILLEBRAND MULTIMERIC PANEL (REF, \$6,40)
- ACTIVATED PROTEIN C RESISTANCE (REF, \$6,50)
- ADRENOCORTICOTROPHIC HORMONE (ACTH) (REF, \$6,30)
- ALDOSTERONE, SERUM (REF, \$6,50)
- ALDOSTERONE/RENIN ACT RATIO (REF, \$6,60)

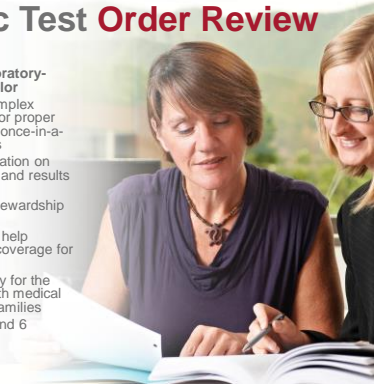
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Genetic Test Order Review

Consider hiring a laboratory-based genetic counselor

- Routinely review complex genetic test orders for proper utilization, including once-in-a-lifetime genetic tests
- Available for consultation on proper test ordering and results interpretation
- Participate in Lab Stewardship Committee
- Work with payers to help promote insurance coverage for new tests
- Great PR opportunity for the Lab and Hospital with medical staff, patients, and families
- ROI is typically around 6 months or less



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Outcome Data

RESEARCH ARTICLE

AMERICAN JOURNAL OF
medical genetics

Genetic Counselor Review of Genetic Test Orders in a Reference Laboratory Reduces Unnecessary Testing

Christine E. Miller,* Patti Krautscheid, Erin E. Baldwin, Taliana Twidik, Amanda S. Openshaw, Kim Hart and Danielle LeGrave
Genetics Division, ARUP Laboratories, Salt Lake City, Utah
Manuscript Received 1 May 2015; Manuscript Accepted 3 January 2014

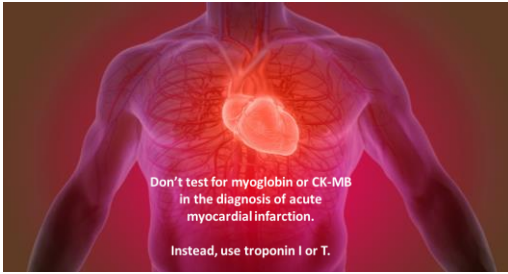
Healthcare savings from molecular test modifications:

- 86 tests modified /month (includes test cancellations and additions)
- Average Cost Savings/ Month >\$48,000 (specifically from cancelation of erroneous tests)
- Savings to hospitals, insurers, and patients ~\$720,000 dollars annually
- <https://onlinelibrary.wiley.com/doi/abs/10.1002/ajmg.a.36453>

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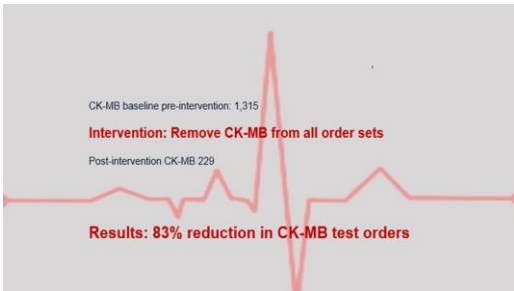
Stewardship Interventions



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Stewardship Interventions



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Where to Start?

Three *Initial areas of Focus*

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Inappropriate test intervals



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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.

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Intervention Methods

Proactive

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



Reactive

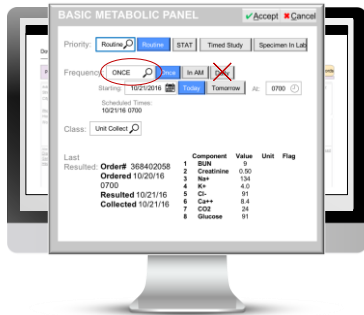
- Duplicate alerts
- Formulary restriction alerts
- Best Practice Alerts
- Physician education



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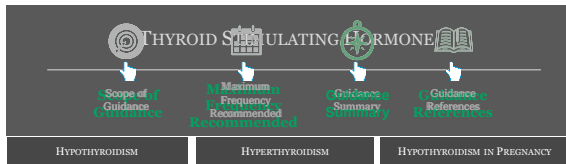


Daily Orders



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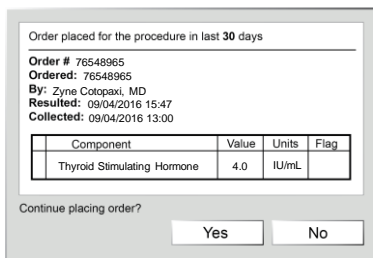
Juppala J, Bianco AC, Bauer AJ, et al. Guidelines for the treatment of hypothyroidism. Prepared by the American Thyroid Association task force on hypothyroidism. *Thyroid*. 2012;22(12):1326-42. doi:10.1089/thy.2012.22.1326

1. American Thyroid Association. Guidelines for the treatment of hypothyroidism. *Thyroid*. 2012;22(12):1326-42. doi:10.1089/thy.2012.22.1326

2. Garber JR, Cobblebrand R, Clark DW, et al. Guidelines for the treatment of hypothyroidism: Guidelines of the American Thyroid Association. *Thyroid*. 2012;22(12):1326-42. doi:10.1089/thy.2012.22.1326

3. American Thyroid Association. Guidelines for the treatment of hypothyroidism. *Thyroid*. 2012;22(12):1326-42. doi:10.1089/thy.2012.22.1326

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Test Interval Guidance Case Study

Project: CPOE Duplicate Alert for 5 target tests identified as being potentially ordered too frequently

Intervention: CPOE duplicate alert

Reduction
In repeat testing

Test Name	Reduction In repeat testing
TSH	84.9%
Lipid Panel	70.8%
Hemoglobin A1c	67.5%
Iron	89.2%
Ferritin	75.3%

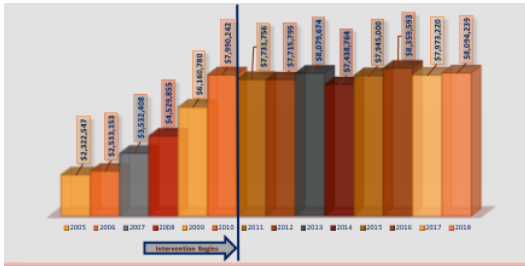


Annualized Direct Cost Savings = **\$203,432**

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Reference Lab Interventions



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Summary

Justification for Stewardship
NCLS Recommendations
Three Initial areas of Focus:

Test Consolidation
 How many reference labs do you use?

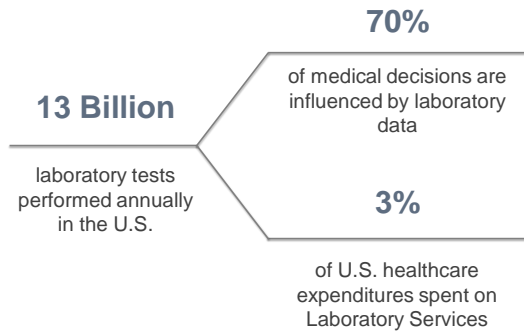
Reference test formulary
 Creation & Implementation

In-House Testing
 Daily recurring labs
 Inappropriate test intervals



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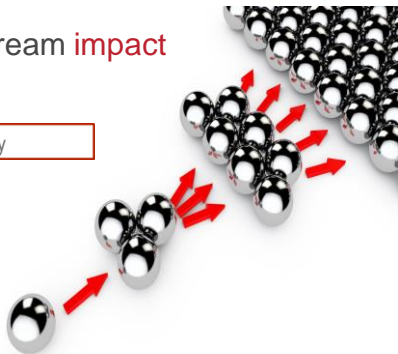


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Downstream impact

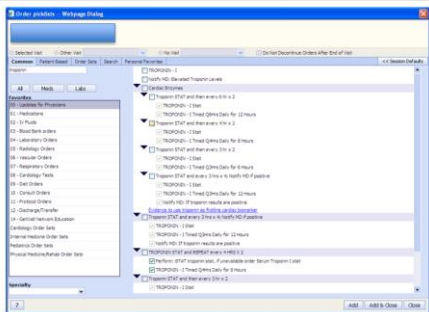
- Length of stay
- Pharmacy
- Radiology
- Others.....



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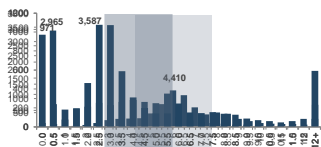
Troponin Orders and Chest Pain LOS



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Troponin I



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

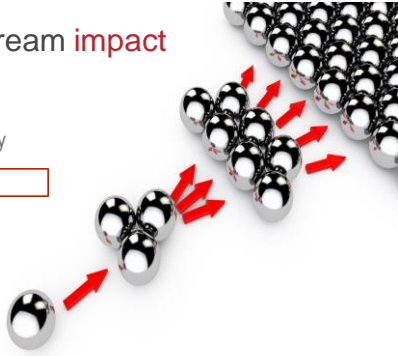
Improve the time-to-decision by improving the test interval by up to 3 hours

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Downstream impact

- Length of stay
- Pharmacy
- Radiology
- Others.....



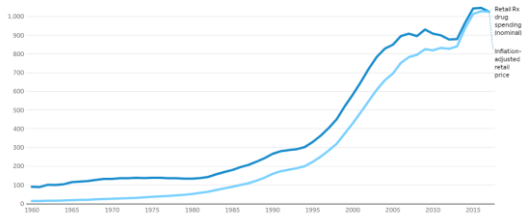
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Pharmacy costs keep rising...

Spending on prescription drugs has risen rapidly over past decades

Nominal and inflation-adjusted per capita spending on retail prescription drugs, 1990-2017



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Downstream Impact on Pharmacy

- Humira (adalimumab)
- Remicade (infliximab)

Humira annual cost per patient rose from \$19K (2012) to \$38K (2018)
 Humira total sales = \$18.4 billion (2017)



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Adalimumab Activity & Neutralizing Antibody

About this test

This test assesses the effectiveness of adalimumab drug therapy. The test measures the activity of TNF- α , which is inhibited by adalimumab, and also detects anti-drug antibodies.

50% of patients suffering from non-infectious inflammatory disorders experience treatment failure.

Detecting treatment failure of TNF- α inhibitors such as infliximab and adalimumab improves patient care and results in cost savings from halting ineffective drug therapy.

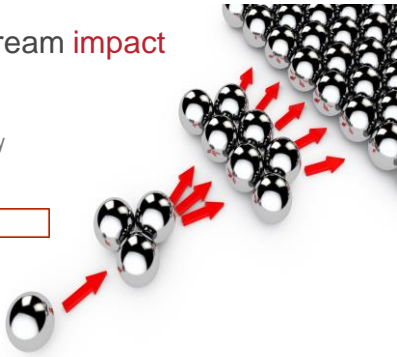
See www.aruplab.com/topics/TNF for additional information.

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Downstream impact

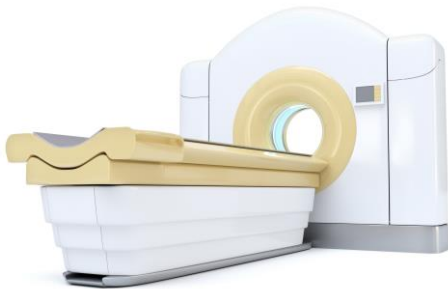
- Length of stay
- Pharmacy
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- Others.....



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Radiology Services



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CT Scans

Procedure	Approximate effective radiation dose	Comparable to natural background radiation for:
Computed Tomography (CT)-Chest	7 mSv	2 years
Computed Tomography (CT)-Lung Cancer Screening	1.5 mSv	6 months

“A chest x-ray delivers 0.1 mSv, while a chest CT delivers 7 mSv — **70 times as much**. And that’s not counting the very common follow-up CT scans.” Source: Harvard Health Publishing

“The average cost of a CT scan in the United States is **\$3,275**” Source: New Choice Health

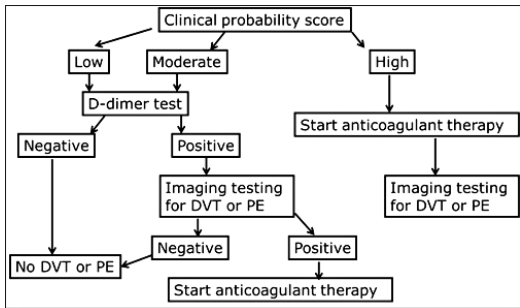
D-Dimer for DVT/PE (VTE)

Initial testing

- For patients with intermediate or low pretest probability by Clinical Prediction Rules (E.g. Wells Criteria)
- **Negative test rules out VTE**
- Cutoff >500 ng/mL fibrinogen equivalent units (FEUs) or age times 10 ng/mL if >50 years old (cutoffs in FEUs do not apply to results generated from assays in D-dimer units [DDUs])
- Test is not specific – patients with positive test require imaging, usually Doppler or compression ultrasound

Source: ARUP Consult

DVT/PE Algorithm



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D-Dimer and CT PE Protocol

Criteria	Score
Clinical Signs and Symptoms of DVT	+10
PE in #1 Diagnosis, or Equivalently Likely	+10
Heart Rate > 100	-10
Immobilization at least 3 days, or Surgery in Previous 4 weeks	+10
Previous, objectively diagnosed PE or DVT	+10
Hemoptysis	+10
Malignancy or Treatment within 6 mos, or pathologic	+10
Well's Criteria Score for PE	3

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D-Dimer and CT PE Protocol

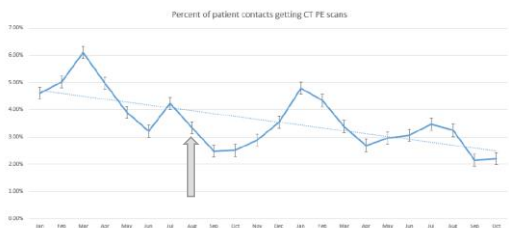
Informational Message - Webpage Dialog

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-molecular factor, inflammation, and malignancy.

Close

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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)

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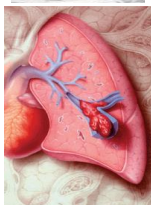
31% ↓
CT Scans
=
\$6,016,940
per year in savings

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My Own DVT/PE Story...

- It all started with surfing in Hawaii (2012)
- R little toe injury (dislocation)
- Long plane ride back to Denver next day
- Months pass
- Acute R upper quadrant chest pain
- ED visit
- D Dimer: >2.5 times upper limit of normal
- CT of thorax performed two hours later
- Dx: Bilateral PE
- Doppler US performed next morning
- Dx: DVT (R knee area)
- Negative for hereditary coagulopathies
- 6 months of warfarin therapy
- Moral of the story: DVT/PE risk is real, common, and we are all probably at some risk when circumstances align

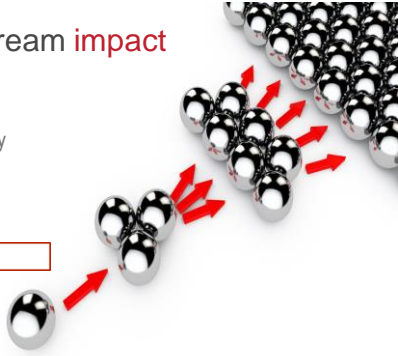


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Downstream impact

- Length of stay
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- Radiology
- Others.....



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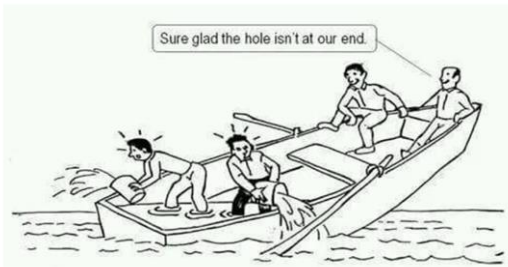
Other Stewardship Collaboration Opportunities

- Lab networking (both within and outside of health system)
- Inreach and Outreach
- Consolidation of purchased services
 - Couriers and transportation
 - Billing
- Cross-training of managers and other leaders
- Shadowing (inter and intradepartmentally)
- Quality Improvement interdepartmental projects
 - Blood stewardship, etc.
 - Organization excellence efforts (E.g. Malcolm Baldrige National Quality Award)
- Patient participation in staff meetings
- The list is probably endless...be creative to fill gaps

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Are We Really All In This Together?



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**LABORATORY
STEWARDSHIP:
STILL A GOLDEN OPPORTUNITY
FOR IMPROVEMENT**

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SENIOR HEALTHCARE CONSULTANT
ARUP CONSULTATIVE SERVICES*



Your Homework Assignment

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(2 minutes 41 seconds)

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