

One Lab's Journey up the Laboratory Value Pyramid

Presented by:

Denise Uettwiller-Geiger Ph.D., DLM(ASCP)

Clinical Chemist and Director of Clinical Trials

Mather Hospital Northwell Health

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Learning objectives

After this webinar, you will be able to:

- Discuss how leveraging technology and usable data can improve quality and achieve high value patient outcomes
- Evaluate the direct impact of laboratory test results on organizational performance
- Examine the value of laboratory information and impact of the laboratory value pyramid
- Describe how the laboratory can contribute to performance driven healthcare

Mather Hospital Northwell Health

Our Mission is to be the Best Community Teaching Hospital in New York State

- 248 Bed Community Hospital established in 1929
- Located North Shore on Long Island, New York
- Continually changing to meet the needs of the community
- Magnet Status
- NYS and JCAHO accredited
Laboratory performs 2.4 million tests annually
- Patient Safety Score "A" from Leapfrog Group, 12 consecutive quarters
- December 2017- Member of Northwell Health



The Value of Laboratory Information



Laboratory Diagnostics Information...The Case for Investment

- Medical risk and quality management
- Improves medical decision-making
- Changes the course of disease
- Reduces the burden of disease



Source: CMS.gov

The Case for Investment



**Labs are only
3% of**



Laboratory Value Pyramid

FIGURE 2

The Laboratory Value Pyramid



Source: Ellis J, Michel RL. The Laboratory Value Pyramid. Published as a 4-part series in *The Dark Report*: Sept. 22, 2014; Nov. 24, 2014; Feb. 17, 2015; March 30, 2015.

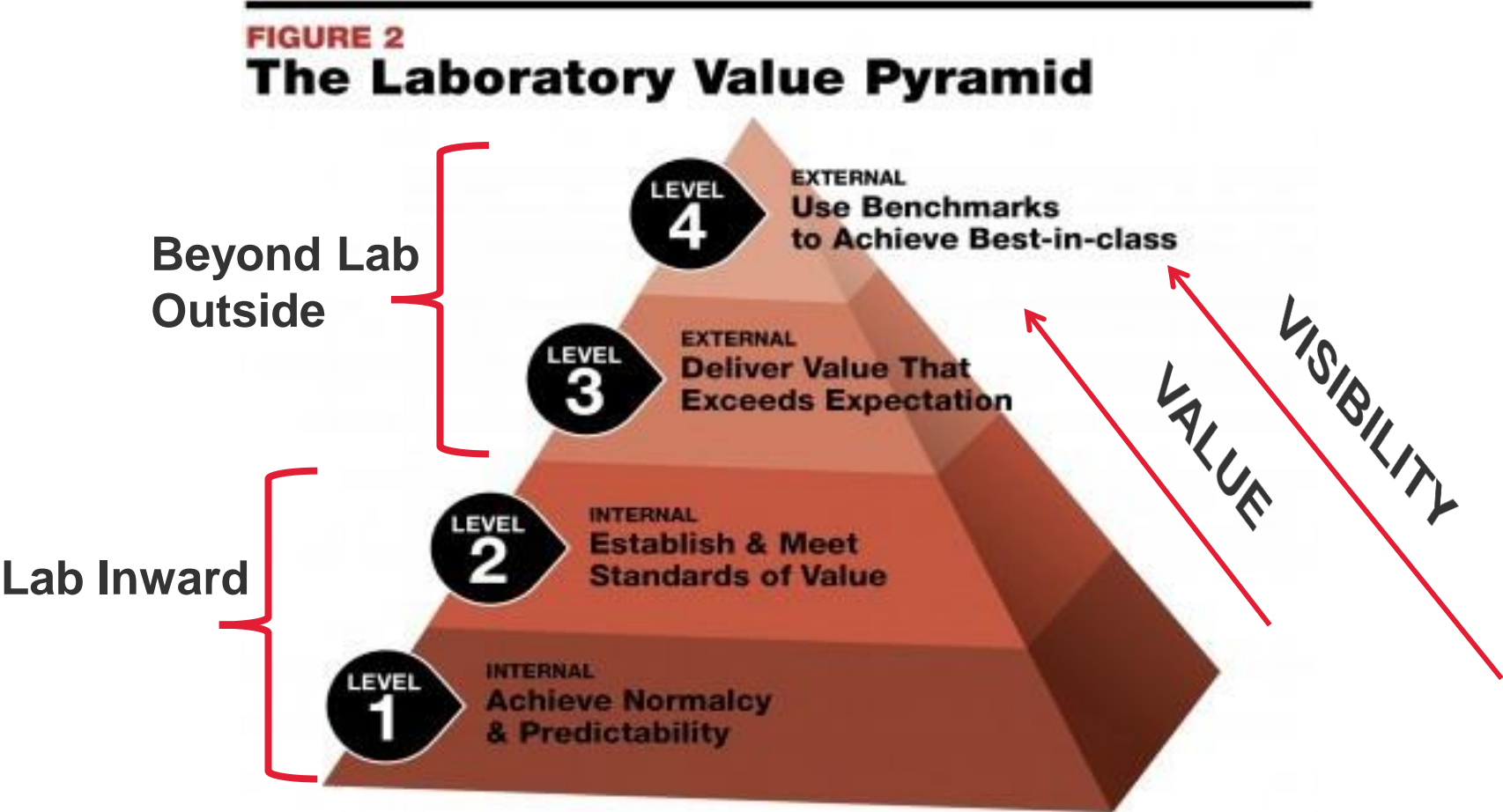
Laboratory Value Pyramid

FIGURE 2
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Laboratory Value Pyramid

FIGURE 2
The Laboratory Value Pyramid



**A thousand mile journey begins
with a single step**

Vision: Provides the organization with direction for the future and brings the promise of a better future.



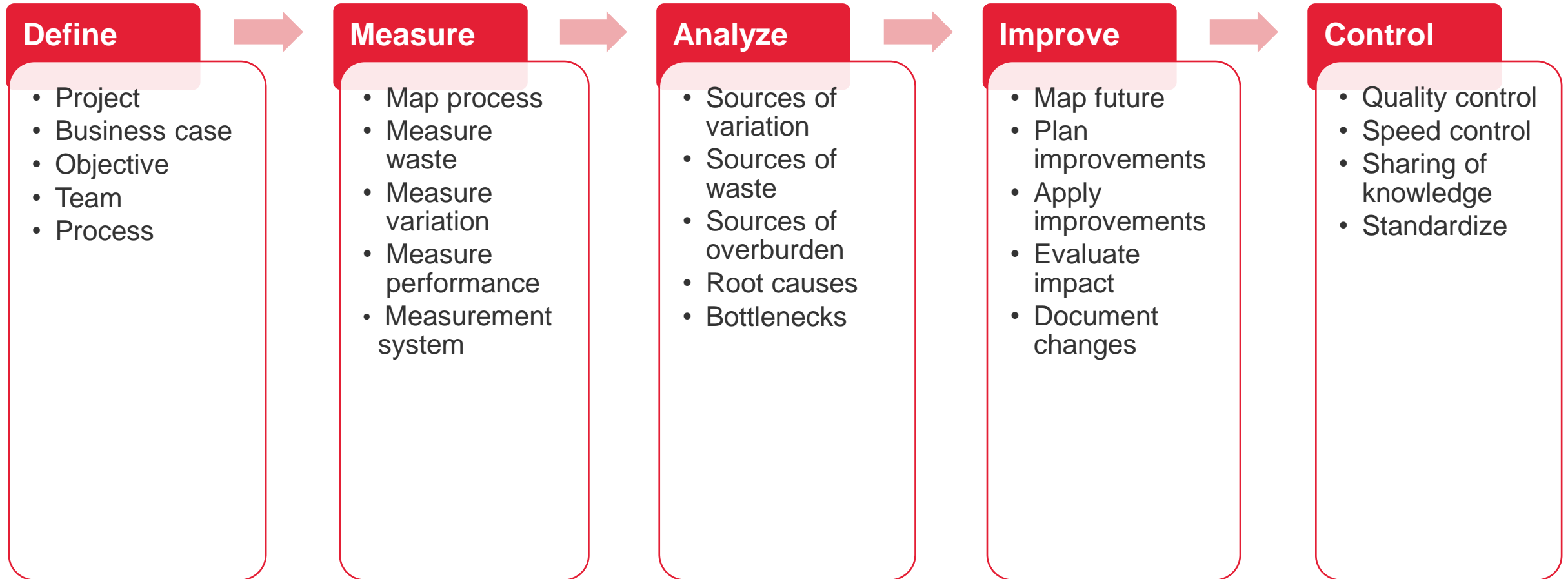
From Volume to Value

**Don't abandon your dreams because of those who
lack the vision!**

Adding Value with Lab Tests

- Goal is to improve patient outcomes while reducing the cost per episode of care
- Lab can spend a bit more money, but contribute to millions in cost savings
- Achieve continuum of quality care throughout the healthcare system with standardized laboratory testing

Process Modification



Does your process leave your staff tired?

Let's take a look at the Lab Value Pyramid Journey...

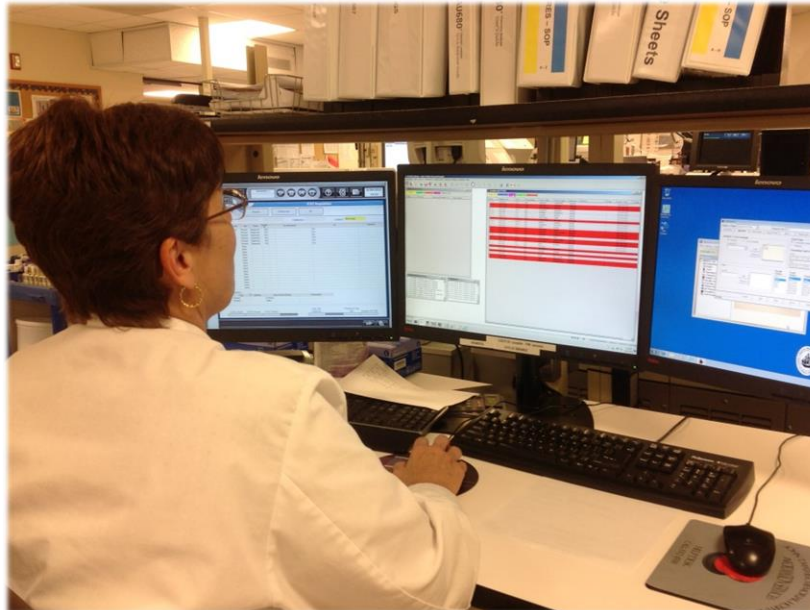
Laboratory Value Pyramid Level 1 and 2 Laboratory Based Initiatives



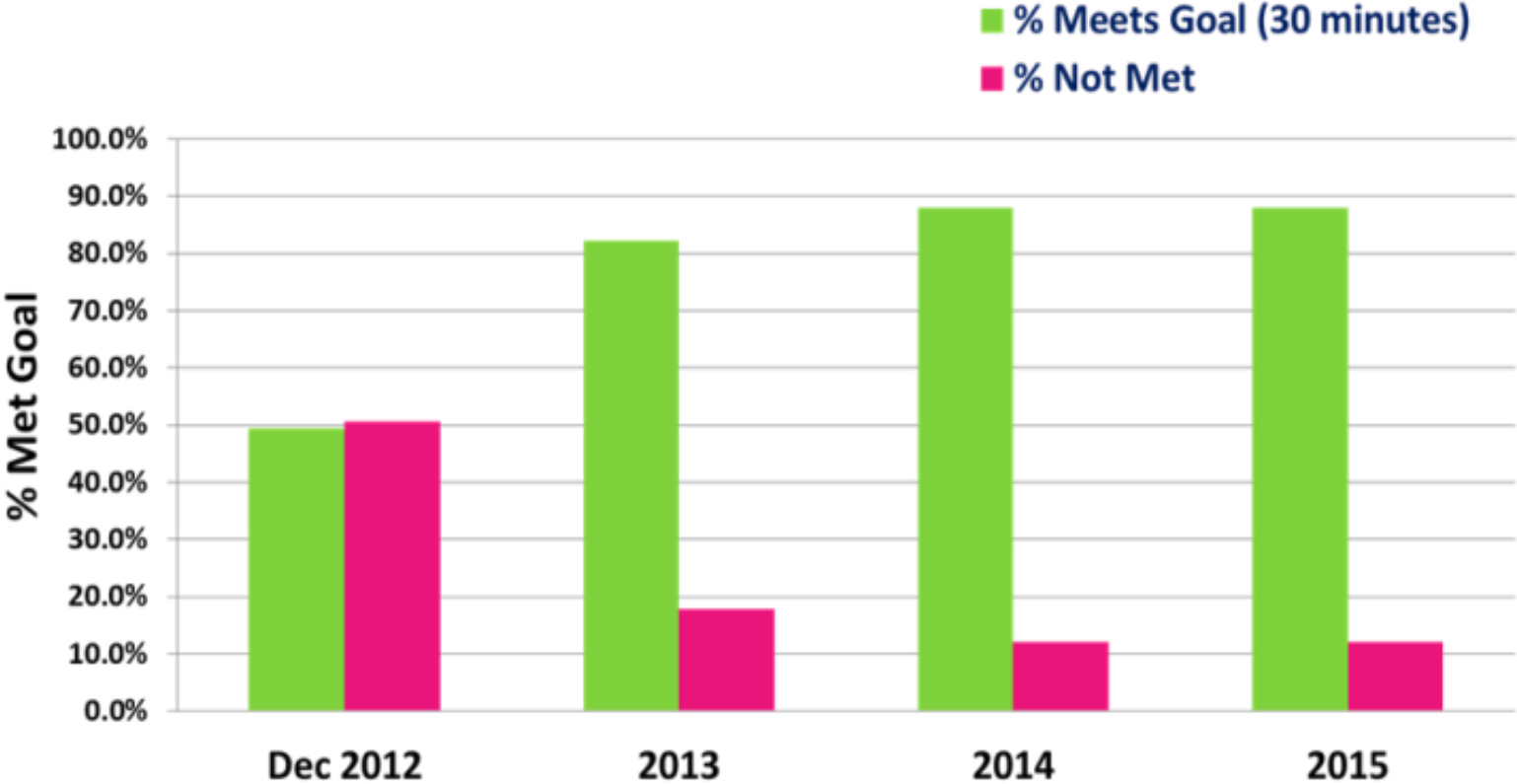
Strategic Plan for Laboratory

- Maintain or Improve Quality Levels
- Free Up Valuable Time and Resources
 - Identify biggest productivity barriers
 - Streamline process
 - Eliminate duplicate efforts
 - Create a proactive vs. reactive culture
- Leverage Critical Intelligence to Drive Decisions
 - Rapid TAT
- Create Real Time Knowledge for better patient outcomes
- Assure patient safety with patient centric approaches

Automation and Auto-validation



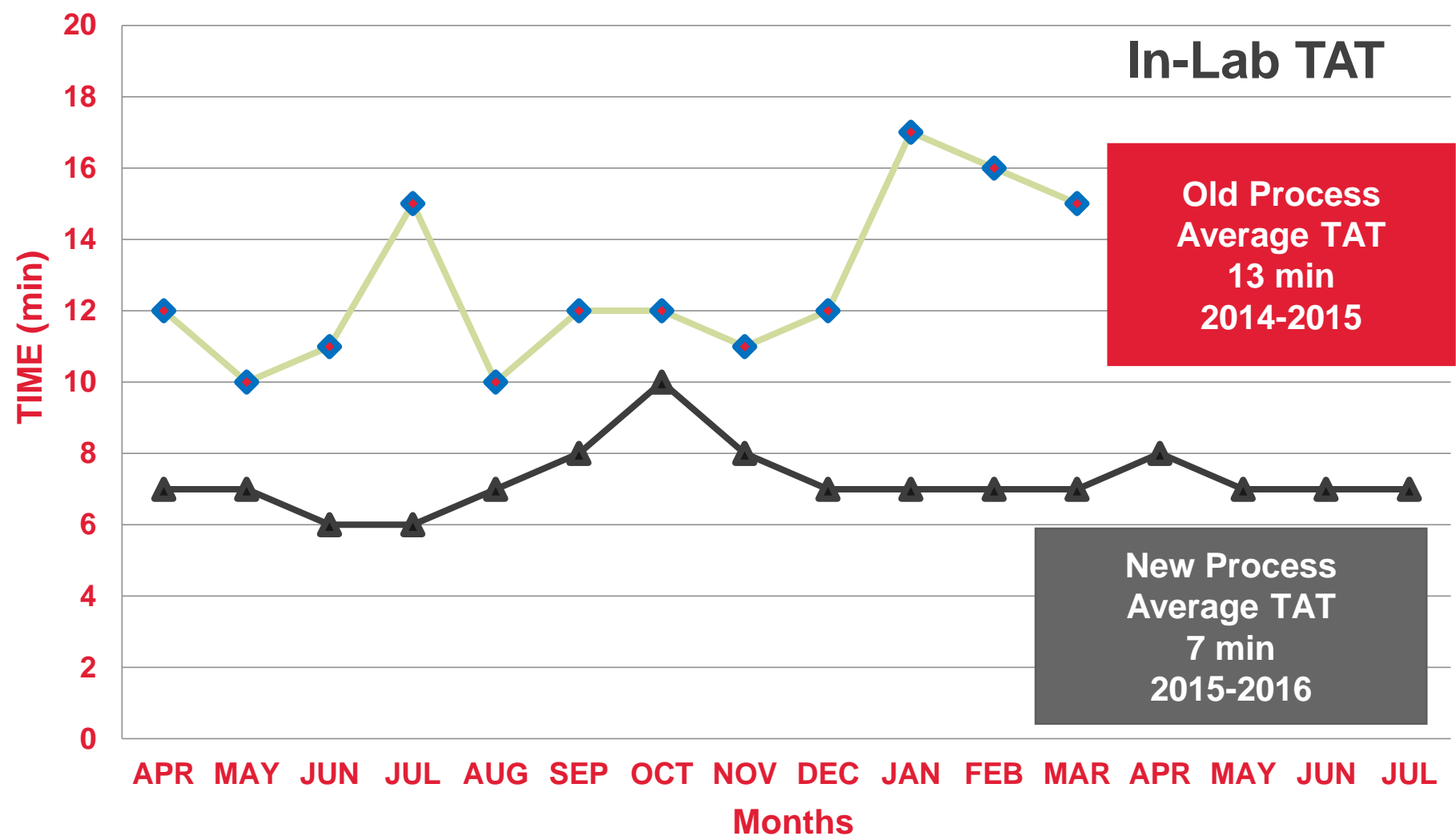
ED Lactate – Receipt to Release TAT



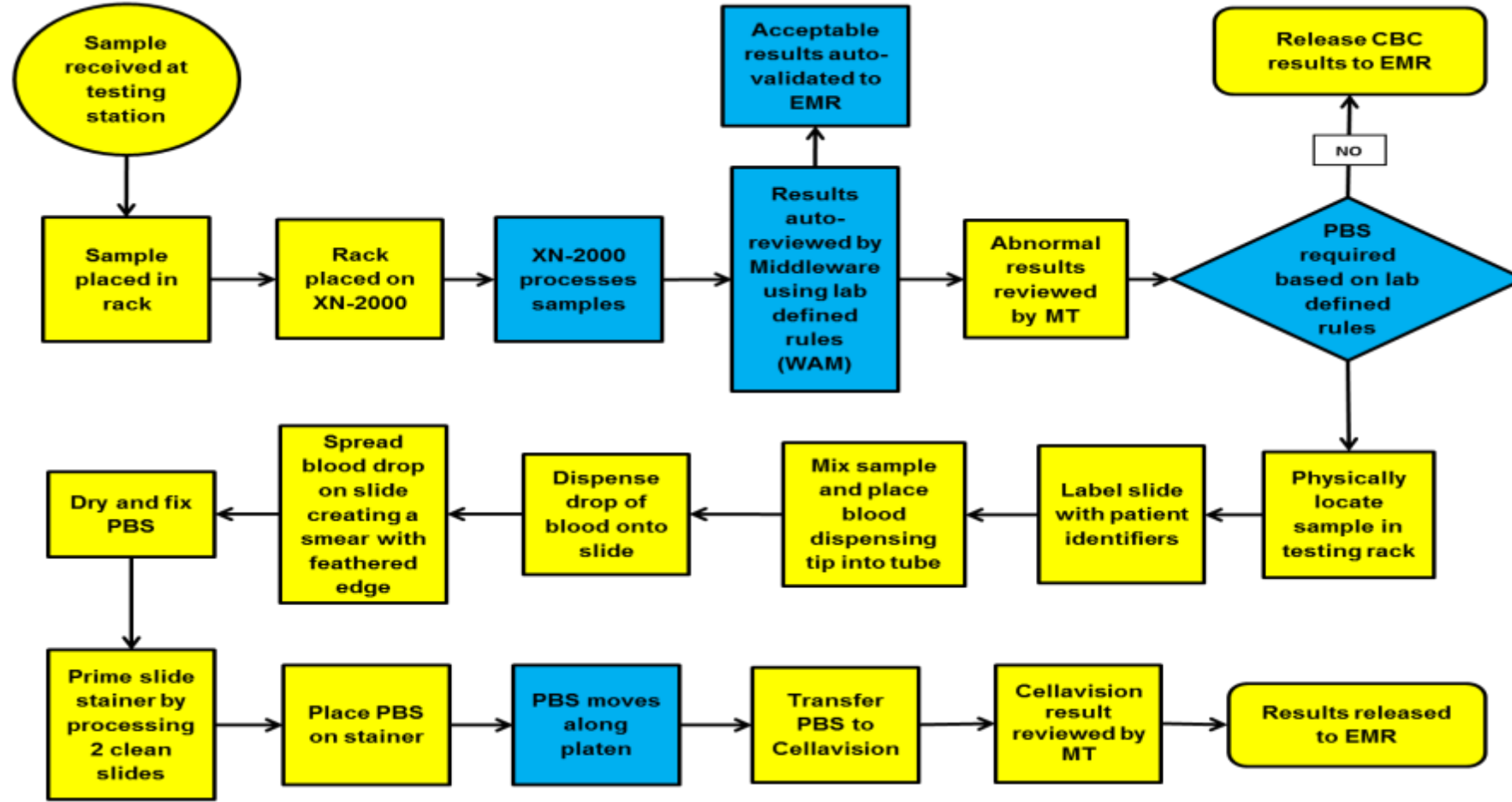
Integration of Slidemaker and Stainer into Hematology Analyzer



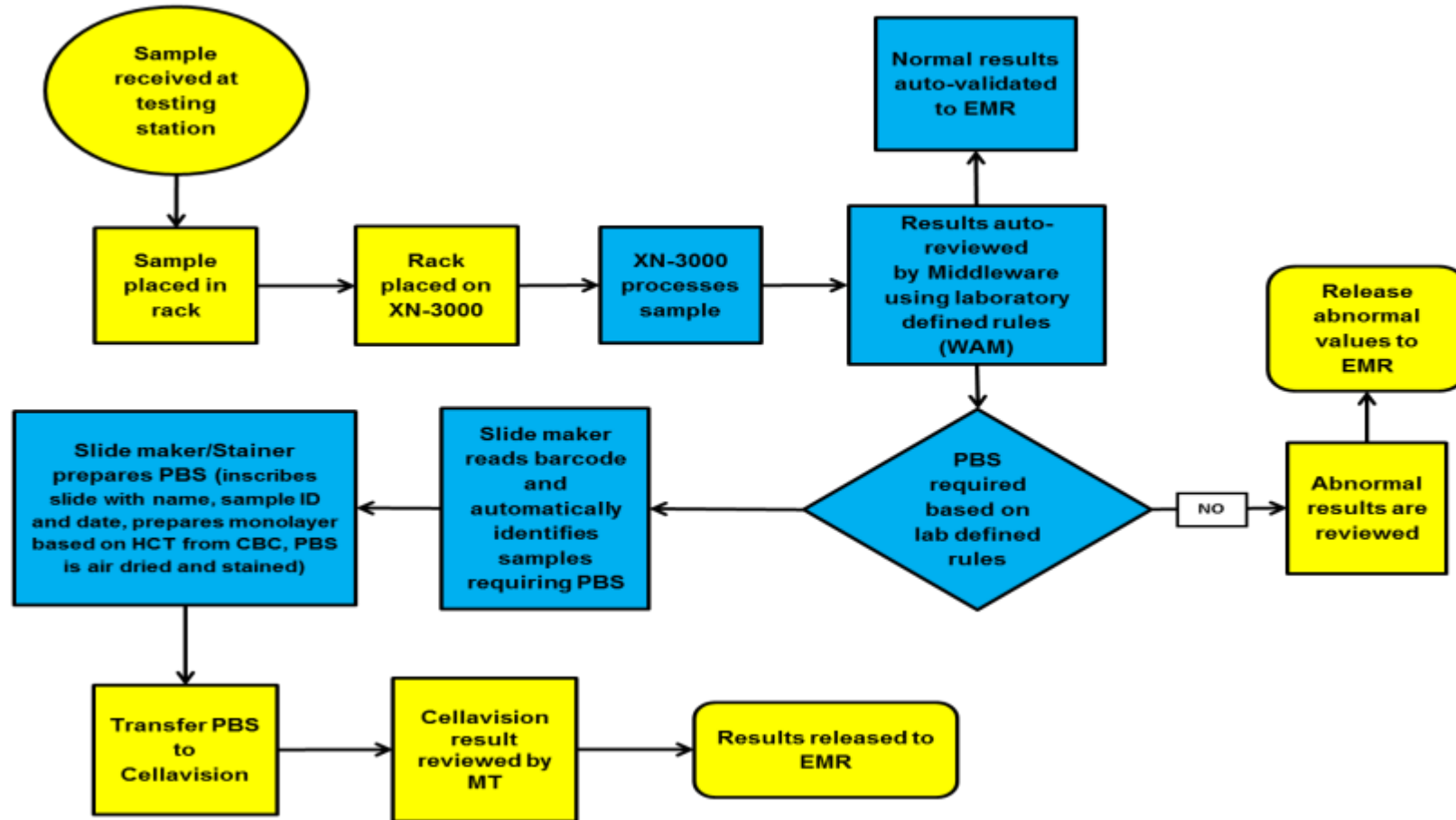
CBC Turnaround Time ED



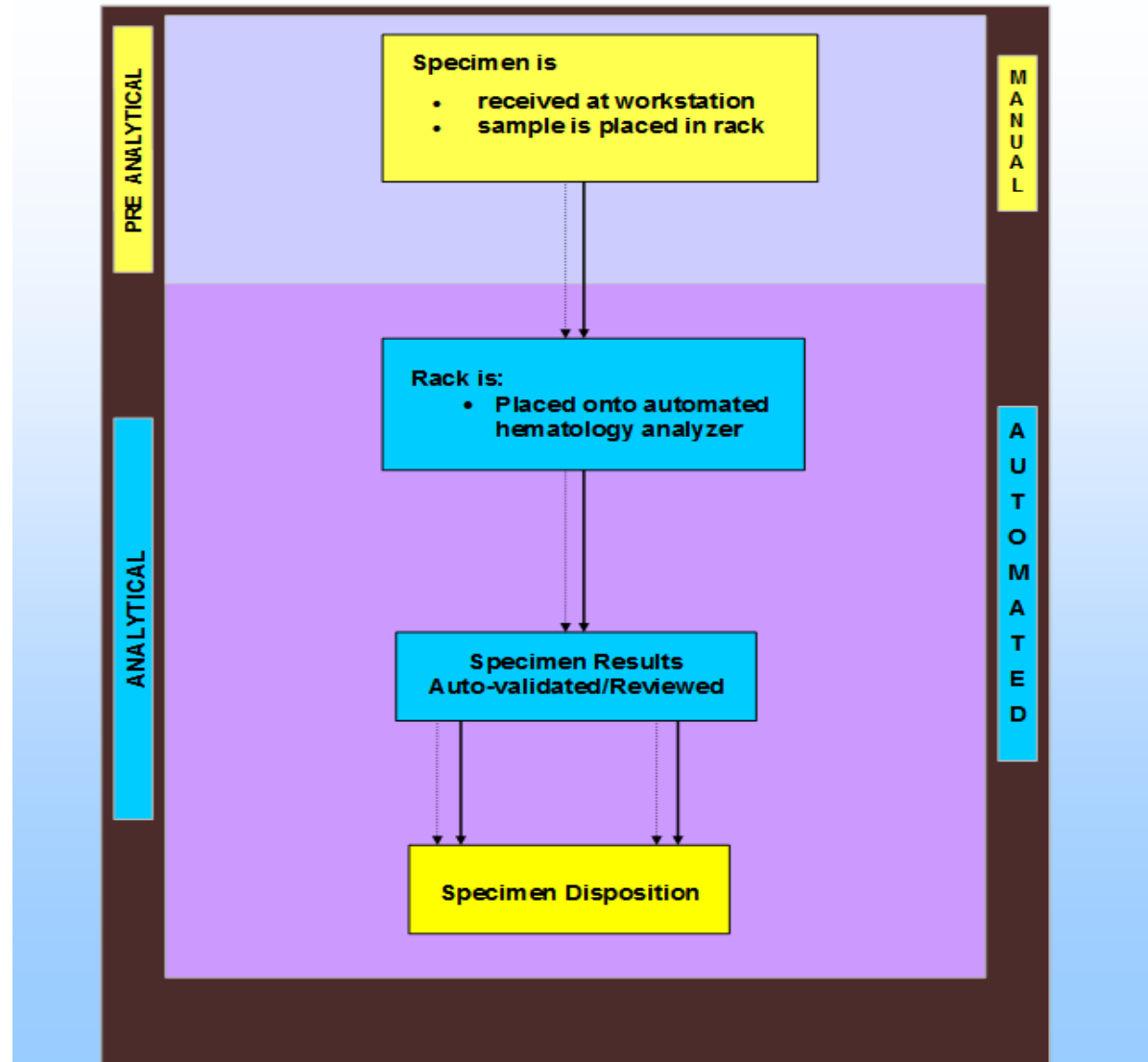
Workflow for Hematology Analyzer Prior to Integration of Slidemaker/Stainer



Workflow for Hematology Analyzer with Integrated of Slidemaker/Stainer



Flow Chart for Integrated Slidemaker/Stainer



Manual vs. Automated Slide Preparation



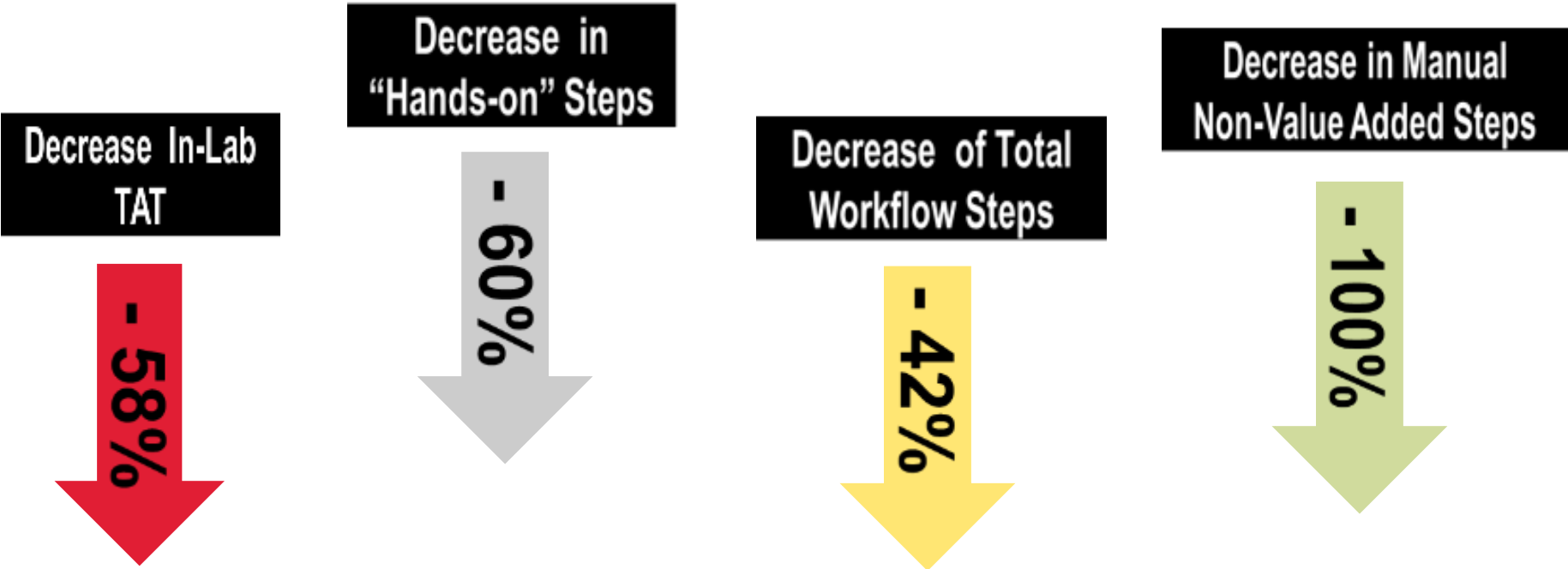
Manual “Hands-On” Slides



**Automated Slide Preparation
“Hands-Free” Slides**

Clinical Impact and Process Improvement Metrics

DECREASED	INCREASED
✓ Total In-Lab TAT	✓ Slide Preparation Consistency
✓ Labor Intensive Manual Tasks	✓ Operational Efficiency/ Productivity



Lab Goals for Success from Volume to Value

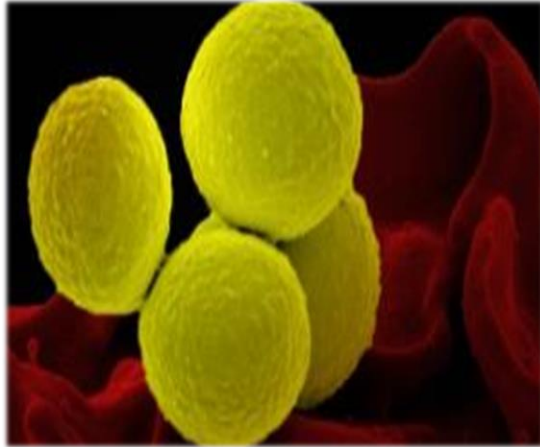
- Drive out waste to drive out costs
- Employ Lean labor planning; manage retention & attrition
- Refocus on reagent and supply savings
- Use Lean management
- Create automated lean work cells—no more silos
- Manage lab orders and test utilization
- Standardize everything—equipment, policies, processes, job descriptions, etc.
- Leverage technology, connectivity, and data mining



Laboratory Value Pyramid Level 3



Reducing Hospital Acquired Infections (HAIs)



Leveraging Technology

Culture The Gold Standard



Molecular Diagnostics



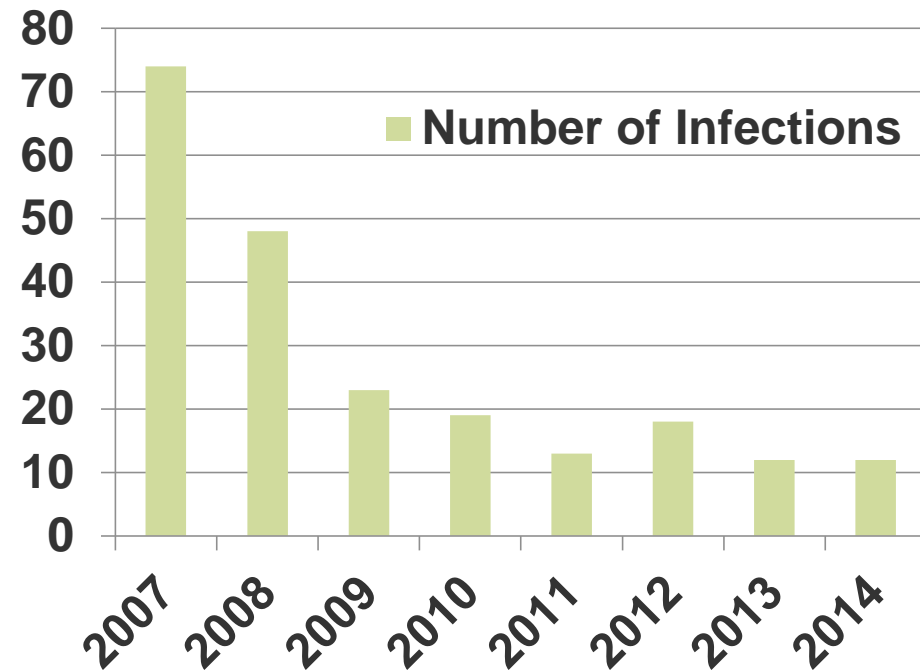
Active Surveillance For MRSA

Cost-Benefit Molecular Testing (PCR)

Laboratory Costs

- Screened high risk patients 2008 – 2014
- 12,785 patients (~ 1,825/yr)
- PCR Assay ~ \$51 per test
- Total Screening Cost: \$657,325
- NO ADDITIONAL FTEs
- MRSA testing performed 24/7

MRSA Infections (248 bed hospital)



(2007 vs. 2014)

62.0 fewer infections @ \$35,000

Financial Impact of Rapid Screening and Reporting For HAI's

Total Cost Avoidance/Reduction with MRSA Testing/Screening is:

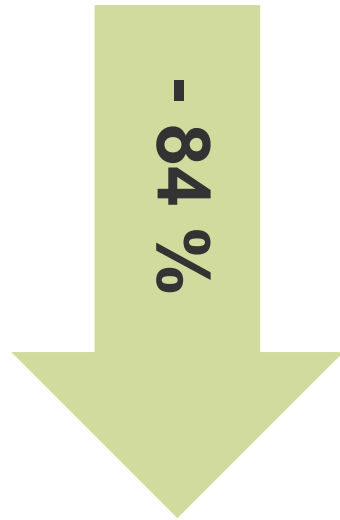
\$1,512,675



Clinical Impact and Financial Metrics

- Implementation of an Active MRSA High Risk Screening Program
- Rapid Reporting of Actionable Information
- Increased Awareness of HAI's

Decreased Infection Rate



Cost Reduction



Laboratory Value Pyramid Level 4

Choosing Wisely Initiative

Mission Statement: Propose guidelines for clinical efficiency and effectiveness in the workup and management of common hospital-based conditions to be endorsed by the Medical Board.

Choosing Wisely Objectives

- Better matching of care to needs
- High value, population specific
- Change Practice to Science — is central to addressing underuse of effective care and overuse of ineffective care

Key Performance Indicators

- Challenge/Opportunity
- Process and Quality
- Patient Benefit
 - Patient safety and satisfaction
 - Outcomes (LOS, mortality, re-admissions)
 - Avoid unnecessary treatment(s)
 - Appropriate level of care
- Cost



Key Questions to Consider

- Can patient outcomes and satisfaction levels be improved?
- Can we demonstrate measurable outcomes?
- What are the savings potential?
- Can clinical practice be changed?



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Teamwork

- Choosing Wisely Committee should include:
 - Senior Hospital Leadership
 - Chief Medical Officer
 - Chief Information Medical Officer
 - Hospitalists
 - Intensivists
 - Cardiologists
 - ED
 - Clinicians
 - Clinical Laboratory
 - Pharmacists
 - Nursing Management/Staff
 - Finance



Choosing Wisely Initiatives

- Clinical Pre-Test Probability and D-dimer
 - Wells Score
 - D-dimer Test
- Chest Pain Accelerated ED Protocol
 - Serial Draws
 - Single Troponins
 - HEART Score
- HF and BNP
 - Pre-discharge BNP
 - NYHA Classification
- HF and Iron deficiency and Anemia
 - RET-He
- Syncope
 - CHES Score



Work in progress...

Choosing Wisely Initiatives

- Head Trauma
 - Canadian Head CT Rule
- ED CT Ordering
 - Reason for ordering
- Procalcitonin (PCT)
 - Meaningful use
- Cervical Trauma
 - Canadian C-spine Rule
- Echocardiogram
 - List reason for ECHO
- C. diff
 - Algorithm



Work in progress...

Choosing Wisely

Choosing Wisely Initiative Clinical Pre-Test Probability Assessment and D-dimer as a First Screen for PE and DVT

Statistics

- 99% of ED cases had no documentation of any CPTP assessment
- 1154 - Total Number of D-dimers ordered between May 2015 and April 2016
 - 919 (85%) D-dimer and no angiography
 - 157 (15%) D-dimer and angiography



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 - **157 (15%) D-dimer and angiography**

Statistics

- ED - 107 (68%) Positive D-dimer ($>500\text{ng/mL}$) had Angiography
- Angiography Results
 - 101 Negative
 - 4 Positive
 - 2 Equivocal

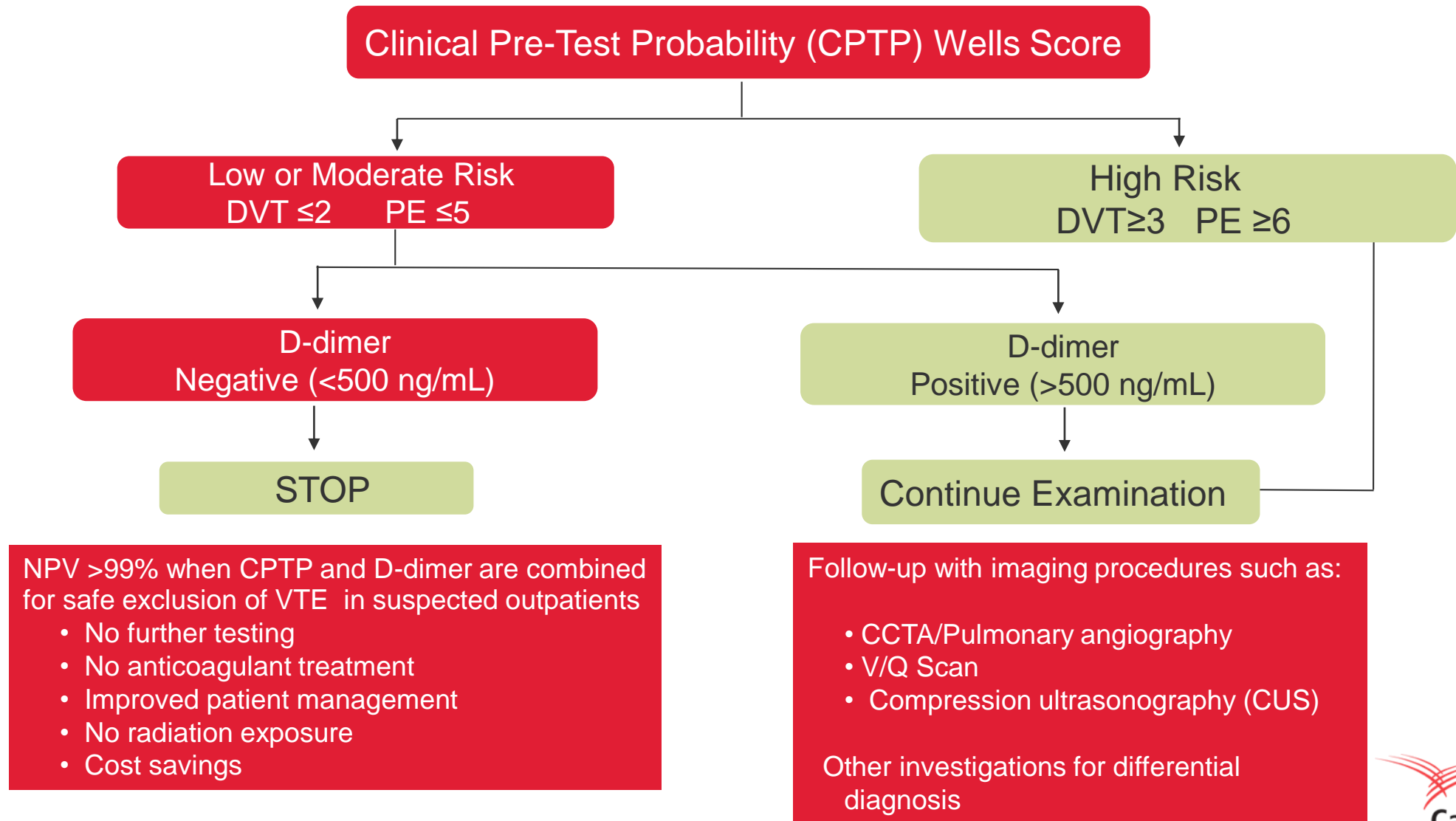
Statistics

- ED - 50 patients (32%) with Negative
- D-dimer (<500 ng/mL) had Angiography
- Angiography Results
 - 50 Negative
 - 32 triple CCTA
 - 2 double
 - 8 single
 - 9 V/Q Scan

Not all D-dimer Tests are Created Equal

- FDA cleared for Exclusion of PE and DVT in low and moderate risk outpatients
- Not all D-dimer tests support an exclusion strategy
- Negative Predictive Value- (NPV reflects the ability of a test to rule out the disease)
- NPV > 99% at a cut-off of 500ng/mL

DVT/PE Risk Assessment Algorithm



Cost Savings

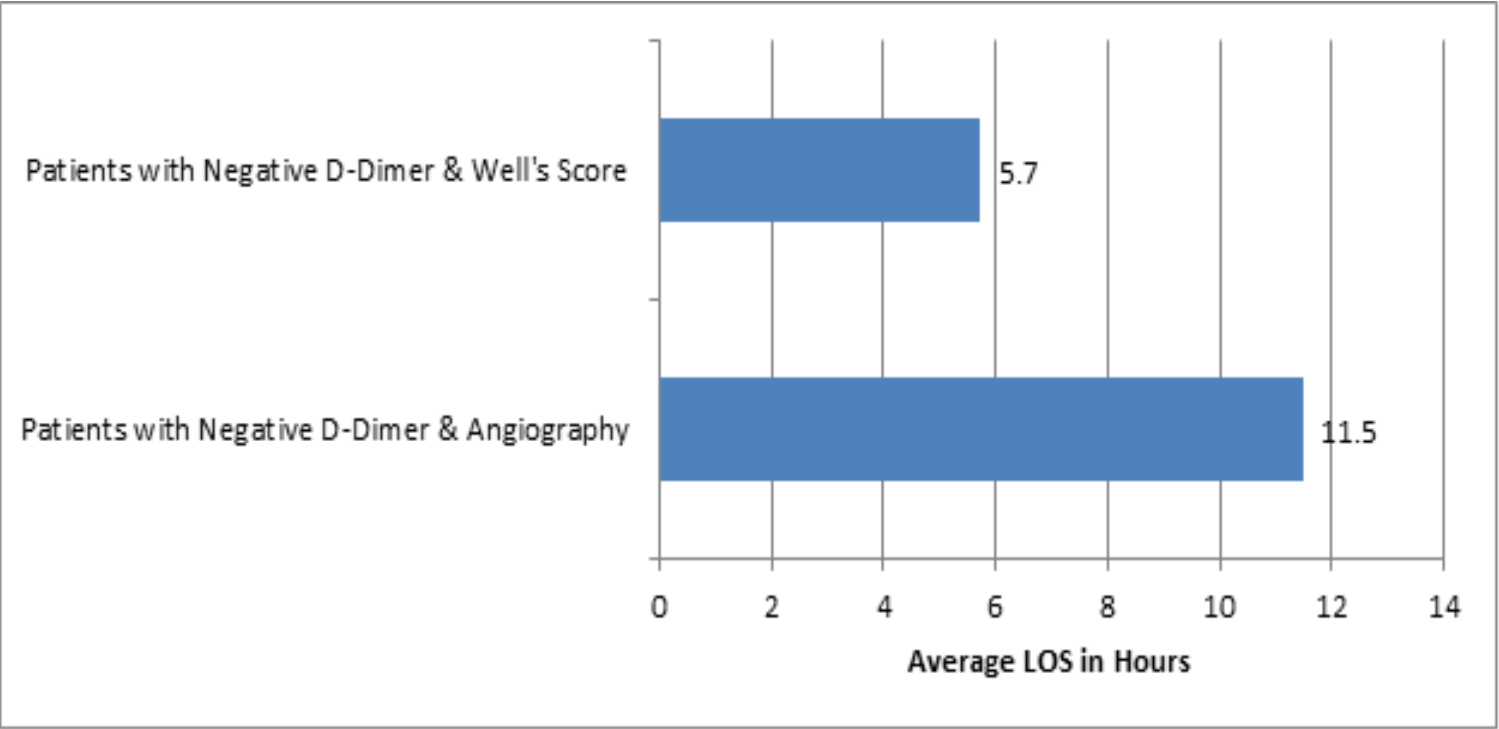
- Cost saving for the hospital
 - Avoid unnecessary imaging procedures: CCTA - \$1,511
- Contrast Media/Meds - \$57.82
 - Contrast Media - \$46.98
 - Meds - \$10.84
- Human Resources
 - RN and CT Tech - \$60.00

Cost savings: \$1682/per patient

\$1,682/pt. x 50 pts. = \$81,441



Effect on ED LOS with Use of Risk Assessment Algorithm for Patients with Suspected DVT/PE



50% decrease in LOS

The Value is Unquestionable...Saves Lived and Dollars

D-dimer.....DVT/PE Exclusion strategy when combined with CPTP

- Cost - \$9.00
- Rapid screening in less than 1 hour
- Promotes accurate (NPV >99%) exclusion of VTE in low to moderate risk outpatients
- Improves patient outcomes
- Enhances patient care management by closing the case and avoiding unnecessary diagnostic/imaging testing
- Frees up beds quicker in ED, thereby eliminating bottlenecks and holds



HF and Iron Deficiency

Iron Deficiency is Common in HF Patients

- 37% of 546 CHF patients were iron deficient
- Iron deficiency (ID) was a strong, independent predictor of unfavorable outcome
- 3-year survival rate was 66.7% in patients without ID vs. 53.6% in patients with ID

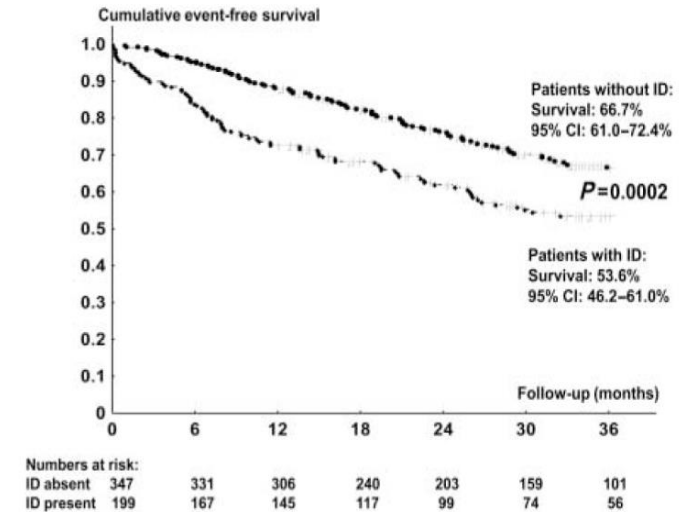
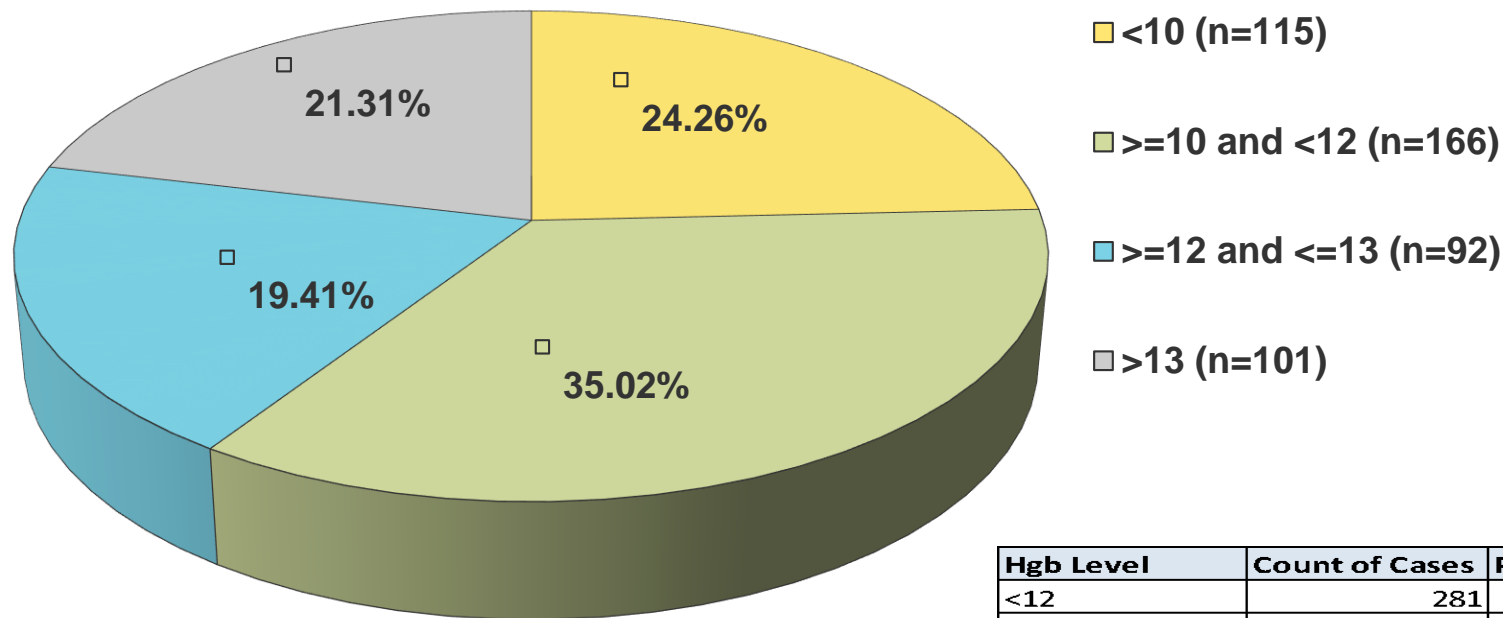


Figure 2 Kaplan–Meier curves reflecting 3-year event-free survival rates in patients with systolic chronic heart failure with vs. without iron deficiency.

Mather HF and Iron Deficiency Statistics

Hemoglobin Levels for CHF Inpatients
Admissions April 1, 2015 - March 31, 2016



N = 474 Patients

Hgb Level	Count of Cases	Percentage
<12	281	59.28%
>= 12	193	40.72%
Total	474	100.00%

Population: Inpatients admitted between April 1, 2015 and March 31, 2016 with a primary discharge diagnosis of CHF.
Source: SCM



IDA and HF Patients

Serum Iron & Ferritin Levels for CHF Inpatients Admissions April 1, 2015 – March 31, 2016

Serum Iron Level	Last Ferritin < 100 ng/mL	Last Ferritin >= 100 ng/mL	No Ferritin Performed
< 40 ug/dL	36	23	3
>= 40 ug/dL	23	12	2
Total	59	35	5

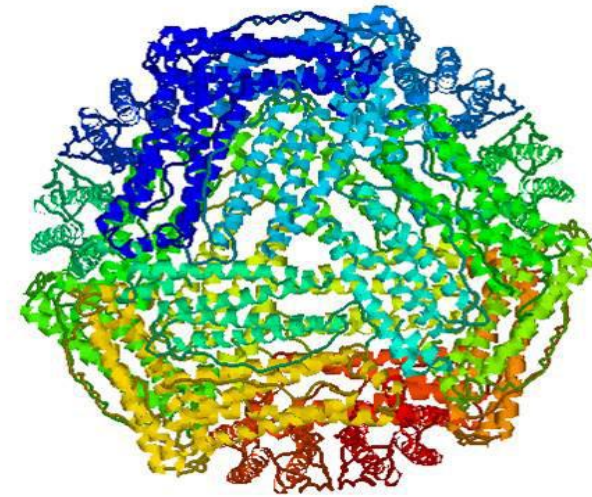
Population: Inpatients admitted between April 1, 2015 and March 31, 2016 with a primary discharge diagnosis of CHF.

Source: SCM

Only 53% (19/36) of patients with Fe <40 and Ferritin <100 left with a prescription for Fe at discharge

Laboratory Anemia Work-up Diagnosis of Iron Deficiency

- Biochemical parameters
 - Serum iron
 - Ferritin
 - Transferrin
 - Transferrin saturation (TSAT)



Laboratory Anemia Work-up Hematology Parameters

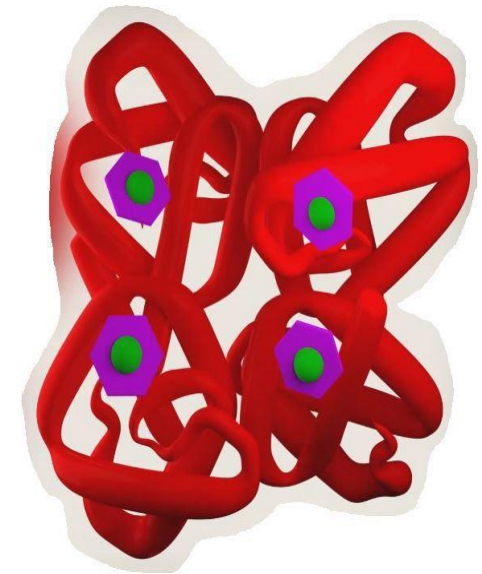
- Based on entire RBC population
 - Hgb
 - HCT
 - MCV
 - RDW
- Based on reticulocyte population
 - Reticulocyte Hemoglobin (RET-He/CHr)

What is Reticulocyte Hemoglobin?

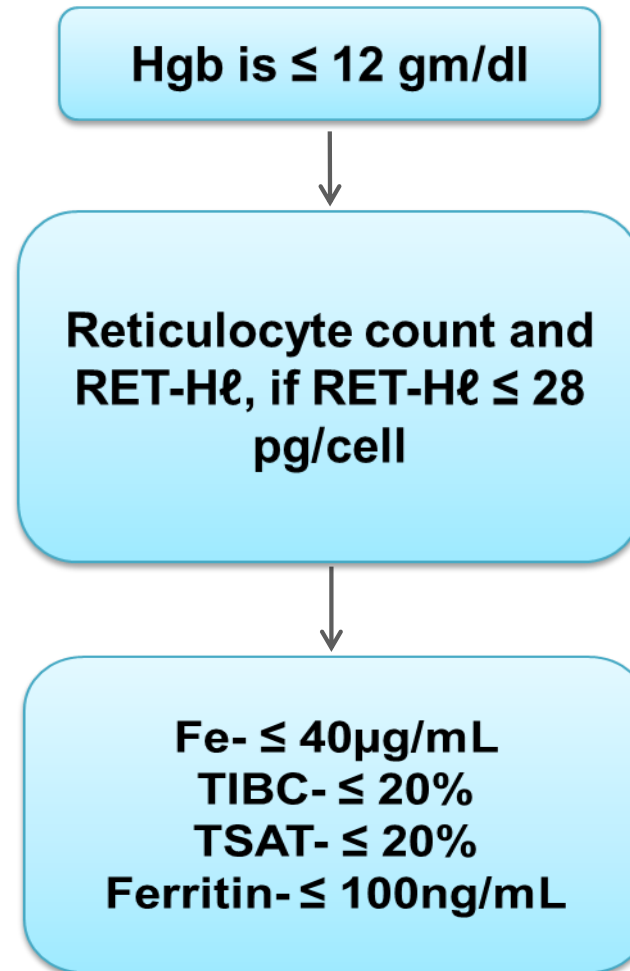
- Measured at cellular level
- Early detection of iron deficiency
- Monitors acute changes in hemoglobin incorporation into the erythron
- More sensitive than indirect chemical measurements

Reference Range for RET-He

- RET-He > 28 pg/cell indicates that sufficient iron is available for incorporation into the red cell
- RET-He < 28 pg/cell indicates that not enough iron is available to produce healthy RBC's
- Reference Range: Adults: 28.2 –36.6 pg/cell



Screening Assessment for ID/IDA in Heart Failure Patients*



The Value is Unquestionable...

- RET-He.....Anemia management test
 - Cost < \$1.00
 - Rapid screening
 - Prevents progression to Iron deficiency anemia
 - Promotes rapid intervention..... reduced blood collection.....improves patient outcomes... enhances patient care management

**Choosing Wisely can successfully shift us from
Volume to High Value Based Patient Outcomes and
Improved Patient Satisfaction!**

Lessons Learned

- ✓ Continuous assessment of the initiatives
- ✓ Keep communication open
- ✓ Information Technology role is essential
- ✓ Change is slower than expected
- ✓ Collaboration among all stakeholders is paramount for success
- ✓ Demonstrate your knowledge
- ✓ Education and be prepared

We Must Break Out of Our Silos for High Value Cost Appropriate Care



There has to be something for everyone!



Executive Summary

- The Laboratory Value Pyramid (LVP) provides an essential and strategic roadmap for making the transition from volume to value.
- Implementation of the LVP demonstrates how the Laboratory can directly contribute to enhanced patient care and outcomes at each level by implementing advanced technology and data to support evidence based practices.
- The LVP provides a communication forum that fosters Laboratorian/clinician collaborations and engagement, that enables initiatives that results in reduce costs and infection rates, effective test utilization for improve quality, patient management and reduce costs.
- The LVP allows the Laboratory to increase their value proposition and visibility, while becoming an integrated member of the healthcare delivery team.

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with a single step**



Questions?



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