The Impact of Medicine on Laboratory Costs with Ideas to Reduce Utilization

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The Purpose of Today’s Presentation

1. Causes of Cost Increases
2. Effects of Cost Increases
3. Solutions and Ideas for Improved Utilization
## Causation Analysis - Root Causes of Cost Increases

### External Causes

**Industries**
- Healthcare
- Medical Technology/Devices

**Diseases**
- Multiple, Chronic
- Emerging

**Medical Errors**

**Economics**
- Competition
- Demand
- Supply

**Government**
- Legislation & Regulations
  - (CMS, FDA, HHS, OSHA, EPA, States)
- Inspection & Accreditation
  - (JCAHO, NCQA, CAP, AABB)

### Internal Causes

**Organizational Cultural Behavior**
- Hospital/Clinic Management
- Laboratory Management
- Physicians
- Patients/Consumers

**Communication Barriers**
- Information Systems
  - Fragmented
  - Uncoordinated
  - Incompatible

**Clinical Integration**
- Missing
  - Fragmented
  - Uncoordinated

**Technological Barriers**
- Testing Equipment
  - Obsolescent
  - Ineffective

## External Causes of Laboratory Cost Increases - Industries

**Healthcare Industry**
- Intense competition for patients incent hospitals to provide equivalent services
- Media “hype” and health care complexity increase demand for more tests
- Continues to add new tests from too many sources - lab, radiology, nuc med, etc.

**Computer Industry**
- Hospital computerization has not, thus far, achieved savings on clinical or administrative costs
- There is no reliable data support claims of cost savings or dramatic quality improvement from electronic medical records
  
  Ref. Himmelstein, D. U., Wright, A., Woolhandler, S., Hospital Computing and the Costs and Quality of Care, 10.1016/j.ajmmed.2009.09.004

**Medical Technology/Device Industry**
- Many new, emerging technologies contribute to overall healthcare expenditure
- Too many devices outside the control of the central laboratory increase workload to correct errors and verify poorly QC’ed results

The Exponential Expansion of Medical Diagnostic Testing

Laboratory medical diagnostic choices for clinical physicians now number over 2000, with many complex tertiary level molecular and genetic tests emerging each year

There is a significant increase in the number of primary care physicians requesting advice and support on the selection and interpretation of laboratory medical diagnostic tests

Primary care and specialist physicians pressured for time, no longer have time to evaluate and interpret test results using evidence-based analysis, perform comparative trending and integrate the information with therapeutic measures

External Causes of Laboratory Cost Increases - Diseases

Multiple Chronic Diseases
- Medical laboratory tests have a significant role in the evaluation of patient safety in patients taking medications for chronic diseases and conditions. Ref. Raebel MA, et al., Pharmacoepidemiology and Drug Safety, 16(1); Feb 8, 2006, 55-64
- Multiple chronic conditions (MCC) are present in 75 million Americans. 65% of total health care spending is on care for the approximately 25% of Americans with multiple chronic conditions.
- Workload increases are due to outpatient treatment of chronic conditions such as diabetes, arthritis, hypertension, and kidney disease. Ref. Thorpe, K., Feb 18, 2010, Health Affairs
- Diabetes mellitus affects ~ 9% of the U.S. adult population. Cowie, CC, et al., Diabetes Care 2009; 32:207-14
- The majority of Americans with multiple chronic conditions are in fact below 65 years of age. As the number of chronic conditions increase, the following also increase: unnecessary hospitalizations, adverse drug events, duplicative tests, and conflicting medical advice.

Emerging Diseases
Genetically determined diseases and new tests for them are rapidly increasing workload and costs
**External Causes of Laboratory Cost Increases - Economics**

**Demand & Supply**

DEMAND measurement is equally as important as performance measurement.

Two different sites with identical equipment will have different capacities to manage the demand for care.

Input factors, i.e., the DEMAND for services, are totally dependent on the demography and disease/conditions incidence & prevalence in the care delivery area.

Each site must have the information gathering and management tools to know how to forecast the unique demand factors in the local area that consume its resources.

Managers must be able to develop trend analyses showing their test mix composition, complexity and volume (Input) to supply the "right" amount of human resources and adapt the analytic footprint to meet the demand.

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**External Causes of Laboratory Cost Increases - Government**

**Legislation & Regulations Increase Fixed Costs**

(CMS, FDA, HHS, OSHA, EPA, States)

**Reimbursement Regulations Increase Administrative, Billing & Clerical Costs**

Over the past 25 years, Congress has reduced Medicare payments to laboratories by 40% in inflation-adjusted dollars.

As part of Health care reform, Congress will employ new methods to audit & deny claims - all claims must be carefully billed correctly – laboratories must collect every dollar that is billed.
External Causes of Laboratory Cost Increases – Inspection & Accreditation

Inspection & Accreditation
(JCAHO, NCQA,CAP,AABB. etc.)

Internal Causes of Laboratory Cost Increases - Organizational

Concerns of Laboratory Top Management

Laboratory automation and staffing costs
Combined Chemistry/Immunassay platforms
Physicians do not know the limitations/ higher cost for POC vs central lab tests
(Ref. Rollins, G, CAP Today, J36(1)an, 2010, p.2)

Absence of substitution processes (see Failure to Remove Older, Ineffective Technologies*)
Evaluation processes for existing tests
Absent test ordering systems that guide physicians to the most appropriate tests for the patient’s disease/condition
Physicians order older, less effective tests even when surpassed by better technology/tests
(Ref. Ford,A., POCT, CAP Today, Jan, 2010, p.60)
**Internal Causes of Laboratory Cost Increases – Patients/Consumers**

Patient demand is influenced by advertising, information from family/friends, internet, and low tolerance of ambiguity by provider (or patient)-“more information is better”


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**The Impact of Medical Errors in Healthcare Organizations**

**Causes Overutilization of Tests**

Pressure to decrease medical errors increases “Defensive” testing

Approximately 1 of 3 hospitalized patients will suffer from some form of medical error

Nosocomial infections represent the 5th highest cause of hospital death

Adverse drug errors may be prevented in more than 40% of cases

Source: Chalfin, D. 32nd Congress of the Society of Critical Care Medicine, 2003

2 serious medication errors will occur per 100 admissions:

Causing a 4.6 day prolonged length of stay
Adding $2.8M to costs in a 700 bed teaching hospital/6 mos

Source: Bates, et.al.,JAMA, 1997

Internal Causes of Laboratory Cost Increases –Medical Error Detection & Prevention

Laboratory costs increase when:

1. A patient given the wrong medication because:
   - Lab tests not ordered in advance to detect high risk conditions in the patient
   - Lab tests performed, but the results were not reviewed by the provider
   - Lab tests performed, but results were incorrect and new tests are ordered

2. A clinical provider reviews but misreads/misinterprets the test results

3. Failure to diagnose a patient with ambiguous symptoms

4. Diagnostic tests repeated are ordered too early to yield useful results to follow-up conditions and therapies

5. Test results showing that a patient needs critical care are not communicated to the responsible caregiver in timely manner


Internal Causes of Laboratory Cost Increases -Physicians

Physician desire for clinical excellence
Preferences of individual physicians
Physicians dictate which POC tests are performed without:
   justifying need for change in Rx, how FTE & TAT will be affected or validation and standardization required
   e.g.: Clinical need for lactate @POC for sepsis cases. Lab should decide best device and method.

Physician overuse
Physician errors in data interpretation - “Outcomes depend on too many variables”
Physician overestimation of the benefits of technology and/or underestimation of its risks
Defensive Medicine

Physician concern about liability
Ref: Chartbook in Health, United States, 2009: Federal Government's 33rd Annual Report to the Congress, February 18, 2010, Center for Disease Control & Prevention, National Center for Health Statistics,p.659, col.1, ¶1
**The Real Truth...Clinical Doctors Have Problems With Tests**

“Because.....
There are so many new laboratory tests......
Lab tests, new and existing, are very complicated
Little or no teaching about laboratory tests is done in medical school,

We now have a whole cohort of clinical doctors who...
Don’t pick the right tests,
or
Don’t take the right action with the test results”

LaPosata, M., in Ford, A., Endowed Chairs, CAP Today, March 2010, p.70

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**Internal Causes of Laboratory Cost Increases – Communication Barriers**

Communication Barriers include:

- **Information System Dysfunction**
  - Fragmented
  - Uncoordinated
  - Incompatible

- **Clinical Integration Dysfunction**
  - Missing
  - Fragmented
  - Uncoordinated
Internal Causes of Laboratory Cost Increases

Technological Barriers
Testing Equipment
   Obsolescent
   Ineffective

Solutions and Ideas to Contain Utilization

Two strategies are need to contain utilization:

   Reactive Actions
   Proactive Actions
Cost Control Objectives – Reactive
“Run The Business Smarter”

- Understand the value of actual costing methods vs. activity-based cost estimates
- Learn the difference between:
  1. billable vs. non-billable tests & activities
  2. reimbursable vs. non-reimbursable tests & activities
- Understand the impact of “hidden” costs, especially costs caused by regulations, laws and compliance
- Apply the “80/20 Rule” to:
  1. Optimize laboratory production operations
  2. Recover revenue to cover the cost of product production
- Learn when to stop producing and when to “make or buy” tests and procedures
- Minimize reimbursement losses and retain profitability

Solutions and Ideas to Contain Utilization - Reactive

Make Critical Choices of Tests & Analyzers

- **Measure and Rank Demand** from all clinical users services by test volume/type
- **Identify Low Value/High Cost tests** using Activity Based Costing (ABC)
- **Identify High Value Tests & Services** using clinical user input; find their cost per test
- **Modify the lab’s technology footprint** to use more efficient, Low Cost analyzers
- **Identify & Remove Low Value, Obsolete, Duplicative & Wasteful Tests**
Solutions and Ideas to Contain Utilization-Proactive

Proactive

Create Interdisciplinary Teams to develop Clinical Integration links between Laboratory, Nursing & Pharmacy that identify necessary vs. wasteful tests

Create Patterns of Tests that create a “Culture of Safety” to advise clinical providers predict / prevent medical adverse events, using user-defined necessary tests

Develop a better “human to human “internal communication system than “computerized clinical reminders”

American Hospitals Do Not Have Adequate Systems in Place to Prevent Medical Errors

Ref Jha, AK, et.al., Use of Electronic Health Records in U.S. Hospitals, NEJM 2009; 360: 1628-38

➢ Don’t depend on your hospital’s computer system to prevent adverse medical events
➢ Computerized hospitals do not catch errors before they reach patients... alert humans do
➢ Physicians traditionally have been individual entrepreneurs, not employees, and are subject only to weak peer enforcement through medical staff laws
➢ Hospitals are under great scrutiny to improve outcomes and may lose even more reimbursement if patient safety lapses cause too may errors
Design Patterns of Tests that Promote a "Culture of Safety"

Build a Laboratory-designed “Culture of Safety” to develop Clinical Integration links between the key hospital services that can detect and prevent adverse events ....
**Create a Better High Alert System for Critical Test Values**

**Active Clinical Decision Support by Lab Medicine Professionals Reduces Medical Errors**, because:

- Computerized clinical reminders don’t work to prevent medication related adverse events (Matheny, M JAMA 15(4):424-29, 2008)

- Lapses in laboratory monitoring of patients taking selected chronic medications is common (Hurley, J. J Gen Int Med 20(4):331-33, 2005)

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**Grim Facts About the Absence of Computerized Interoperability in U.S. Hospitals**

- More than 90% of U.S. hospitals do not even meet basic functionality requirements for Electronic Health Record (EHR) systems

- Only 11.5% of U.S. hospitals have a comprehensive Electronic Health Record (EHR) system in all clinical units

- Only 7.6% have a basic EHR in at least one clinical unit

- Only 17% have computerized physician order entry systems for medications

- Only 17% of U.S. hospitals use either minimally functional or comprehensive e-records system

Laboratory Computer Systems are Not Interoperable with Other Critical Hospital Systems

- 75% of acute care hospitals in the U.S. have both laboratory and radiology computer systems, but they are not linked to other critical centers where adverse medical events occur most frequently, such as Critical care units (ER,ICUs)

Grim Facts About Hospital Computer Systems

- Most hospital Electronic Health Records (HER) have not reduced costs, they increase costs
- Most hospital Electronic Health Records (HER) have not increased quality

Absence of Computer System Interoperability in Hospitals Demands New Efforts to Reduce Medical Errors

Patient Safety Lapses are System Failures
Who is Responsible for Test Appropriateness Guidelines for Patient Safety?

The institution’s medical staff must work to set joint guidelines for appropriate use of laboratory tests.

How Do Laboratories Contribute to Patient Safety?
Break Down the “Silos”

➢ Clinical departments in many hospitals traditionally operate in an isolated “Silo” culture rather than as a “Team”

➢ Silos behave as small independent “businesses” within the hospital’s organizational structure with their own unique, isolated patterns of practice and behavior

“Silo” Communications

➢ “Silo” cultures communicate vertically...
   Up and down their own command structure

➢ “Silo” communication is rarely laterally directed or integrated with other parts of the organization
   until
   Someone needs the expert advice (consult) from within the “silo”
How is the “Silo” Culture Altered?

- **Building Trust** within the “Silo’s “turf”
- **Adding Value** to the “Silo” work effort
- **Reducing stress** for the “Silo” workers
- Convincing the “Silo’s leaders that the effort to reduce utilization is “OUR” effort

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**Trust - Building**

- Adding Value Builds Trust
- Trusting Relationships Improve Organizations
- Behavior Changes Happen when Trust is Real
- Leadership is about Building Trust
- Developing a better “human to human “internal communication system builds Trust
Examples of Barriers to Trust-Building

Non-Team Behavior

Hospital staff who:
- perform Point of Care Tests and refuse to maintain competency, equipment & perform quality control
- order “defensive medicine” tests only to protect against a lawsuit

Market the Laboratory’s Value to the Hospital

- Break down barriers that prevent the Team approach to preventing medical errors
- Silos
- Turf
- Indifference
- Hostility
- Arrogance
Lead your Organization in Institutional Improvement Initiatives

- POCT Control
- Interdisciplinary Teams

Laboratory Professionals Need to Change Their Image to Make a Difference in the Patient Safety Arena

- Traditionally, the image of the hospital laboratory has been viewed as only technical and non-patient care

- Laboratory leaders must project a new, patient-focused image to win the trust of the hospital’s “hands on” patient care staff
Keep the Patient at the Center of Your Thinking

Laboratory professionals must change their image to be more proactive in promoting outcomes and the patient care process to win the confidence of clinical providers.

Image Change Promotes Trust and Confidence

- Behavioral change is needed to produce changes in the test utilization patterns of clinical staff.

- Utilization improvements will happen if clinical staff perceive that laboratory leaders:
  - Have the same patient care values and goals as they do.
  - Are not punitive in their approach to improving quality requirements.
  - Are not creating more work for the clinical staff.
Learn How to Create “Win-Win” Interactions with the Clinical Staff

1. Place yourself in the midst of complex situations that interface across several different areas of the hospital

2. Promote your message that patient safety is “OUR” job, and provide evidence based guidance to prove that the laboratory is a key provider of patient safety

Think The “Win-Win” Philosophy

“Win-Win”

1. is a leadership role taken on by brave, courageous people with strong values and principles

2. is an interpersonal exercise involving self-awareness, imagination, conscience and interdependence in our relationships with others

3. Is based on the paradigm that there is plenty for everybody...one person’s success is not achieved at the expense or exclusion of the success of others

There is Opportunity in Crisis

*Timing* is Everything

*Carpe Diem* — Seize the Day (Moment)

*Introducing Laboratory Interdisciplinary Teams to Reduce Utilization and Medical Errors*
The Purpose of Interdisciplinary Teams

1. Prevent clinical medical errors that have not yet occurred, using laboratory experts and systems to assist clinical providers in disease management

Excessive preventable error rates in hospitals:

- Threaten patient safety
- Continue to be a concern of the JCAHO
- Threaten the accreditation status of the health care organization

2. Avoid test overutilization ("Defensive Medicine") by clinical physicians


List of Laboratory-Related Serious Reportable Events to JCAHO

Death or serious disability associated with:

Events Involving Care

- Medication Error
  - Wrong, drug, dose, rate, time, preparation, route of administration
  - **Hemolytic Reaction** due to ABO incompatible blood or blood product
  - **Hypoglycemia** occurring while the patient is in a health care facility
  - **Hypertension** in a neonate

Events Involving a Product or Device

- Use of contaminated drugs, biologics or devices provided by the health care facility

Medical Errors in the Diagnostic Cycle and the Quality of Care

According to Centers for Disease Control data (2003),
The risk of laboratory test-related error for a hospitalized patient in a private hospital is:

37.5 errors / 100,000 patients

The risk of laboratory test-related error for a patient in a primary care practice is:

34 errors / 100,000 patients

Diagnostic Cycle Errors

The most significant errors in the Diagnostic Cycle are:

1. Preanalytical
   - Specimen collection
   - Specimen transport
2. Interpretation of test results

Source: Mariani, S.M., Laboratory Services: Access, Quality and Safety, Presentation at AACC Annual Meeting, 2003, Philadelphia, PA
Clinical Provider Causes of Diagnostic Errors

Clinical health care providers do not have useful support systems to help them not make a mistake based on a test result.

Clinical providers preclude the use of evidence-based approaches to improve clinical decision-making.

Critical diagnostic, disease detection and monitoring information is overlooked by providers when:
- Computer time is limited – “seven clicks to find it is too much”
- Test interpretation is too detailed
- Test result information is not available when needed urgently

Malone, B. Interpretive Comments on Test Results, Clinical Laboratory News, Dec 2009, pp.6-8

Physician Causes of OVER and MISutilization

Physician lack of knowledge about specialized tests
Physician errors in data interpretation
Physician overestimation of the benefits of technology and/or underestimation of its risks

Defensive Medicine
Physician concern about liability

Too much information – Too many choices


Interdisciplinary teams (IDT) need to be developed to improve the quality and safety of health care

Subject matter experts on supportive IDT can make a significant difference in health care organizations to:
   Improve disease management outcomes
   Reduce medical errors

Active Clinical Decision Support by Lab Medicine Professionals
Reduces Medical Errors

Consultation by Laboratory Medicine Professionals when directly involved in clinical management:

Prevents errors of commission by recognizing/reporting:
  - Complications of medications, especially anticoagulants
  - Monitoring anti-infective therapy levels and reporting non-therapeutic levels
  - Toxicity of medication dosage
  - Recommending optimum blood, blood component and infusion therapy

Prevents errors of omission by recognizing/reporting:
  - Significant trends/variation in monitoring tests on seriously ill inpatients
  - "High Alert" tests signaling the escalation of a disease or condition
  - Test patterns suggesting hidden diseases and complications of therapy
  - Pharmacogenomic markers for drug response or drug complication
The Need for a Laboratory Interdisciplinary Team to Support Clinical Providers

- To improve patient safety and timeliness of care, carefully interpreted, evidenced-based decision-making data should be provided by a Core Team of certified Laboratory subject matter experts, directly acting at the clinical interface, and composed of:

  - A physician leader/Medical Director
  - An clinical and/or laboratory informatics expert
  - A Clinical Nurse (RN, NP, NC)
  - Key specialists in
    - Chemistry
    - Microbiology
    - Coagulation
    - Transfusion Medicine
    - Hematology
    - Immunology

The New Lab – Clinical Interface Team

New job titles may need to be created in the Laboratory and the health care organization to link the Lab IDT to the Clinical Team, such as:

  - A Lab Medicine Clinical Manager
  - A Laboratory Nurse Manager
  - A Computerized Medical Record Manager

These new positions should be designed to:

- bridge the “information communication gap” between clinical care sites and the lab
- speed up the interpretation and integration of critical information to care givers
Daily Interdisciplinary Team Interactions are Needed to Prevent Medical Errors in Health Care Organizations

Laboratory Medicine Professionals Need to be Part of a Patient Safety Interdisciplinary Team In Health Care Organizations
**High-Risk Adverse Medical Events Needing Lab Medicine Professional Support**

*The Lab IDT is a vital part of the disease management process for:*

- Infection
- Sepsis
- Hemorrhage
- Cardiac Medication Effects
- Hypo/Hyperglycemia
- Reversible Nephropathy
- Hypertonic Na Infusion
- Potassium over/under treatment
- Venous thrombosis
- Kernicterus
- Opiate/Narcotic overdose
- Antiinfective Timing/Effectiveness
- Coagulopathy Evaluation
- Coumadin/Heparin Monitoring
- Blood Component Therapy
- Rapid ACS Tests
- Insulin Monitoring
- LFT, RFT, Heme, Coag tests
- Microalbuminuria
- Osmolarity, Na+
- KCl/K3PO4 infusion
- D-Dimer assay
- Microbilirubin
- Toxic drug levels

**Top Management Executives Must Articulate a Vision that Puts the Patient First**

*Hospital and Laboratory Top management* must be willing to develop and support:

- A cross-organizational interactive team organizational structure
- Clinical privileges for certified lab professionals providing services/expertise
- Training to increase interactive communication between clinical and laboratory experts
- Informatics support to design faster linkages between clinical care sites and lab IDT members
Precedents for Interdisciplinary Teams

- **Pharmacy**
  - Pharmacist participation in daily medical care rounds, reducing medication errors by 66% in an ICU (Leape, et al., JAMA, 1999)
  - Pharmacists dispense meds in a nursing home under the supervision of the attending MD (State of CT, 2003)
  - Pharmacists interpret basic lab test results in commercial pharmacies

- **Nursing**
  - With approved clinical privileges, Nurse clinicians and practitioners write orders for procedures, meds, and approved interventions

Laboratory Expert's Role in Disease Management

Disease and patient care process management means tapping the underutilized potential of Laboratory Medicine’s proven expertise in diagnostics to directly provide:

- **Interpretive reporting for busy clinicians**
- **Pattern recognition & patient data integration capability**
- **Connectivity and messaging experience**
- **Measurement and analytic capability**
- **Trending and data mining capability**
Actions Needed by Lab Expert Teams to Prevent Errors

- **Interpretive reporting** to clinicians by clinically-privileged laboratory professionals; integration of evidence-based data for clinicians

- **Integrated Laboratory Patient Profiles** merging test results from all lab sections to allow easy interpretation and correlation for each patient

- **Enterprise Data Integration** ("no more stovepipe" communication lines)

- **Computer-generated alerts** to clinical physicians about:
  - 1. proper timing of repeat tests
  - 2. unexpected critical results in patients other than acute/critical care


Actions needed by Lab Top Management to Initiate Lab Expert Teams (Management)

- **Actively solicit the support of the organization’s top management**

- **Participate in organization wide committees and focused teams** for quality improvement; delegate lab department and section leaders to serve on hospitals quality improvement committees

- **Gain the support of clinical department chiefs to use interdisciplinary lab expert teams** on daily rounds and regular consultation to prevent medical errors before they happen

- **Coordinate the agreement of mutually acceptable standards for reducing errors** that meet the needs of clinical department/section chiefs with laboratory department/section chiefs
Actions needed by Lab Top Management to Initiate Lab Expert Teams
(Cultural)

Identify a senior, “natural leader” in the lab with clinical interests & interpersonal skills

Appoint a Lab Expert Team Chief to select team members who will “buy in” to the concept of Lab Expert Teams working on a one-to-one daily basis with clinicians in actual clinical sites (not the lab)

Provide training for the laboratory’s department and section chiefs in team-building with clinical staff

Work with behavior modification training specialists to teach clinicians the most effective ways prevent medical errors

Train the entire laboratory supervisory staff in “customer satisfaction” techniques to understand “what the clinicians want, why & when they want it”

Suggested Lab Expert Team Organization Chart
High Risk Areas Needing Lab Expert Team Action

- Sites needing rapid care management decisions to assist pressured clinical care givers
- Sites with
  1. varied interactions with diagnostic and treatment technologies
  2. high volume and/or unpredictable patient flow
  3. Diagnostic or therapeutic interventions having a narrow margin of safety, including high-risk drugs
  4. Communication barriers with patients and clinical staff

Basic Principles Underlying Lab Expert Team Interaction with Clinical Teams

- Team members depend on and interact with each other as an organizational asset
- Shared excellence in service to patients
- Integration of critical information about the patient to prevent adverse events and optimize positive treatment outcomes
Lab Expert Teams Add Value to Clinical Care by.....

- Reducing uncertainty for clinical care decision-makers
- Managing risk when caregivers have limited time
- Promoting interconnectivity between the laboratory, clinical decision-makers and therapeutic services
- Enabling disease management at the time of therapy
- Providing evidence-based support data about the patient’s disease, condition or therapeutic progress
- Providing trending and metaanalysis of the patient’s current and past lab data
- Recommending preventive medicine test protocols for at risk patients

Basic Duties of Lab Expert Teams...the 4 P’s

- Prevention
- Prediction
- Problem-Solving
- Patient Care Management Support
Clinical Areas Where Lab Expert Teams are Most Needed

- Medication Management
- Post-op/Post-Procedure Complications
  - Infection
  - Renal/Hepatic Failure
- Coagulation Management
- Transfusion/Infusion Management

Most Common Adverse Drug Events

- **Inpatient**
  - Analgesics
  - Morphine
  - Sedatives
  - Antibiotics
  - Electrolyte Solutions
  - Antineoplastics
  - Antiasthmatics
  - Antiallergics
  - Antihypertensives
  - Cardiac Meds
  - Anticoagulants
  » Antihypertensives
  » Antidepressants

- **Outpatient**
  - Meperidine, Cocaine,
  - Ampicillin
  - K3PO4, Polyethylene Glycol with electrolytes
  - Doxorubicin
  - Epinephrine
  - Esmolol (β-blocker)
  - Digoxin
  - Heparin, Coumadin
### High-Risk Clinical Areas Where Lab Expert Teams are Most Needed

#### Medication Management

**Life-Threatening Adverse Events**

- **Anticoagulation**
  - Mgt: Coumadin
  - .................................................. Heparin
- **Cardiac Meds**
  - .................................................. K+
- **Insulin**
  - .................................................. Hypo/Hyperglycemia
- **Opiates/Narcotics**
  - ................................................. Drug levels

**Non Life-Threatening Adverse Events**

- Renal Function, Hepatic Function, Hematology, Coagulation Test Monitoring
- A1C Hemoglobin

#### Prevention & Predictive Tests

### High-Risk Clinical Areas Where Lab Expert Teams are Most Needed

**Infection Management**

**Life-Threatening Adverse Events**

1. **Incorrect Timing of Antiinfectives**
   - Sepsis
   - Surgical Site Infections
     - Gram-negative
     - E. Coli
     - Non-specific
     - Pneumococcus
     - Gram-positive
     - Staphalococcus
     - Streptococcus
2. **Missed Diagnosis**
   - Viral
     - SARS, Encephalitis, Meningitis
     - Bioterror Organisms

**Non Life-Threatening Patient Care Mgt Adverse Events**

1. **STD Diagnosis**
   - Chlamydia
   - GC
   - Syphilis
     - a. Abs WBC<200/ul3
     - b. Serum Albumin
       - (sepsis predictor)
2. **Neutropenia in Oncology Patients**
   - a. Bioterror Organisms
   - b. Tuberculosis

**Non Life-Threatening**

- Renal Function, Hepatic Function, Hematology, Coagulation Test Monitoring
High-Risk Clinical Areas Where Lab Expert Teams are Most Needed
Coagulation & Transfusion/Infusion Management
Prevention, Predictive & Patient Mgt Tests

Life-Threatening Adverse Events
Coagulation
1. Disseminated Intravascular Coagulation
2. D-Dimer in post-surgical patients to predict venous thrombosis

Risk Clinical Areas Where Lab Expert Teams are Most Needed

Coagulation & Transfusion/Infusion Management
Prevention, Predictive & Patient Mgt Tests

Non Life-Threatening Adverse Events
Coagulation
1. Thrombocytosis

Transfusion/Infusion
1. Volume Depletion
2. ARDS/Transfusion Related Acute Lung Insufficiency
3. KCl/K2PO4 overdose
4. >0.9 NaCl overdose

The Last Word....The “Bottom Line”

• Many adverse medical events are recognized only by medical laboratory workers

• Continuous, real-time scanning of laboratory (and pharmacy) patient data records facilitates active interventions to prevent adverse medical events

**The Last Word….The “Bottom Line”**

- Clinical errors result from systemic, not individual, problems
- Humans cannot be relied on consistently to render decisions that comply with evidence-based recommendations.
- Simple algorithms, alerts or other information and protocols that incorporate more complex rules reduce the clinical decision error rate.
- **Source: AHRQ Research News, 262:2 (June) 2002**
- Patient data combined with clinician-defined rules can generate an automated alert designed to inform nurses about potentially serious clinical situations
  - **Source: AHRQ Research News, 233:16 (Jan) 2000**

**Adding Value and Image to Reduce Laboratory Utilization and Increase Patient Safety**
A Definition of Value

• The dictionary defines it as.....

• “Worth in usefulness or importance to the possessor...of the information”

The Need to Increase the Value of Laboratory Services

• Laboratory professionals need to improve the value of their products/services to:
  1. Gain confidence and increase appropriateness of lab use by clinicians
  2. Preserve their market share in the community
  3. Capture new managed care business
  4. Convince administrators to increase budgets
The Need to Increase the Image of the Laboratory Professional Staff

• *In the eyes of the medical, nursing and management staff as:*

1. A key player in *preventive medicine/disease management*
2. An advocate for *patient safety*
3. An *advisor/expert consultant* to clinicians
4. A critical player in emergency *preparedness and epidemiology*

Important Facts

• *Doctors have little time for:*
  1. Preventive care
  2. Explaining the effects of medications
  3. Recommending followup tests to monitor therapy

• *Younger doctors know less about lab tests than older doctors*

• *Medical schools do not teach pathophysiology and laboratory medicine decision-making*
More Facts

• *Doctors don’t like numbers*, long, complex lab reports and changes in tests that they’re used to………

• *Many doctors never read lab reports*………..

• *There is wide “gap” dividing lab professionals* from interacting with clinical physicians………………

• *57% of medical errors in elderly patients are caused by medications* resulting in death/morbidity …………

• *The general public does not understand the value of a lab’s products and services*

Where is Value Added?

*By promoting *Interconnectivity* and *Partnerships* with:

- **Internal Partners**
  - Clinical physicians, nurses, pharmacists and other hospital staff
**What Should Labs do to Add Value?**

1. **Promote a “Culture of Safety”**
   - Educate providers and patients about medical errors that can be detected/prevented using lab tests

2. **Promote preventive medicine & disease management**
   - Offer screening tests for high risk populations in public venues

3. **Promote public safety**
   - Educate the lab staff, management and community officials on the lab’s role as a “first responder” for emerging infections and bio-chemical terrorism; become a “sentinal”lab

4. **Provide expert consultative services to clinical providers and providers in nursing homes and facilities served by the lab**

**How can Labs Combat the “Commodity” Image?**

1. **Venture outside the “comfort zone”** of the lab and interact will all levels of users of information provided by the lab

2. **Become proactive and visible** in the organization

3. **Stress the lab’s staff expertise and experience** to direct patient care providers

4. **Establish credibility and marketability for tests** that can detect or prevent medical errors

5. **Become the “vanguard of patient safety” for patients** within the health care organization

6. **Develop and provide outcome data** for clinical providers
What labs can do better to improve image.....

• **Advise physicians about test results.....**

  ......pharmacists do it, doctors don't have time to do it...why not lab professionals who know the most about tests result interpretation?

• **Don’t count on computerized reminders to alert physicians....**

• **Call in/check with physicians to follow-up on “High Alert” Medications, Drug-Test Interactions & “High Risk” Events....**

What labs can do better to improve image.....

Perform **Reflex Testing** in addition to short, specific enhanced test pattern interpretations

Reports have already demonstrated that Reflex Testing can reduce costs and lead to better patient outcomes

Ref: Malone.B. Interpretive Comments on Tests Results, Clinical Laboratory News, December 2009, p.6
Reflex Testing

*Reflex Testing* allows the laboratory to provide clinical physicians with a true *interpretation* of multiple test values, not isolated individual tests.

*Analysis of Reflex testing algorithms (test patterns)* allow the laboratory to decide why a test value is abnormally high or low.

Ref: Malone B. Interpretive Comments on Tests Results, Clinical Laboratory News, December 2009, p.6

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Medical Policy Approval Required

Laboratory management needs to proactively seek the approval of the hospital’s Medical Policy Board to permit Reflex Testing when a patient’s abnormality requires that the laboratory perform more tests to provide a complete picture.
Some “High Alert” Medications, Drug-Test Interactions & “High Risk” Events Where Reflex Testing by the Lab is Key…

1. **Coumadin & Heparin** - thromboprophylaxis
2. **Insulin, KCl, Antibiotics**, et. al.
3. **Sepsis** in ICUs, **Nosocomial Infections, Bilirubin** (Newborn)
4. **Acute coronary syndrome** (CRP, BNP, CK-MD, Treponins)
5. **Microalbuminuria** in poorly stabilized diabetics/hypertensives
6. **Drug-induced hepato- and renal toxicity**

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**Critical Lab Practices Affecting Patient Outcome**

- Anticoagulation Monitoring
  - **Coumadin**
  - **Heparin**
  - **D-Dimer**
- **Digoxin Monitoring**
- **Any Test Monitoring a Medical Dosage**
  - **Insulin**
  - **Glucose**
  - **Hemoglobin A1C**
  - **Lipid Profiles**
  - **Potassium**
  - **Bilirubin (Kernicterus)**
Tactics That Reduce Adverse Medical Events Related to Medications

- Partnerships with Pharmacists
- Detect Drug-Test Interactions
- Continuous, Real-Time Scanning of:
  1. Laboratory Records
  2. Pharmacy Records
- Monitoring Drug Doses
- Monitoring Renal Function Tests
- Monitoring Liver Function Tests

To Add Value and Reduce Utilization, Labs Must...

Champion New External Strategies......and Internal Actions

1. Be Proactive
2. Be Visible
3. Stress the lab’s expertise / experience
4. Seek out new partners
5. Establish credibility with clinical groups
6. Perform public service
7. Perform public education
8. Promote Interconnectivity
1. Institute Risk Management
2. Reduce Uncertainty
3. Improve Care Management
4. Promote Preventive Medicine
5. Provide Outcome Measures
6. Promote Interconnectivity
The Future Goal to Reduce Utilization

Change physician behavior by building trust:

to accept the decision support systems provided by interdisciplinary expert teams

Change is very important within organizations, and organizational barriers to change must be understood

Approaches to behavioral change should reflect the specific issue, and be based on a model of physician decision-making.

Traditional continuing medical education should be changed to include more interactive interventions.

Source: AHRQ Research News, 255 (Nov) 2001