

# Improving Lab Value: Using the EMR for Better Lab Utilization and Results

Karen Kaul, M.D., Ph.D.

Chair, Department of Pathology and  
Laboratory Medicine  
NorthShore University HealthSystem

Clinical Professor of Pathology  
University of Chicago Pritzker School of  
Medicine

# Health care trends

- Lab testing: \$60 billion (4% of health care cost)
- Increases of 15-20% predicted
- Value = Quality / Cost equation
- Clinicians can understand 40-50 lab tests

# Opportunities for Lab utilization improvement

- Tests over-ordered
- Tests under-ordered
- Complex, expensive sendouts
- Tiered testing, algorithms

# Thanks to NorthShore EPIC and HIT team

- Dr. Ari Robiscek, VP, Clin and Qual Informatics
- Meredith Sefa, Epic Optimization Team
- Senior applications analysts
  - Annalyn Chiu and Darryck Maurer
- Dr. Jonathon Silverstein VP, Clin Res Informatics
- Dr. Arnold (Ned) Wagner, CMIO
- Dr. Ken Anderson, CQO
- John Cavataio, Manager LIS
- Charnell Johnson, Director LIS



# Pilot Lab Projects at NorthShore

- 4 hospital system with large medical group and outreach
- Fully EPIC functional (HIMSS level 7)
- Labs on Soft and Tamtron
- Projects chosen:
  - Overordered tests
  - Genetic tests
  - Guidelines

# Commonly ordered tests

Procedure Description	Procedure Code	Count July-Oct 11	Avg per 1000 pd, July-Oct 11
NURSING GLUCOSE DOCUMENTATION	LAB57	98093	1,136
BASIC METABOLIC PANEL, BL	LAB5005	52875	613
CBC W DIFFERENTIAL	LAB58	40603	470
CBC W/O DIFFERENTIAL	LAB28	33893	393
PT (PROTHROMBIN TIME), BL	LAB616	22245	258
MAGNESIUM, BL	LAB581	20813	241
ADMISSION MRSA SCREEN	LAB3988	17970	208
PHOSPHORUS, BL	LAB511	12832	149
PTT, BL	LAB612	12679	147
CARDIAC MARKERS, BL	LAB5299	11930	138
EXTRA LAVENDER TUBE 1	LAB7532	9889	115
THERAPEUTIC HEP RANGE	LAB6121	9223	107
URINALYSIS - MICROSCOPIC ONLY	LAB6660	8327	96
URINALYSIS - MICROSCOPIC ONLY	LAB6660	8327	96
HEPATIC GROUP, BL	LAB5004	8314	96
EXTRA BLUE TUBE 1	LAB7538	8233	95
COMP METABOLIC PANEL, BL	LAB5006	7383	86
URINALYSIS - MACROSCOPIC	LAB6650	6654	77
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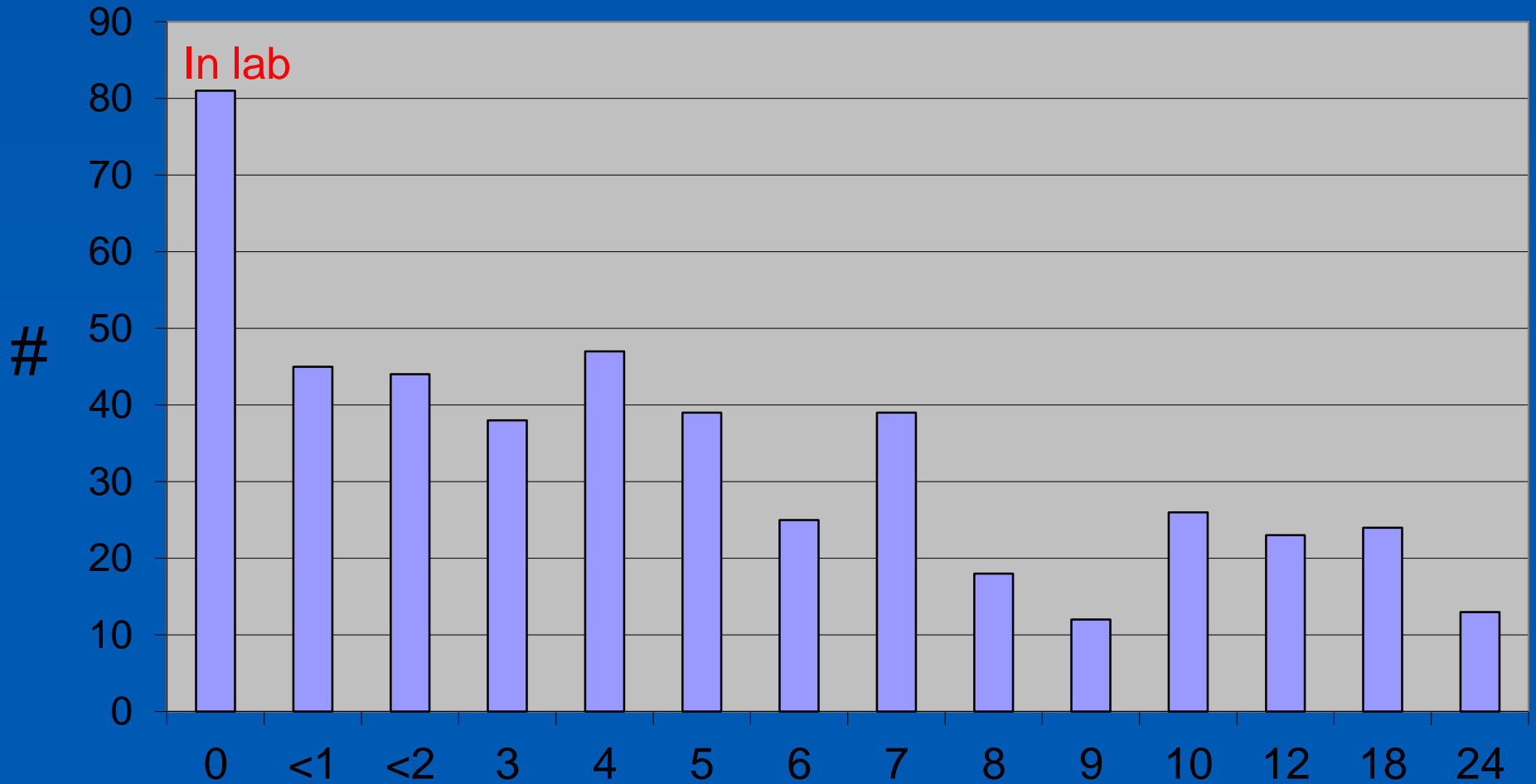
# Tests ordered > once daily (10 mo)

BASIC METABOLIC PANEL, BL	5665
PTT, BL	3604
CBC W DIFFERENTIAL	3548
CARDIAC MARKERS, BL	3398
CBC W/O DIFFERENTIAL	3120
THERAPEUTIC HEP RANGE	2810
MAGNESIUM, BL	1995
PT (PROTHROMBIN TIME), BL	1712
CK-MB, BL	1705
CULTURE BLOOD VENIPUNCTURE	1464
ABG/O2 SAT - LABORATORY	1253
ABG/O2 SAT - RESPIRATORY EVANSTON	1019
PHOSPHORUS, BL	870
DIFFERENTIAL, BL	688
EXTRA LAVENDER TUBE 1	496
I-STAT PANEL - OR ONLY	387
GRAM STAIN	346

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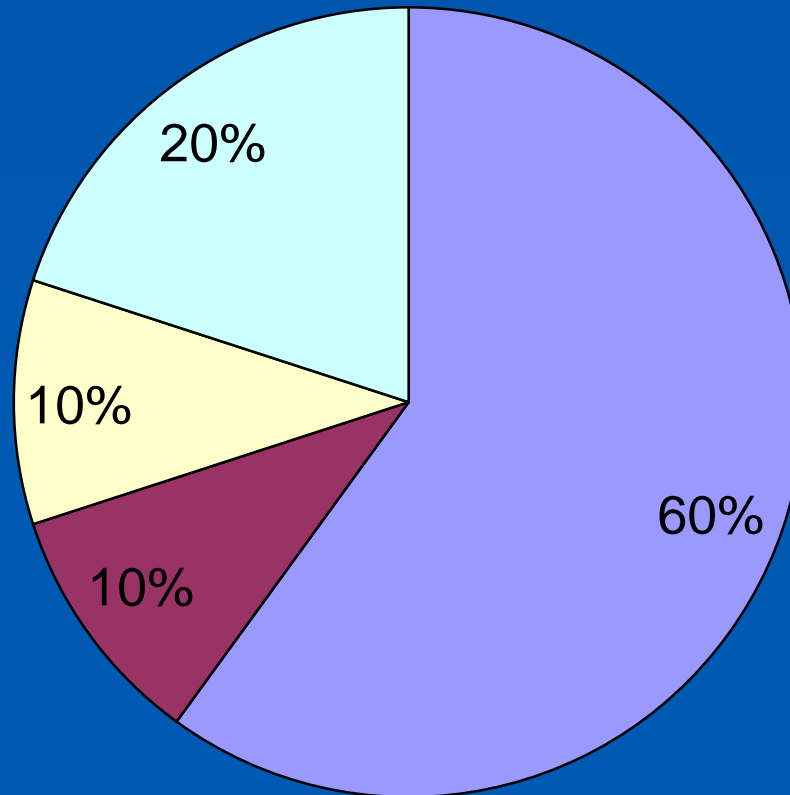
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# CBC with differential (n=505, one month data) Hours between reported result and next order



Hours between result/ next order

Surveyed Physicians' reasons for ordering multiple CBC with diff tests within 24 hours on inpatients.



- Ordering error
- Ordered by other service
- Clinical situation changed
- Personal preference

# Current Existing Order Validation

- Currently, there is an existing order validation in place, the **Duplicate Encounter Box**
  - This validation box comes up as long as there is already an order for the procedure during the whole encounter
  - Applies to almost all order types (LAB, Imaging, etc)

**Order Validation**

The following information is missing or may need your attention

The following orders duplicate existing orders from this encounter:  
CBC W DIFFERENTIAL [LAB58]

Do you want to accept these orders anyway?

# CBC Diff Alert – IP Lab

Procedure Description	Procedure Code	Count July-Oct 11	Avg per 1000 pd, July-Oct 11	Count Sept 5-yeast	Avg per 1000 pd, Sept 5-yeast	Ratio present to past
NURSING GLUCOSE DOCUMENTATION	LAB57	98093	1,136	4036	1,135	1.0
BASIC METABOLIC PANEL, BL	LAB5005	52875	613	2232	628	1.0
CBC W DIFFERENTIAL	LAB58	40603	470	1380	388	0.8
CBC W/O DIFFERENTIAL	LAB28	33803	303	1551	436	1.1
PT (PROTHROMBIN TIME), BL	LAB616	22245	258	913	257	1.0
MAGNESIUM, BL	LAB581	20813	241	770	217	0.9
ADMISSION MRSA SCREEN	LAB3988	17970	208	508	143	0.7
PHOSPHORUS, BL	LAB511	12832	149	471	132	0.9
PTT, BL	LAB612	12679	147	523	147	1.0
CARDIAC MARKERS, BL	LAB5299	11930	138	610	172	1.2
EXTRA LAVENDER TUBE 1	LAB7532	9889	115	413	116	1.0
THERAPEUTIC HEP RANGE	LAB6121	9223	107	547	154	1.4
URINALYSIS - MICROSCOPIC ONLY	LAB6660	8327	96	51	14	0.1
URINALYSIS - MICROSCOPIC ONLY	LAB6660	8327	96	254	71	0.7
HEPATIC GROUP, BL	LAB5004	8314	96	302	85	0.9
EXTRA BLUE TUBE 1	LAB7538	8233	95	354	100	1.0
COMP METABOLIC PANEL, BL	LAB5006	7383	86	223	63	0.7
URINALYSIS - MACROSCOPIC	LAB6650	6654	77	6	2	0.0
URINALYSIS - MACROSCOPIC	LAB6650	6654	77	250	70	0.9

As of Sep 10, 2012

# CBC Diff Alert - Design Features

- Search interval in past/post 24 hrs
- Works across all encounters. For the inpatient setting, orders from pre-admission, admission and HOV encounters are checked
- Pulls up last result
- Shows next scheduled time
- Allows order cancellation ( e.g. cancel next day 9am scheduled order if one is ordered stat prior evening)
- Yes No buttons for ordering anyway; NO DEFAULTS
- Works even if ordered via Order Set
- Track how many were ordered via Order sets, via standing orders, and cancellations

# CBC Diff Alert

Duplicate check alert that comes up after Signing Order

**Procedure Duplicate**

**PROCEDURE DUPLICATE: PLEASE REVIEW**

**Procedure Duplicate Action**

Do you want to stop ordering the order currently being placed? [\[Remove All\]](#)

1. **CBC W DIFFERENTIAL - ONCE 7/2/12 16:15 to 7/2/12** 1. [\[Remove\]](#)  
[Show order information](#)

**OR**

Do you want to discontinue the following orders that already exist? [\[Discontinue All\]](#)

1. **CBC W DIFFERENTIAL - DAILY 7/2/12 06:30 to 7/3/12 Status:Scheduled** 1. [\[Discontinue\]](#)  
[Show order information](#)

Order duplicate found. Continue to accept these orders?

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# CBC Diff Alert – Limitations

- Cannot change alert text
- Triggered upon Signing
- Need to click “Remove” on the alert....choosing “yes/no” only closes the alert and leaves the order onscreen
- Cannot offer any alternative procedure e.g. CBC Diff -> H&H
- Restrictions on what we can do with this alert

# CBC Diff Alert – Test Scenarios

## SUCCESS scenarios:

- search 24 hrs forward/backward starting from the time new order was placed
- check if new scheduled order is <24 hrs from existing scheduled order
- cancel next day 9am scheduled order if one is ordered stat prior evening
- Will not alert if same-day order from ED and INP
  - Stat CBC in ED and Daily CBC in Inpatient

# Data/feedback?

- First week: alert firings? 229
- Are avoiding ? tests/day
- Number overridden
- Number of unique patients

# Potential financial impact of reduction in unneeded testing

CBC with differential:

average of 505 tests per month ordered more frequently than q 24 hours on inpatients.

20% have abnormal finding:

manual smear and differential done

Potential cost impact:

$$500 \times \$4 = \$2000$$

$$100 \times \$10 = \$1000$$

\$3000 monthly for one test

# “Once only” tests

- Overordered Germline tests:
  - Hypercoagulation mutation assays
  - CF carrier testing
  - Spinal Muscular Atrophy screening
  - Pharmacogenomic tests
- Need to make results accessible

# BPA for once-only tests

## BestPractice Advisory - Aocrm3,Research

▼ This procedure analyzes a germline genetic target that will not change over the course of a patient's lifetime. There is no need for repeated testing.

**Please see the results of the previous testing performed on the date below.**

Test done during ENCOUNTER DATE 04/24/12

- FACTOR V MUTATION
- FACTOR V MUTATION

↗ Select this link to review results in Chart Review.

Accept

Cancel

# F.Y.I.

## Attention Ordering Providers

### Effective Immediately

### Once in a Lifetime Alert

To help prevent duplicate “once in a person’s lifetime” genetic tests being performed a second time, an Alert will display to inform you the test has already been performed.

To locate result; click the Alert hyperlink to Chart Review > Lab tab; then search for result.

BestPractice Advisory - Aocrm3,Research

▼ This procedure analyzes a germline genetic target that will not change over the course of a patient's lifetime. There is no need for repeated testing.

Please see the results of the previous testing performed on the date below.  
Test done during ENCOUNTER DATE 04/24/12

- FACTOR V MUTATION
- FACTOR V MUTATION

Select this link to review results in Chart Review.

Accept Cancel

The Once in a Lifetime Alert will display for the following Genetic Labs:

- LAB1203 – Cystic Fibrosis Mutation
- LAB1056 – Factor V Leiden Mutation
- LAB1088 – Prothrombin Mutation
- LAB1092 – Hypercoag MTHFR Mutation
- LAB2190 – Spinal Muscular Atrophy (SMA)

**Questions:** Contact the Hospital Based Trainers

EVH x1100 GBH x3700 HPH x6700 SKH x6220

# Once in a Lifetime Alert - Impact

Deployment Date: Jun 11, 2012

ONCE IN A LIFETIME ALERTS							
RunDate: 9/15/2012			6/11 - 6/30	7/1-7/31	8/1-8/31	9/1-9/14	Total
			Jun	Jul	Aug	Sep	
Patients			14	14	15	8	51
<b>Once in a Lifetime Alerts</b>			<b>26</b>	<b>18</b>	<b>21</b>	<b>13</b>	<b>78</b>
Success Rate			85%	56%	81%	62%	73%

DUPLICATE ORDERS				
6/11 - 6/30	7/1-7/31	8/1-8/31	9/1-9/14	Total
Jun	Jul	Aug	Sep	
4	6	4	3	17
<b>4</b>	<b>8</b>	<b>4</b>	<b>5</b>	<b>21</b>

*Four month pilot:  
Prevented 57 tests*



## Financial impact – once only alerts

- CF lab cost ~\$85-100
- Hypercoag lab cost ~\$85-100
- *Estimate 150 x \$85 = \$38,250 ann.*
  
- SMA sendout cost \$4-500 (reimbursement?)
- Pharmacogenomic test costs

# “Once positive: Don’t repeat” type tests

- Serology Positive Alert (SPA)
- Hepatitis C screening
- Rule: If result shows POSITIVE, no need to do another test

# Serology Positive Alert (SPA)

## Baseline Data

- Hepatitis C Antibody Orders: Aug 2011 - 2012
  - Total = 3579
  - Cancelled = 160
  - Completed = 3419
    - » Outpatient = 590
    - » Inpatient = 2829
- 220 patients with multiple orders
  - 25 with previously positive results

# Serology Positive Alert (SPA)

Procedures (1 Order)

HEPATITIS C ANTIBODY, BL

Routine Lab, ONCE First occurrence Today at 1415

BestPractice Advisory - Aocrm15,Research

There is no need for repeated testing once this procedure shows a positive result.

**Please see the result of the previous testing performed on the date below.**

Test done during ENCOUNTER DATE 09/09/12

- HEPATITIS C ANTIBODY, BL
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- HEPATITIS C ANTIBODY, BL
- HEPATITIS C ANTIBODY, BL

Select this link to review results in Chart Review.

Accept

Cancel

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# Adherence to guidelines

ASCCP guidelines for HPV testing:

- HPV testing not indicated under age 21
- HPV if ASCUS in women aged 21-29
- HPV for primary screening over age 30, can extend follow-up interval

Jackson and Shirts, JPI 1:26, 2010

Informatics methods for laboratory evaluation of HPV ordering patterns

# Building new rules

Triage HPV orders based on:

- Patient age
- Pap smear results
- Screening interval

# Building new rules

Triage HPV orders based on:

- Patient age
- Pap smear results
- Screening interval
  
- *Survey across encounters*
- *Discrete data*

# LIS/HIS driven Use of Deemed users

- Complex genetic, serologic and neurologic testing
- Often sendout tests
- Often over-ordered
- Miscellaneous test codes used



# The Future

- Algorithms, clinical decision support
- Lab control of ordering
- Lab formulary
- We all need to become informaticists!