

### 2013 Lab Quality Confab

#### **Fewer Hospital Acquired Infections (HAIs), Improved Patient Outcomes, and Millions of Dollars in Savings by Leveraging Technology**

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### Learning Objectives

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Describe the Laboratory's role in the identification of HAIs using new technologies

- Discuss how enabling technologies and staff collaborations can aid in the management of HAIs
- Demonstrate how the Laboratory can contribute to performance driven healthcare

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### John T. Mather Memorial Hospital

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#### Our Mission is to be the best community hospital in New York State

U.S. News & World Report's Best Hospital Rankings

Magnet Status

![](_page_2_Picture_6.jpeg)

Ranked #31 in New York Ranked #42 in NY Metro Area 248 Bed Community Hospital established in 1929

Located North Shore on Long Island in Suffolk County

Continually changing to meet the needs of the community

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### 2013 Lab Quality Confab

## Lab Information

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### The Case for Investment... Laboratory Diagnostics Information...

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

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![](_page_4_Picture_7.jpeg)

Healthcare total spending: \$2.60 trillion in 2010 or \$8,686 per person \$2.00 trillion in 2005 or \$6,697 per person

Source:CMS.gov

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### **The Case for Investment**

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### Labs are only 3% of

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### **2013** Lab Quality Confab

## The Challenges

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## Scope of the Problem

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### **Hospital Acquired Infections**

## Hospital infections cost \$9.8 billion a year

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Source: JAMA Internal Medicine September 2013

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### **Hospital Acquired Infections**

- In the US, hospital acquired infections (HAIs) afflict nearly 2 million patients and kill approximately 99,000 people annually.
- Every year an estimated 1.7 million
   Americans develop a new infection while hospitalized.

![](_page_10_Picture_0.jpeg)

#### Clostridium *difficile* Infections (CDIs) and Deaths Reach and Remain at Historic Highs

- CDI hospitalizations
   Increased 3-fold 2000-2009
- Deaths linked to CDI
   14,000 in 2007
- \$1 billion in medical costs
   CDIs in hospital patients only
  - **Epidemic strain** 
    - First emerged in 2000
    - Causes more cases and severity

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## Mather Experience

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### Rapid Active Surveillance J.T. Mather Objectives

- Improve the diagnosis and identification of MRSA and C. difficile infections
- Identify patients that are colonized or infected
- Place colonized/infected patients into contact isolation
- Reduce patient-to-patient transmission
- Reduce HAI infections and associated morbidity and mortality
- Improve patient safety and outcomes
- Comply with regulatory requirements

![](_page_13_Picture_0.jpeg)

### Mather's Surveillance Program

### **Our Campaign:**

## The BUG Stops Here!

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### Rapid Surveillance is the Foundation for Effectively Eliminating HAI'S

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### Teamwork

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#### Surveillance Program should include:

Senior Hospital Leadership Infectious Disease Professionals Clinical Laboratory Pharmacists Nursing Management/Staff Physicians Environmental Services

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### **Clostridium** *difficile*

### **Clostridium** *difficile*

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![](_page_16_Picture_5.jpeg)

### Mather Algorithm for Rapid Accurate Diagnosis of C. diff

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![](_page_18_Picture_0.jpeg)

### **Interpretation of Results**

#### **C. DIFF QUIK CHEK COMPLETE™**

#### Simultaneously tests for: C. difficile antigen (GDH) & A/B Toxins

![](_page_18_Figure_4.jpeg)

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### **Cepheid GeneXpert®**

- Automates and integrates sample purification, nucleic acid amplification, and detection of the target sequence in samples
- Uses real-time PCR and RT-PCR
- Uses primers and probes to detect a proprietary sequence for the presence of a cassette inserted into the *C. diff* chromosome in a single test cartridge
- Delivers test results in less than an hour
- Available on-demand in real time, around the clock, allowing for fast interventions by clinicians and infection control preventiontists when C. diff is detected.

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### C.difficile Testing Cost-Benefit

#### Costs

**Total Testing Volume** 

- 2009: 275/mo = 3,107/yr
  2010: 148/mo = 1,774/yr
  2011: 160/mo = 1,919/yr
  2012: 122/mo = 1,522/yr
- Simultaneous EIA- \$12 per test
  PCR Assay ~ \$40 per test
- Cost 2010: \$ 26,968
- Cost 2011: \$ 33,108
- Cost 2012: \$ 26,384

Total Testing Cost: \$86,460

- NO ADDITIONAL FTE'S
- C. diff testing performed 24/7

#### Savings 248 bed hospital

82,373 patient days/91% occupancy

#### **Rate of Infection/1000 Patient Days**

- 0.95/1,000 = 70.0 infections (2009)
- 0.57/1,000 = 46.0 infections (2010)
- 0.65/1000 = 50.0 infections (2011)
- 0.34/1000 = 26.0 infections (2012)

#### (2009 vs 2012)

Difference = 44.0 infections @ \$35,000

Decrease in 2010 hospital costs = \$840,000 Increase in 2011 hospital costs = \$140,000 Decrease in 2012 hospital costs = \$840,000

> \$1,540,000 cost avoidance Net Savings \$1,453,540

#### Cost Savings Using a Simultaneous Two Test Algorithm PCR vs. Quik Chek Complete- 2012

#### **100% of patients tested with PCR**

![](_page_21_Figure_2.jpeg)

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### **Clinical Outcome Results for 2012**

- Improved services by providing simultaneous testing for GDH and Toxins
- Implementation of reflex to PCR for Ag+/Toxin-
- Increased Awareness of HAI's
  - **Achieved Best Practices in:**

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### **Rapid MRSA Screening**

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### Molecular Diagnostics Detection and Screening Technology

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### **Culture – The Gold Standard**

- Traditional microbiology 48 hr broth enrichment
- Sensitive
- Low cost

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- **Report final results in 96 hours (4 days)**
- After many patients are discharged but not before they have had an opportunity to transmit their MRSA to others

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### **Molecular Diagnostics**

### Direct method of infectious agent detection

 Identification of infectious organisms through the detection of DNA/RNA sequences

Dramatically reduce (TAT)

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### Symptoms of MRSA

### Severe Infections Usually in healthcare settings

- Bloodstream infections
- Pneumonia
- Surgical site infections

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### **Cepheid GeneXpert®**

- Automates and integrates sample purification, nucleic acid amplification, and detection of the target sequence in samples
- Uses real-time PCR and RT-PCR
- Uses primers and probes to detect a proprietary sequence for the presence of a cassette inserted into the *C. diff* chromosome in a single test cartridge
- Delivers test results in less than an hour
- Available on-demand in real time, around the clock, allowing for fast interventions by clinicians and infection control preventiontists when C. diff is detected.

![](_page_27_Picture_7.jpeg)

#### Active Surveillance For MRSA Cost-Benefit Molecular Testing (PCR)

#### Costs

Screened high risk patients

- 2008: 88/mo = 1,050/yr
- 2009: 139/mo = 1,663/yr
- **2010:** 176/mo = 2,107/yr
- 2011: 182/mo = 2,181/yr
- 2012: 164/mo = 1,967/yr
- PCR Assay ~ \$50 per test

 Total Screening Cost \$448,400

• NO ADDITIONAL FTE' S

MRSA testing performed 24/7

Savings

248 bed hospital 82,373 patient days/91% occupancy

- 0.90/1,000 = 74.0 infections (2007)
- 0.59/1,000 = 48.0 infections (2008)
- 0.29/1,000 = 23.0 infections (2009)
- 0.25/1,000 = 19.0 infections (2010)
- 0.17/1,000 = 13.0 infections (2011)
- 0.23/1,000 = 18.0 infections (2012)

(2007 vs 2012)

Difference = 56.0 fewer infections @ \$35,000

Decrease in 2008 hospital costs = \$910,000 Decrease in 2009 hospital costs = \$875,000 Decrease in 2010 hospital costs = \$140,000 Decrease in 2011 hospital costs = \$210,000 Increase in 2012 hospital costs = \$175,000

#### \$1,960,000 cost avoidance

Net Savings Due to Prevention \$1,511,600

![](_page_29_Figure_0.jpeg)

### **Clinical Impact and Financial Metrics**

- Implementation of an Active MRSA High Risk Screening Program
- Improved services by bringing Molecular testing in-house
- Increased Awareness of HAI's

#### **Achieved Best Practices in:**

#### **Decreased Infection Rate**

![](_page_29_Figure_7.jpeg)

![](_page_29_Figure_8.jpeg)

![](_page_30_Picture_0.jpeg)

### Total Cost Avoidance/Reduction for MRSA Screening and C. *difficile* is

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![](_page_30_Picture_3.jpeg)

![](_page_30_Picture_4.jpeg)

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### **Balancing Healthcare Costs** Making the financial case at JT Mather:

#### Surveillance \$534,860

#### Cost of Infection \$3,500,000

Saving: \$2,965,140

![](_page_32_Picture_0.jpeg)

### Length of Stay

- Implementation of an Active MRSA Screening Program
- Improved services by bringing Molecular testing in-house
- Increased Awareness of HAI's

#### Length of Stay in ICU and CCU

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### **John T. Mather Memorial Hospital**

Patient Admissions Number of Patient Care Days

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![](_page_34_Picture_0.jpeg)

### **Improving Patient Management**

#### **Appropriate utilization of resources improves patient flow**

2001-2002- <u>854</u> saved patient care days <u>254</u> more patient admissions generating additional revenue of \$1,270,000

2004-2007- <u>1575</u> saved patient care days <u>451</u> more patient admissions generating additional revenue of \$2,255,000

2009-2011- <u>1648</u> saved patient care days <u>85</u> more admissions generating additional revenue of \$425,000

**Total Savings: \$3,950,000** 

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### Measurable Outcomes of Rapid HAIs Surveillance Programs

- Rapid and effective management for reduction of Hospital Acquired Infections (HAI)
- Making evidence-based, data driven decisions
- Defining comprehensive outcome measures
- The impact of value added measures on patient outcomes, cost, cost effectiveness, rapid turnaround time, technology selection, reduced infection rates and enhanced patient safety and satisfaction
- Laboratory can play a major role in reduction of HAIs

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![](_page_36_Picture_2.jpeg)

See Cliff sniff C. diff! In fact, it refers to one hospital's innovation for early detection of (*C. diff*): a two-year-old beagle named Cliff. Cliff the Beagle is faster at detecting certain infections than the standard clinical laboratory tests used daily in hospitals throughout the world.

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### 2013 G2 Volume to Value

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# Thank You

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### **Questions????**

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