Rapid Molecular Technology Improving Patient Outcomes

A Better Way

Ed Hochwalt, MT, MBA
Director of Corporate Accounts

Cepheid
A better way.

Objectives

- Provide a brief overview of molecular PCR technology
- Learn about rapid applications available today
- Provide insight as to how rapid applications have impacted patient care based on current literature
- Provide an understanding of the impact on hospital costs related to rapid results.
- Discuss ways in which antibiotic stewardship can be influenced by rapid test results.

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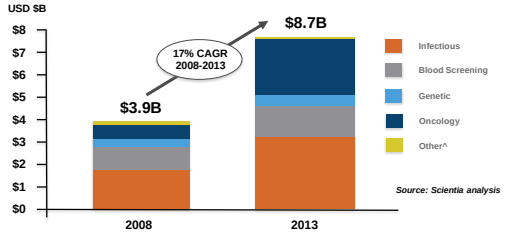
MDx is Fastest Growing Segment of IVD Market

Significant growth is expected in oncology and portions of infectious disease in the critical care segment due to high value tests*



^Includes cardiology, CNS predisposition, theranostic tests, and other emerging tests.
*Tests that provide critical information to help physicians make clinically relevant decisions; as a result command a premium price

Molecular Diagnostics

- **Designated nucleic acid target (what are you looking for?)**
- **Sample type (where will you find the target?)**
- **Extract nucleic acid (how will you isolate the target nucleic acid?)**
- **Detection and results (how do you know if the target is there?)**

When It Comes To Multiplexing: Not All NAATs Are Created Equal

Amplification Technology	Used By	Isothermal?	Level of Multiplexing (commercial product)	Quantitative CE IVD?
PCR	Cepheid, Roche, BD & most of Dx and research world	No	20-80 targets	Dozens
HDA	BioHelix	Yes	One target	0
SDA	BD	Yes	2-3 targets	0
NASBA	BioMerieux	Yes	One target (HIV viral load)	1
TMA	Gen-Probe	Yes	Three targets (HPV is an exception)	0
Loop Mediated Isothermal Amplification	Eiken, Illumigene, Quidel, Alere	Yes	One target	0

Am J Gastroenterol 2013; 108:478–498; doi:10.1038/ajg.2013.4; published online 26 February 2013

CME

Guidelines for Diagnosis, Treatment, and Prevention of *Clostridium difficile* Infections

Christina M. Surawicz, MD[1], Lawrence J. Brandt, MD[2], David G. Binion, MD[3], Ashwin N. Ananthakrishnan, MD, MPH[4], Scott R. Curry, MD[5], Peter H. Gilligan, PhD[6], Lynne V. McFarland, PhD[7,8], Mark Mellow, MD[9] and Brian S. Zuckerbraun, MD[10]

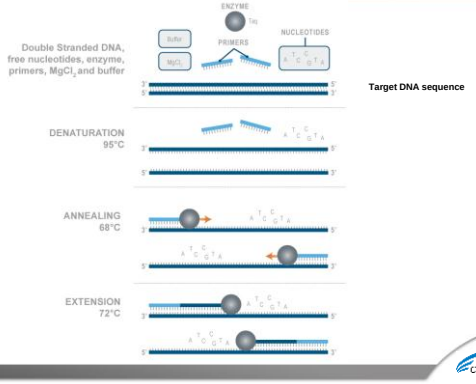
Recommendations

2. Nucleic acid amplification tests (NAATs) for *C. difficile* toxin genes such as PCR are superior to toxins A+B enzyme immunoassay (EIA) as a standard diagnostic test for CDI. (Strong recommendation, moderate-quality evidence)
3. Glutamate dehydrogenase (GDH) screening tests for *C. difficile* can be used in two- or three-step algorithms with subsequent toxin A+B EIA testing, but the sensitivity of such strategies is lower than NAATs. (Strong recommendation, moderate-quality evidence)

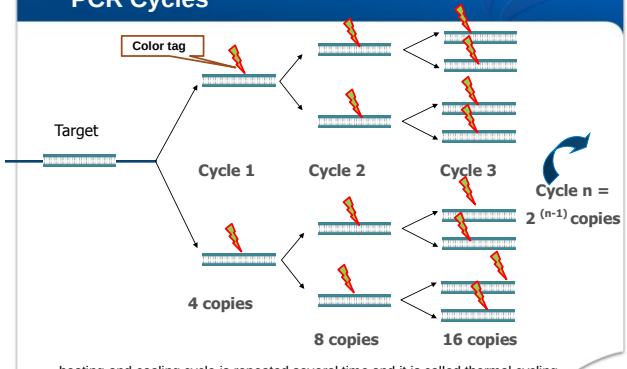
The sensitivity of GDH antigen detection has led to its use as a screening test as part of CDI testing algorithms, although it should be noted that as many as 10 % of patients with toxigenic organisms can be missed by this method.

Evidence suggests that NAATs for toxigenic C. difficile are good stand-alone tests for toxigenic C. difficile . There are several Food and Drug Administration (FDA)-approved NAAT's, including PCR assays and isothermal amplification tests. PCR is an excellent confirmatory test, but data for isothermal amplification testing are not yet sufficient to recommend it.

Polymerase Chain Reaction (PCR)



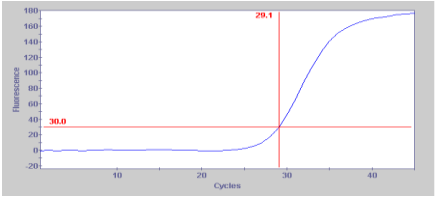
PCR Cycles



heating and cooling cycle is repeated several time and it is called thermal cycling

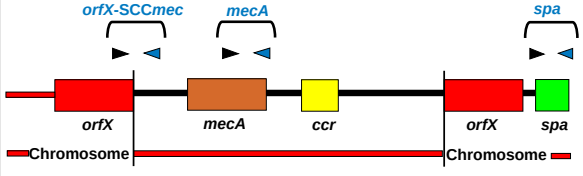
How to Detect Amplified Target?

- Real-time PCR
- Continuous amplification and detection in one tube
- Use a target specific probe labelled with a fluorescent dye
- Instrument collects fluorescent data and provides result



MRSA/SA target design

SCC*mec* cassette



This is a MRSA

The strain is now MSSA
It is an "empty cassette"
Xpert Results: *Spa*+, *orfX*+, *mecA*-

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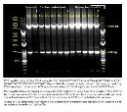
Molecular Testing Process

3 major steps to the process

- DNA Extraction - Isolating the DNA from cells

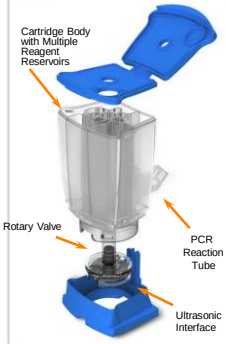
- DNA Amplification - Manufacturing multiple copies of the DNA of interest
  - Real-time PCR

- DNA Detection - A mechanism of detecting the DNA of interest



- **Separate rooms necessary**
  - **Isolation, amplification and detection**
- **Time**
- **Contamination**
- **Non-Automated**
- **End point analysis (Gels)**

The Molecular Lab in a Cartridge

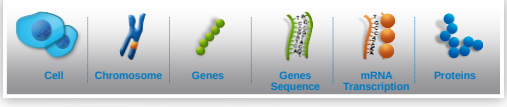


- **All Testing Done Within Cartridge**
  - Sample Prep / Extraction
  - Amplification
  - Detection
- **Any PCR Protocol**
  - DNA extraction → Bacterial menu
  - RNA reverse transcription → Virus menu
  - Nested PCR → Ultra-sensitivity
  - Multiplexing → 'All-in-one' tests incl. Controls

Uniquely Scalable: *Low to High Throughputs*

'Molecular Server Cabinet'
architecture enables system to grow with testing needs

New 2016 - POC

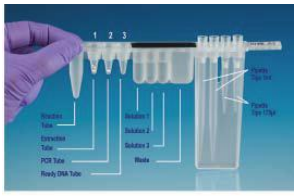


Multiplexing

Honeycomb: Strategic Extension into High-Level Multiplexing

- Over 1,000 wells for Real-Time PCR of 100s of Targets
- Both qualitative and multiplexed quantitative mRNA expression
- Identical Cartridge – proven sample prep

BD Max – next generation for BD

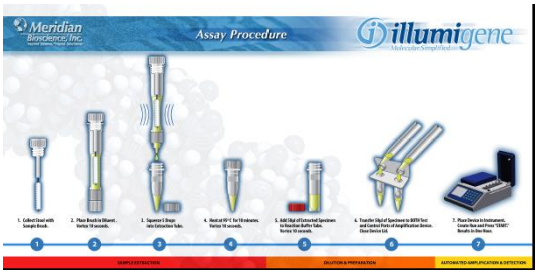


: DNA Unitized Reagent Strip

: BD Max System

Illumigene - LAMP

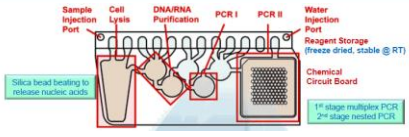
loop-mediated isothermal DNA amplification (LAMP) technology

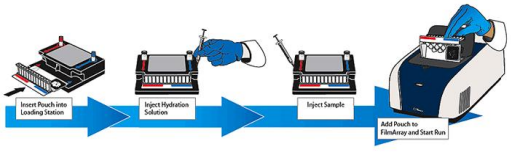


BioFire Diagnostics : System Offering

Platform

Film Array System





Others

Focus

GenMark

Liat and Cobas - Roche

Hologic Panther

Biofire FilmArray BCID Panel

FilmArray Blood Culture Identification Panel

1 Test. 27 Targets. All in about an hour.

Gram + Bacteria

Enterococcus
Listeria monocytogenes

Staphylococcus
Staphylococcus aureus

Streptococcus
Streptococcus agalactiae
Streptococcus pyogenes
Streptococcus pneumoniae

Gram – Bacteria

Acinetobacter baumannii
Haemophilus influenzae
Neisseria meningitidis
Pseudomonas aeruginosa

Enterobacteriaceae
Enterobacter cloacae complex
Escherichia coli
Klebsiella oxytoca
Klebsiella pneumoniae
Proteus
Serratia marcescens

Yeast

Candida albicans
Candida glabrata
Candida krusei
Candida parapsilosis
Candida tropicalis

Antibiotic Resistance

mecA - methicillin resistant
vanA/B - vancomycin resistant
KPC - carbapenem resistant

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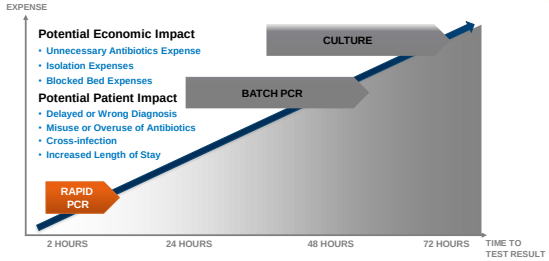
Economic and Medical Cost of Delayed Diagnosis



Time to Test Results Costs Money and Lives

Articles that look at time to result as crucial to maximizing diagnostic value:
1. *Lance R. Peterson, M.D., Donna M. Hacek, M.T.(A.S.C.P.), Ari Robicsek, M.D., Case Study: An MRSA Intervention at Evanston Northwestern Healthcare, printed in The Joint Commission Journal on Quality and Patient Safety Volume 33 Number 12, December 2007*
2. *Lance R. Peterson, M.D., Rapid Diagnosis of Community-Acquired MRSA, printed in Clinical Updates in Infectious Diseases, Volume Issue 3, October 2006*
3. *Eli N. Perencevich, MD, MS et al., SHEA Guideline: Raising Standards While Watching the Bottom Line: Making a Business Case for Infection Control, Infection Control and Hospital Epidemiology, Volume 28, Number 10, October 2007*

Rapid Detection of Methicillin-Resistant *Staphylococcus aureus* using the Cepheid GeneXpert® Dx System and the Xpert™ MRSA Test

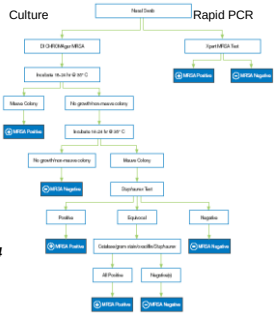
S. Lassiter2, G. Mayernick2, S.R. Patel1, T. M. Gannon1, P.R. Harris1 and **W.E. Phillips**2
Cepheid, Sunnyvale, CA1 and TriStar Health System, Centennial Medical Center, Nashville, TN2

Article highlights

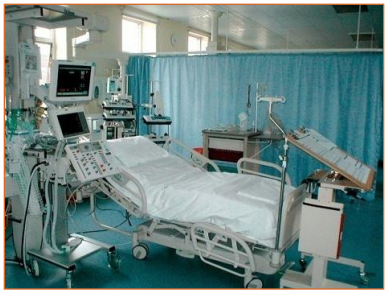
1. TAT
   - Culture – 35.8 Hrs
   - PCR – 6.9 Hrs
2. Culture is not as sensitive as PCR
3. Culture resulted in 7,584 fewer Potential Contact Precaution Hours (PCPH) which equates to an additional 44 potential HAI transmissions
4. Avoided 11 infections*

11 X $23,000 = $253,000 in cost avoidance over a 4 month period

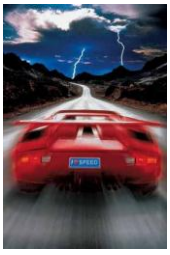
*Davis, *et al*



In the U.S., sepsis kills nearly 600 patients each day!



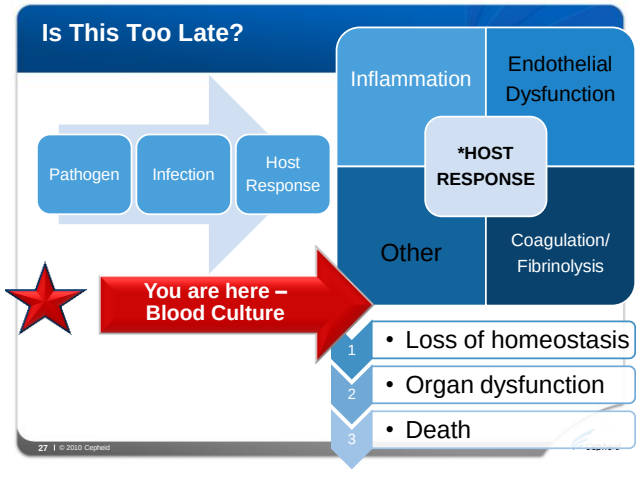
The Need for Laboratory Speed



- Rapid Antibiotic Therapy Saves Lives
  - **Targeted antibiotic therapy increases survival by ~ 25-45%**
  - **For every hour appropriate antibiotic is delivered sooner, survival increases by ~ 7-10% [1]**

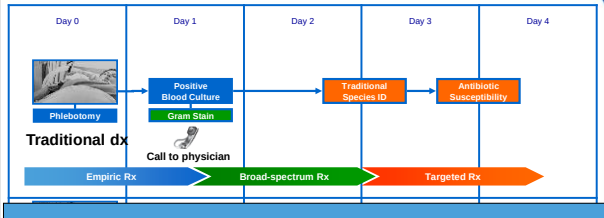
1. Kumar et. al, 2006. Crit. Care Med. (34)

Is This Too Late?



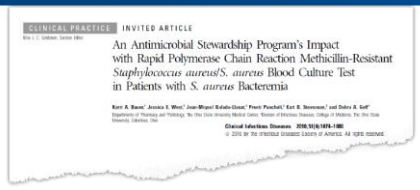
Traditional vs. Rapid Identification

Active role of Microbiology: improved integration with patient care



Rapid Detection of MRSA & SA – Blood Culture

On-Demand Results Reduces LOS and Cost



CLINICAL PRACTICE INVITED ARTICLE

An Antimicrobial Stewardship Program's Impact with Rapid Polymerase Chain Reaction Methicillin-Resistant *Staphylococcus aureus*/*S. aurens* Blood Culture Test in Patients with *S. aurens* Bacteremia

The Ohio State University College of Medicine

- **Implementation of the Xpert® MRSA/SA BC test coupled with an infectious disease pharmacist's consultation resulted in:**
  - **Mean time of switch from vanco to cefazolin/nafcillin (optimal antibiotic therapy) occurred 1.7 days sooner (for MSSA bacteremic patients)**
  - **Mean length of stay was 6.2 days shorter (for both MRSA and MSSA bacteremic patients)**
  - **Mean hospital costs were $21,387 less (for both MRSA and MSSA bacteremic patients)**

Implementation of Polymerase Chain Reaction to Rule Out *Clostridium difficile* Infection Is Associated With Reduced Empiric Antibiotic Duration of Therapy

William J. Peppard, PharmD, BCPS, and Nathan A. Ledeboer, PhD, D (ABMM)†,‡*

- ***Moving from batch test to a rapid test resulted in:***

Table 2. Primary and secondary clinical and economic outcomes

Clinical and economic outcomes	EIA (n = 79)	PCR (n = 87)	P
Duration of antibiotic therapy in days, mean (CI)	2.31 (1.48-3.15)	0.88 (0.45-1.33)	.007
Diagnostic test performed per patient, mean (CI)	2.73 (2.64-2.83)	1.16 (1.04-1.28)	<.001
Duration of contact isolation in days, mean (CI)	1.46 (0.61-2.32)	0.62 (0.08-1.32)	.131
Total treatment cost per patient[a] (CI)	69.54 (43.36-95.73)	65.97 (46.61-85.34)	.828
Diagnostic test cost[a] (CI)	13.67 (13.08-14.26)	37.15 (32.51-41.79)	<.001
Antibiotic therapy cost[a] (CI)	36.95 (12.70-61.20)	20.64 (5.08-36.20)	.262
Contact isolation cost[a] (CI)	19.39 (8.07-30.71)	8.19 (1.14-17.52)	.131

Note: CI = 95% confidence interval; EIA = enzyme immunoassay; PCR = polymerase chain reaction.
[a]Costs are reported in US dollars.

The rapid reporting of PCR test results was associated with a reduced empiric CDI antibiotic duration of therapy. When combined with fewer diagnostic laboratory tests performed per patient, shorter length of empiric antibiotic therapy, and briefer duration of contact isolation, the higher acquisition cost of the PCR test was offset and resulted in cost neutrality. These findings provide additional data to support the routine use of the PCR test.

Hosp Pharm 2014;49(7):639–643

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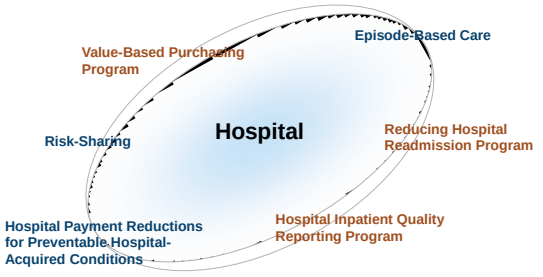
What is quality in health care…..*NOT*?

Doing the same thing over and over again and expecting different results

– Albert Einstein, definition of insanity

The U.S. Healthcare Environment



Trends in Healthcare Landscape

Focus is on value, performance & prevention

- Moving away from fee-for-service to fee-for-value
- Payments tied to quality and cost savings
- Increased accountability and transparency

Medicare Incentive Programs

Maximum Potential Impact of CMS Incentive Programs on DRG Payments

PROGRAM	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
Hospital Inpatient Quality Reporting Program* (Reduction to annual update)	-2.0%	TBD	TBD	TBD	TBD
Hospital Value-Based Purchasing Program (Incentive/Penalty)	+/- 1.0%	+/- 1.25%	+/- 1.50%	+/- 1.75	+/- 2.0
Reducing Hospital Readmission Program (Penalty)	- 1.0%	- 2.0%	- 3.0%	- 3.0%	- 3.0%
Preventable Hospital-Acquired Conditions Provision (Penalty)			-1.0%	-1.0%	-1.0%

A Single Episode May Contribute to Multiple Penalties

*Each year Medicare sets the hospital payment update for HIQR through a formal rulemaking process for participating acute care hospitals.

HAI Measures as Part of Quality Reporting

CMS Hospital Inpatient Quality Reporting (IQR) Program

Infection Type	Reporting Begins	Payment Determinations
Central Line Blood Stream Infection	01/01/2011	FY 2014
Catheter-Associated Urinary Tract Infection	01/01/2012	FY 2014
Surgical Site Infection	01/01/2012	FY 2014
MRSA Bacteremia Infection	01/01/2013	FY 2015
Clostridium Difficile Infection	01/01/2013	FY 2015

Data Captured and Made Publicly Available

Patients can make more informed decisions as to where to seek care based on hospital performance compared to others in the same area.

Hospitals will be able to assess how they perform relative to others competing for the same patient population.

Hospitals will be able to assess the impact of incentives or penalties on their overall financial health.

Budgetary Headaches Move Toward Value-Based Medicine

From Silo

To Holistic Approach

- **Moving away from the lowest cost per test to Total Cost of Care**
- **Focus on medical outcome, quality and prevention**

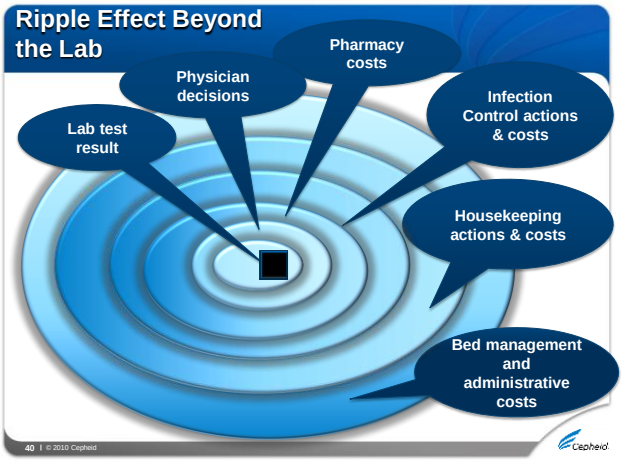
Two Areas to Measure When Considering PCR

Understand current patient pathway and medical interventions around lab results.

Quantify impact on health system resources.

Quantify the total cost of diagnosis.

Ripple Effect Beyond the Lab



Title: Discontinuation of Contact Precautions for Methicillin-Resistant *Staphylococcus aureus* (MRSA): A Randomized Controlled Trial Comparing Passive and Active Screening with Culture and Polymerase Chain Reaction

Erica S. Shenoy, MD, PhD, JiYeon Kim, MD, MPH, Eric S. Rosenberg, MD, Jessica A. Cotter, MPH, Hang Lee, PhD, Rochelle P. Walensky, MD, MPH* and David C. Hooper, MD*

Table 3. Single First PCR Test Performance Compared to Three Sequential CA in Intervention Arm Population.

1 negative Xpert MRSA PCR test = 3 negative cultures

	Sensitivity % (95% CI)	Specificity % (95% CI)	Positive Predictive Value % (95% CI)	Negative Predictive Value % (95% CI)
All subjects, series of 3 swabs completed (N=191)	93.9 (85.4 to 97.6)	92.0 (85.9 to 95.6)	86.1 (75.9 to 93.1)	96.6 (91.6 to 99.1)

Gets MRSA-negative patients out of costly isolation rooms

Title: Discontinuation of Contact Precautions for Methicillin-Resistant *Staphylococcus aureus* (MRSA): A Randomized Controlled Trial Comparing Passive and Active Screening with Culture and Polymerase Chain Reaction

Erica S. Shenoy, MD, PhD, JiYeon Kim, MD, MPH, Eric S. Rosenberg, MD, Jessica A. Cotter, MPH, Hang Lee, PhD, Rochelle P. Walensky, MD, MPH* and David C. Hooper, MD*

Estimated Effect on Unnecessary Contact Precaution Days Avoided and Costs Saved

Strategy	Passive cultures	Active surveillance cultures	PCR screening (1 Xpert MRSA)
Discontinuation rates of contact precautions	6.6%	26.2%	63.8%
Fewer contact precaution days	104	418	1841
Cost savings	$86,950	$349,472	$1,539,180

Group B Strep (GBS) Monetizing

Undetermined pre-natal care Antepartum screening in Labor/Delivery

All suspect patients admitted enter in facility without prior GBS result. Currently THH is not able to timely screen these patients. Protocols are to hang "penicillin" IV on both mother and baby until cleared by Physician. Early detection would avoid excessive cost and additional time on the floor increasing LOS by 1-2 days.

Normal Labor/ Delivery 24-36 hour stay
Mothers who come in with no GBS screen = 10/month
Cost of increase LOS by 24 hours
- **At 10 Mom patients/month x at 816.00/day = $8160/month = $97,920 savings /year**
- **Antibiotic savings? 6 does – IV infused for mom and 1 for baby**

Penicillin cost (unknown)

Savings per Year estimated at

$97,920

Rapid Molecular Testing for TB to Guide Respiratory Isolation in the U.S.: A Cost-Benefit Analysis

Alexander J. Millman[3,5], David W. Dowdy[6], Cecily R. Miller[4], Robert Brownell[3], John Z. Metcalfe[1,2,3], Adithya Cattamanchi[1,2,3], J. Lucian Davis[1,2,3]*

PLOS ONE | www.plosone.org 1 November 2013 | Volume 8 | Issue 11 | e79669

Results: Among a hypothetical cohort of 234 individuals undergoing evaluation for presumed active TB annually, 6.4% had culture-positive TB. Compared to smear microscopy, Xpert reduced isolation bed utilization from an average of 2.7 to 1.4 days per patient, leading to a 48% reduction in total annual isolation bed usage from 632 to 328 bed-days. Xpert saved an average of $2,278 (95% uncertainty range $1582–4570) per admission, or $533,520 per year, compared with smear microscopy.

Conclusions: Molecular testing for TB could provide substantial savings to hospitals in high-income countries by reducing respiratory isolation usage and overall length of stay.

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Campaign to Prevent Antimicrobial Resistance in Healthcare Settings

Key Prevention Strategies

CDC

- Prevent infection
- Diagnose and treat infection effectively
- Use antimicrobials wisely
- Prevent transmission

Clinicians hold the solution!

CDC Antimicrobial Resistance Recommendations

In general, threats assigned to the urgent and serious categories require more monitoring and prevention activities, whereas the threats in the concerning category require less. Regardless of category, threat-specific CDC activities are tailored to meet the epidemiology of the infectious agent and to address any gaps in the ability to detect resistance and to protect against infections.

HAZARD LEVEL: URGENT

These are high-consequence antibiotic-resistant threats because of significant risks identified across several criteria. These threats may not be currently widespread but have the potential to become so and require urgent public health attention to identify infections and to limit transmission.

Clostridium difficile (C. difficile), Carbapenem-resistant Enterobacteriaceae (CRE), Drug-resistant *Neisseria gonorrhoeae* (cephalosporin resistance)

HAZARD LEVEL: SERIOUS

These are significant antibiotic-resistant threats. For varying reasons (e.g., low or declining domestic incidence or reasonable availability of therapeutic agents), they are not considered urgent, but these threats will worsen and may become urgent without ongoing public health monitoring and prevention activities.

Multidrug-resistant *Acinetobacter*, Drug-resistant *Campylobacter*, Fluconazole-resistant *Candida* (a fungus), Extended spectrum β-lactamase producing Enterobacteriaceae (ESBLs), Vancomycin-resistant *Enterococcus* (VRE), Multidrug-resistant *Pseudomonas aeruginosa*, Drug-resistant Non-typhoidal *Salmonella*, Drug-resistant *Salmonella* Typhi, Drug-resistant *Shigella*, Methicillin-resistant *Staphylococcus aureus* (MRSA), Drug-resistant *Streptococcus pneumoniae*, Drug-resistant tuberculosis (MDR and XDR)

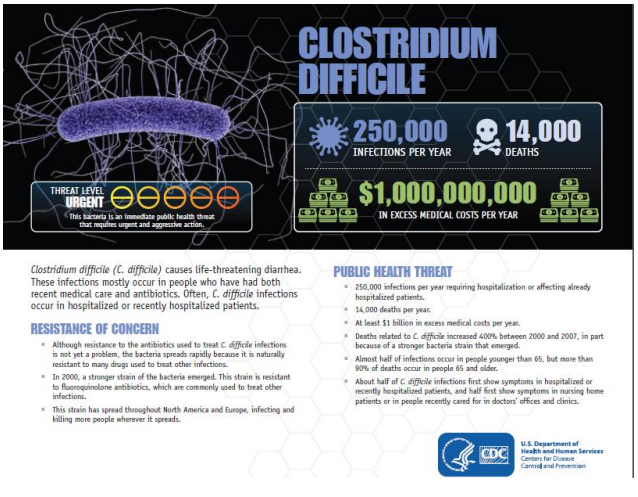
HAZARD LEVEL: CONCERNING

These are bacteria for which the threat of antibiotic resistance is low, and/or there are multiple therapeutic options for resistant infections. These bacterial pathogens cause severe illness. Threats in this category require monitoring and in some cases rapid incident or outbreak response.

Vancomycin-resistant *Staphylococcus aureus* (VRSA), Erythromycin-resistant *Streptococcus* Group A, Clindamycin-resistant *Streptococcus* Group B

Although *C. difficile* is not currently significantly resistant to antibiotics used to treat it, it was included in the threat assessment because of its unique relationship with resistance issues, antibiotic use, and its high morbidity and mortality.

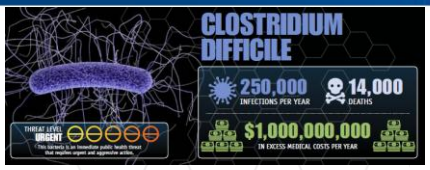
- *Xpert C diff/EPI*
- *Xpert Carba-R (in development)*
- *Xpert CT/NG*
- *Xpert VAN-A*
- *Xpert MRSA, SSTI and Blood Culture, Pre-surgical*
- *Xpert MTB/RIF*
- *Xpert GBS*



New Epidemic Strain of *C. difficile*

- **Name: BI/NAP1/027, toxinotype III**
  - Historically uncommon (particularly in U.S. strain collections), now epidemic
  - Current strain more resistant to fluoroquinolones
  - Carries extra toxin known as **binary toxin**
  - Mutations in **toxins A and B regulatory gene (*tcdC*)** and increased toxin production *in vitro*
  - Shows increased spore production

CDC Recommendations



WHAT YOU CAN DO

CEOs, Medical Officers, and other Healthcare Facility Leaders Can:

- Support better testing (nucleic acid amplification tests), tracking, and reporting of infections and prevention efforts.
- Ensure policies for rapid detection and isolation of patients with *C. difficile* are in place and followed.

Predicting Recurrence of C. difficile Colitis Using Bacterial Virulence Factors: Binary Toxin Is the Key

David B. Stewart, Arthur Berg, John P. Hegarty*
Surgery/Division of Colon and Rectal Surgery, Penn State Hershey Medical Center, Hershey, PA

70%

Conclusions:

1) ***Binary toxin*** is an independent predictor of CDC recurrence, which has not previously been reported.
2) The combination of ***binary toxin and tcdC mutation*** is associated with the highest number of CDC recurrences, such that their combined presence is associated with a 70% recurrence rate.
3) C. difficile which produces binary toxin may require longer antibiotic regimens to prevent disease recurrence.

Does multiple targets mean more information for the physician?

Binary Toxin and Death after *Clostridium difficile* Infection
Emerg Infect Dis. 2011 Jun

- Patients with binary toxin had higher case-fatality rates than patients without binary toxin.

Fidaxomicin Non-inferior to Vancomycin for Treatment of C Difficile Infection

February 3rd issue of the *New England Journal of Medicine*

- When the drugs were used to treat a first recurrence of *C. difficile* infection, the rate of second recurrence within two weeks was 7.6% with Fidaxomicin versus 27.4% with Vancomycin
- Four week recurrence rates were 19.7% and 35.5% for Fidaxomicin and Vancomycin, respectively with non-027 CDI cases.
- In 027 CDI cases performance with Vancomycin and Fidaxomicin were similar

Rapid Detection of Xpert BC - MRSA & SA

On-Demand Results

Rapid Detection of MSSA and MRSA from Blood Cultures Using the GeneXpert MRSA/SA Blood Culture Assay

Violeta Rekasius, Patricia Grajales, P. C. Schreckenberger
Department of Pathology, Loyola University Medical Center, Maywood, IL

A total of 210 unique patient blood culture samples were tested. There was 100% agreement with all Staphylococcal species when the conventional cultures and susceptibility methods were compared to the real time PCR method. In all, there were 22 MSSA and 28 MRSA. There were 152 CONS, where the PCR indicated MSSA negative and MRSA negative. In addition there were 8 cultures that grew non-Staphylococcal species which tested PCR negative for MSSA and MRSA.

The superior sensitivity and specificity of this method has been confirmed in two recent reports (1,2). In our study there was a total of 24% clinically relevant samples with Staphylococcus aureus and 72% non-Staphylococcus aureus samples.

Targeted antibiotics

Timely diagnosis allowed for targeted antibiotic treatment for 24% of the patient samples, but even more important, 72% of the patients did not require further antimicrobial coverage, increased length of hospital stay, additional blood culture draws or other costly and ineffective treatment plans.

De-escalation of antibiotics

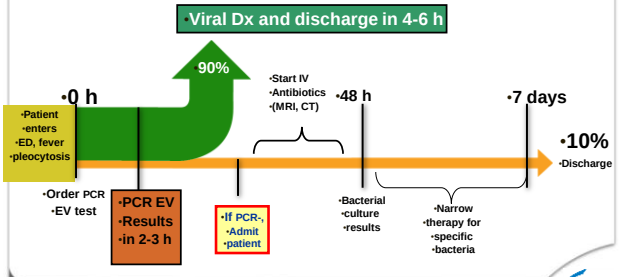
CONCLUSIONS

The GeneXpert® MRSA/MSSA Blood Culture PCR assay provides a rapid and a highly diagnostic tool to detect MSSA and MRSA, which in turn results in faster diagnosis and targeted antibiotic treatment.

PCR Can Improve Patient Management and Avoid Unnecessary Antibiotics

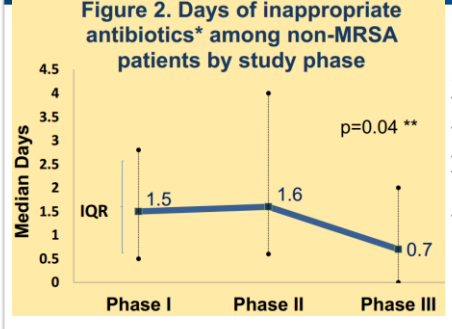
•Child comes to Emergency Department with symptoms of meningitis;
•CSF is sent to laboratory for Enterovirus testing, including PCR

•The Clinical Case for Innovation - Redefining Patient Care
•Brian J Silverstein, MD and Leslie A Wainwright, PhD, November 3, 2005



Xpert MRSA/MSSA SSTI in the ED

Figure 2. Days of inappropriate antibiotics* among non-MRSA patients by study phase



Talan et al, IDSA 2011

- Retrospective blinded review
- Admitted adults with complicated SSTI
- Phase I: Baseline
- Phase II: ED use of rapid test, MD education
- Phase III: PharmD direction

***treatment with vancomycin, linezolid, daptomycin and TMP/SMX were considered inappropriate for non-MRSA**

Key US publications

Impact of Xpert MTB/RIF on Antibiotic Stewardship

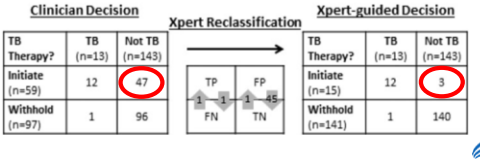
Impact of GeneXpert MTB/RIF on Patients and Tuberculosis Programs in a Low-Burden Setting
A Hypothetical Trial

J. Lucian Davis[1,2], L. Masae Kawamura[3], Lelia H. Chaisson[1], Jennifer Grinsdale[3], Jihane Benhammou[4], Christine Ho[5], Anna Babst[6], Houmpheng Banouvong[3], John Z. Metcalfe[1,2], Mark Pandori[6], Philip C. Hopewell[1,2], and Adithya Cattamanchi[1,2]

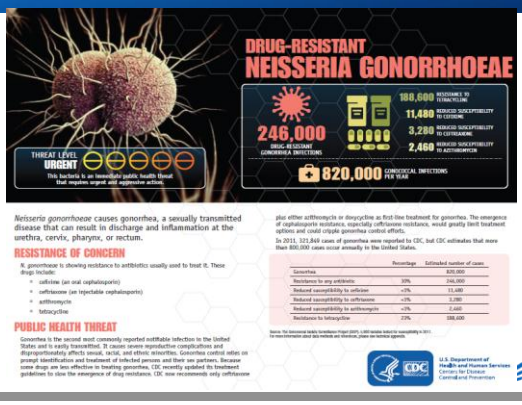
Am J Respir Crit Care Med Vol 189, Iss 12, pp 1551–1559, Jun 15, 2014

Conclusions:

- Xpert could greatly reduce the frequency and impact of unnecessary empiric treatment, contact investigation, and housing



Neisseria Gonorrhoeae resistance - Urgent



Cepheid.

Rapid CT/NG NAAT testing is now recommended for same-day therapy

A key change in the *2015 Guidelines* is the recommendation of **alternative treatment regimens** *for N. gonorrhoeae*):

- Antimicrobial resistance on the rise, combo-therapy now recommended in US.
- Medication should be provided on site**, on the same day**, simultaneously, **and under direct observation**. If medications are not available when treatment is indicated, linkage to an STD treatment facility should be provided **for same-day treatment** (p.62-63)

In addition, should any person who tests positive for chlamydia or gonorrhea, along with women who test positive for trichomonasis, **should be re-screened 3 months after treatment** (p. 7)**.**

There is now a rapid CT/NG test that provides on-demand random access, with results in less than 90 minutes

Cepheid.

Where does the cost impact come from?

- **Lab – Budget usually gets the hit**
  - **Reduced labor**
  - **reduce send-outs**
  - **increase potential billing revenue**
- **Infection prevention**
  - **Reduce PPE usage**
  - **Increase efficiencies for nursing staff**
  - **Decrease costs related to HAI**
  - **Present on admission status**
  - **VRE – Oncology, immuno-suppressed**
- **Pharmacy**
  - **Reduction in unnecessary antibiotic**
    - **MRSA vs Staph aureus vs non MSSA/MRSA, Enterovirus, C diff/027, unknown GBS status**
  - **Utilization of most appropriate antibiotics – Pre-surgical, ER**
  - **Reduce LOS from most effective therapy**
- **Housekeeping - cleaning - curtains**
- **Bed Management – increase revenue**
- **ER – Patient management – call backs? Ie Chlamydia/Gonorrhea**
- **Patient satisfaction surveys**

Cepheid.

Questions

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