The Impact of Rapid Diagnostics on Antimicrobial Stewardship

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Objectives

- Review traditional microbiology identification methods
- Discuss the benefits of rapid diagnostic tests
- Describe diagnostic stewardship
- Provide specific examples of rapid tests

The Conundrum

- Healthcare expenditures exceed $3 trillion
- Cost-containment is imperative
- Recent survey of 41 institutions
  - Administrators view cost as the most important ASP outcome
  - ID providers view appropriateness as the most important metric
- Conflict between healthcare efficiency and optimal patient outcomes
- Results in “silo” mentality
- Deprives bedside medicine of new critical technology

Antibiotics January 2016

Suboptimal Antibiotic Use

- Occurs 30 -50 % of all prescriptions
- Related specifically to microbiology:
  - Inappropriate use or interpretation of microbiology
  - Lack of microbiology confirmed diagnosis
  - Failure to submit appropriate specimens for culture
  - Lab test errors
  - Misuse of microbiology resources
  - Overreliance on empiric coverage regardless of microbiology results

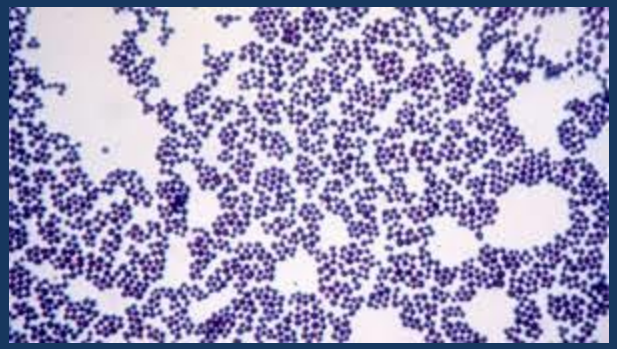
Clinical microbiology review January 2017,
volume 30; issue 1, 381 - 407

Conventional Identification Method for *Staphylococcus aureus*

1 Incubation

1-5 days of incubation

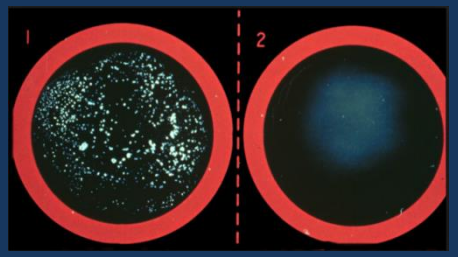
2 Gram stain



GPCC

3 CHROMagar

Staphaurex



24 hours

4 Sensitivity Panel

18-24 hours

Time line: 48 – 72 hours from BC collection

J Clin Microbiol 2012;50(1):127-33

Benefits of Adding a Rapid PCR-Based Blood Culture ID Panel to an Established Antimicrobial Stewardship Program (ASP)

- Background
  - Single-Center, retrospective
  - Medical University of South Carolina
- Inclusion Criteria
  - ≥ 18 years of age
  - Positive blood culture between August 1 and October 31 of 2010, 2012, and 2014
- Exclusion Criteria
  - Expired or placed on hospice care prior to blood culture positivity
  - Those whose blood cultures were deemed to contain contaminants

Macvane, S. H., & Nolte, F. S. (2016). Benefits of Adding a Rapid PCR-Based Blood Culture Identification Panel to an Established Antimicrobial Stewardship Program. Journal of Clinical Microbiology, 54(10), 2455-2463. doi:10.1128/jcm.00996-16

- Study Groups
  - Group 1: Conventional identification (control group)
  - Group 2: Conventional identification with ASP (AS group)
  - Group 3: Rapid identification with ASP (BCID group)

- Outcomes Evaluated
  - Primary: Time to effective therapy and initial antimicrobial use
  - Clinical Endpoints:
    - In-hospital mortality, 30-day all-cause readmission, microbiological clearance, hospital LOS following blood culture positivity, and overall patient-specific hospital costs

Results (N = 364 patients)

- Median time to organism ID was shorter in the BCID group
  - ✓ 17.2 hours vs. 57.4 hours (control) and 53.9 hours (AS)
- Shorter median time to effective therapy in BCID group
  - ✓ 4.9 hours vs. 15 hours (control) and 13 hours (AS)
- Antibiotic de-escalation occurred sooner in BCID group
  - ✓ 48 hours vs. 63 hours (control) and 61 hours (AS)
- No significant differences in all-cause or infection-related LOS, in mortality, in 30-day readmission
- While the cost between the groups were not significant, the average hospital cost was ~ $10,000 less in the BCID group
- The study found the benefit of BCID group was an improved time to optimal antibiotic therapy

Clinical Impact

CLINICAL PRACTICE INVITED ARTICLE

Ellie J. C. Goldstein, Section Editor

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

Karri A. Bauer,[1] Jessica E. West,[2] Joan-Miquel Balada-Llasat,[2] Preeti Pancholi,[2] Kurt B. Stevenson,[2] and Debra A. Goff[3]

Departments of [1]Pharmacy and [2]Pathology, The Ohio State University Medical Center, [3]Division of Infectious Diseases, College of Medicine, The Ohio State University, Columbus, Ohio

Previous studies have identified that RDT results in

- Improved time to optimal antibiotics for MSSA
- Reduced antibiotic exposure for SCN contamination
- Reduced length of stay and call backs to ETC
- Reduced cost to the institution

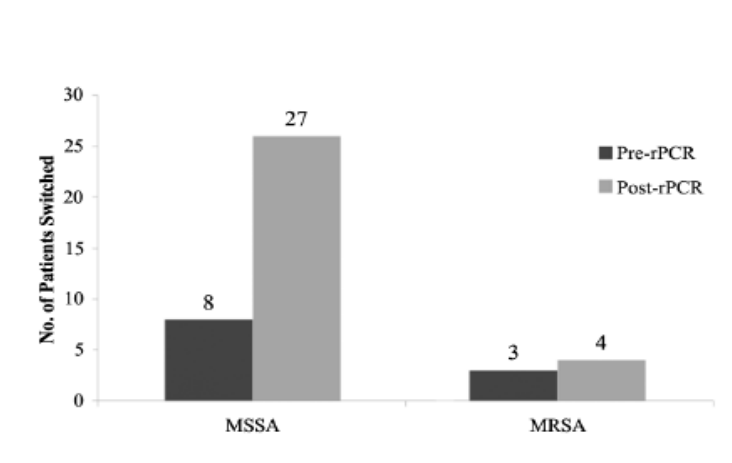


Table 2. PNA FISH assay effect on length of stay and defined daily doses of vancomycin usage in patients not in intensive care units

	Control group	PNA FISH	*P* value
Total DDD of vancomycin/patient	6.78	4.9	NS
DDD of vancomycin/patient after GPCC result	4.8	2.55	0.06
Patients receiving no doses of vancomycin	3/34 (9%)	9/53 (17%)	0.06, NS
Patients receiving 1 or less doses of vancomycin	5/34 (15%)	23/53 (43%)	<0.005
Number of patients with LOS < 3 days after GPCC result	6/34 (18%)	20/53 (38%)	0.06, NS
Median LOS (days)	6	4	<0.05, CI 0.95–1.87

*Ann pharmacother*2012;46(11):1484-90
Clin Infect Dis 2010;51(9):1074-1080
J Antimicrob Chemother 2006;58:154-158

Rapid Molecular ID Diagnostic Techniques

- Nucleic acid-based diagnostics, monoplex and multiplex PCR
- Microarray panels
- Peptide nucleic acid fluorescent *in situ* hybridization
- Magnetic resonance-based testing
- Matrix-assisted laser desorption ionization-time of flight mass spectrometry
- Next generation sequencing

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“Our technical capabilities
are exceeding our ability to apply
them effectively and economically
to human problems”

John Bartlett 1974

Choosing an Initiative

MIDTOWN MEDICAL CENTER ANTIMICROBIAL STEWARDSHIP PRIORITIZATION RISK ASSESSMENT 2017

Asumption: Given the association between antimicrobial use and the selection of resistant pathogens, inappropriate antimicrobial use is often used as a surrogate marker for the avoidable impact on antimicrobial resistance.

Priorities	PROBABILITY	SEVERITY = (MAGNITUDE - MITIGATION)				RISK*			
	*Likelihood this will occur**	Do we have an appropriate program, policy, test or procedure?	Is the process effective, including good compliance?	Frequency or chance of non-compliance with p/p if in place	Regulatory Accrediatation Issue TJC, CMS, public reporting		Ability to measure scope and impact	Target for the organization (C-Suite or departmental buy-in?)	Priority Rank
SCORE	*0 = N/A 1 = Low 2 = Moderate 3 = High*	*1 = Yes 2 = Developing 3 = No*	*1 = Yes 2 = Somewhat 3 = No*	*1 = Low 2 = Medium 3 = High*	*1 = Internal response 2 = optional core element 3 = External reporting*	*Risk Score*	*1 = Good 2 = Fair 3 =Difficult*	*1=Yes 0= No*	*1= being highest importance 3 = lowest importance*
Use of ABX when a virus is causing a lower respiratory infection (molecular filmarray respiratory panel)	2	3	3	1	2	11	1	1	1
Use of abx for treating contaminated blood cultures (Molecular great basin blood culture technology)	3	3	3	1	2	12	1	1	1
Use of abx for asymptomatic bacteruia (Opportunity to educate)	3	3	3	2	2	13	2	0	1
Initial empiric therapy with broad-spectrum abx without streamlining to narrow spectrum agents after organism has been identified (Manual Bug Report)	2	1	1	2	3	9	3	1	2
Inappropriate use of abx (use-restricted)	1	1	1	1	3	7	2	1	2
Decreasing ABX utilization rates (DOT/1000)	2	3	3	2	3	13	3	1	1
Patient/family appropriately educated on risks/benefits of antibiotic use	1	3	3	1	3	11	3	0	1
Inappropriate ABX use Metrics: similar spectrum, renal adjustment, 72-hour time out, ID appropriate (Informatics alerts)	3	3	3	1	3	13	3	1	1

Choosing an Initiative

EVENT	Mortality	Additional cost	Additional LOS
Contaminated blood cultures	not available	$8,720	5.4 days[1]
C. diff	1.13 OR[3]	$6000 - $8000[2,3]	4.7 days[3]
ADR	0.08-0.12/100,000[7]	$2262/ADR[4,5,6]	2 days[6]

*Scale = 1 low (affects ≤ 33% of population
Risk Score Analysis: Low Risk ≤ 6, Moderate Risk 7-9, High Risk ≥ 10

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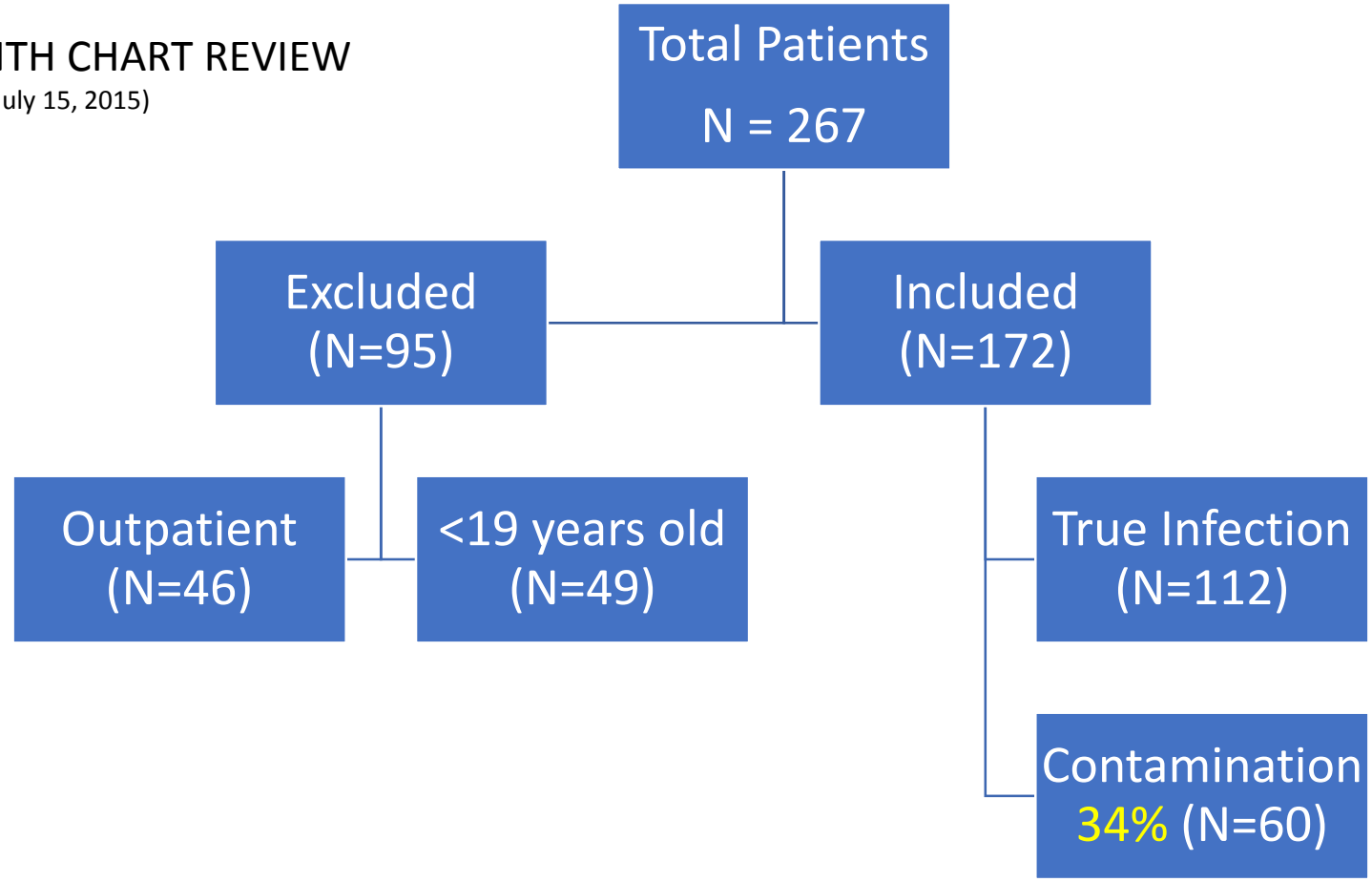
BC Contamination (Study I)

3-MONTH CHART REVIEW
(April 15 – July 15, 2015)



Impact of Contamination (Study II)

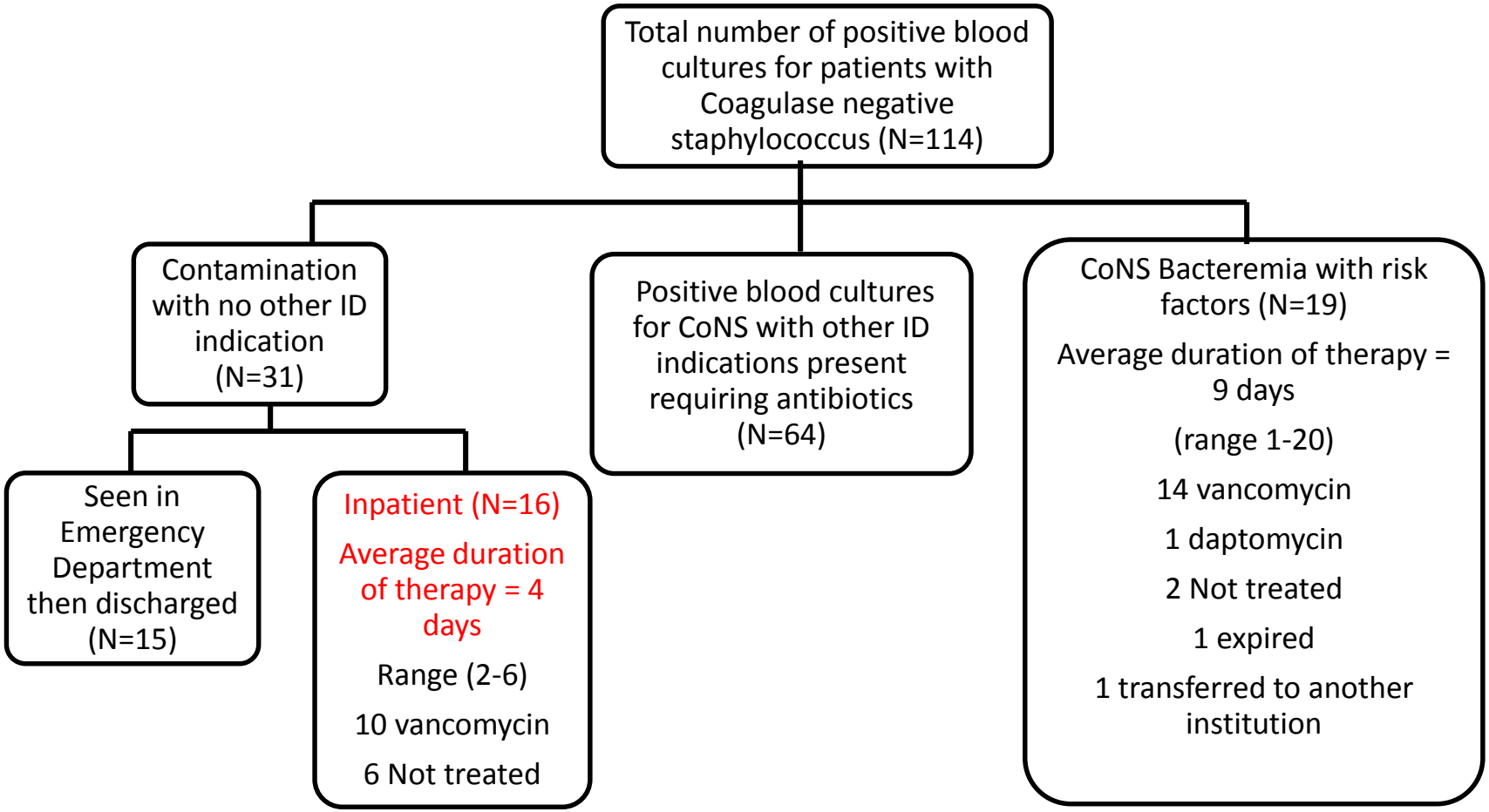
- 4.5 month retrospective chart review
  (04/01/2013 – 08/15/2013)
- versa TREK blood culture recovery system
- Age > 18 years

240 pictured

Data Collection

- Patient unique identification
- Patient location
- Reason for Hospitalization
- Demographics
  - Age, Gender, Antibiotic allergies
- Culture and sensitivity
  - Time from admission to BC collection
  - Number and date of bottles collected
  - Number of bottles positive
  - BC collection site and time
  - Culture and Sensitivity report
  - Empiric/Targeted antibiotics
  - Repeat BC
- Risk factors
  - Intravascular devices
  - Prosthetic devices
  - IV drug use
  - Immunocompromised
- Outcomes
  - Number of CoNS blood stream infections verses contamination
  - Appropriate antibiotic selection
  - Duration of therapy
  - Length of hospital stay
  - Increased LOS for contaminated BC bottles
  - ID consultation

Duration of Therapy



Impact of Rapid BC Identification (Study III)

Patient Inclusion Criteria (N = 43)

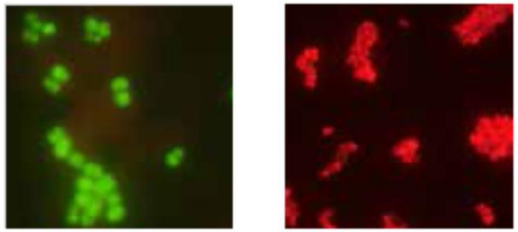
- Immunocompetent, age > 18 years
- No-risk factors for MRSA such recent hospitalization, antibiotic exposure, prior MRSA infection or colonization
- No foreign devices in place
- No additional ID indications requiring empiric vancomycin

Testing

- Quick FISH GPCC BC (QF GPCC) is a peptide nucleic acid fluorescence in-situ hybridization
- N = 50 kit secured from company
- Targets the 16S rRNA of Staph aureus and CoNS directly from BC with a sensitivity and specificity 98%

Table 2: Patients who were excluded

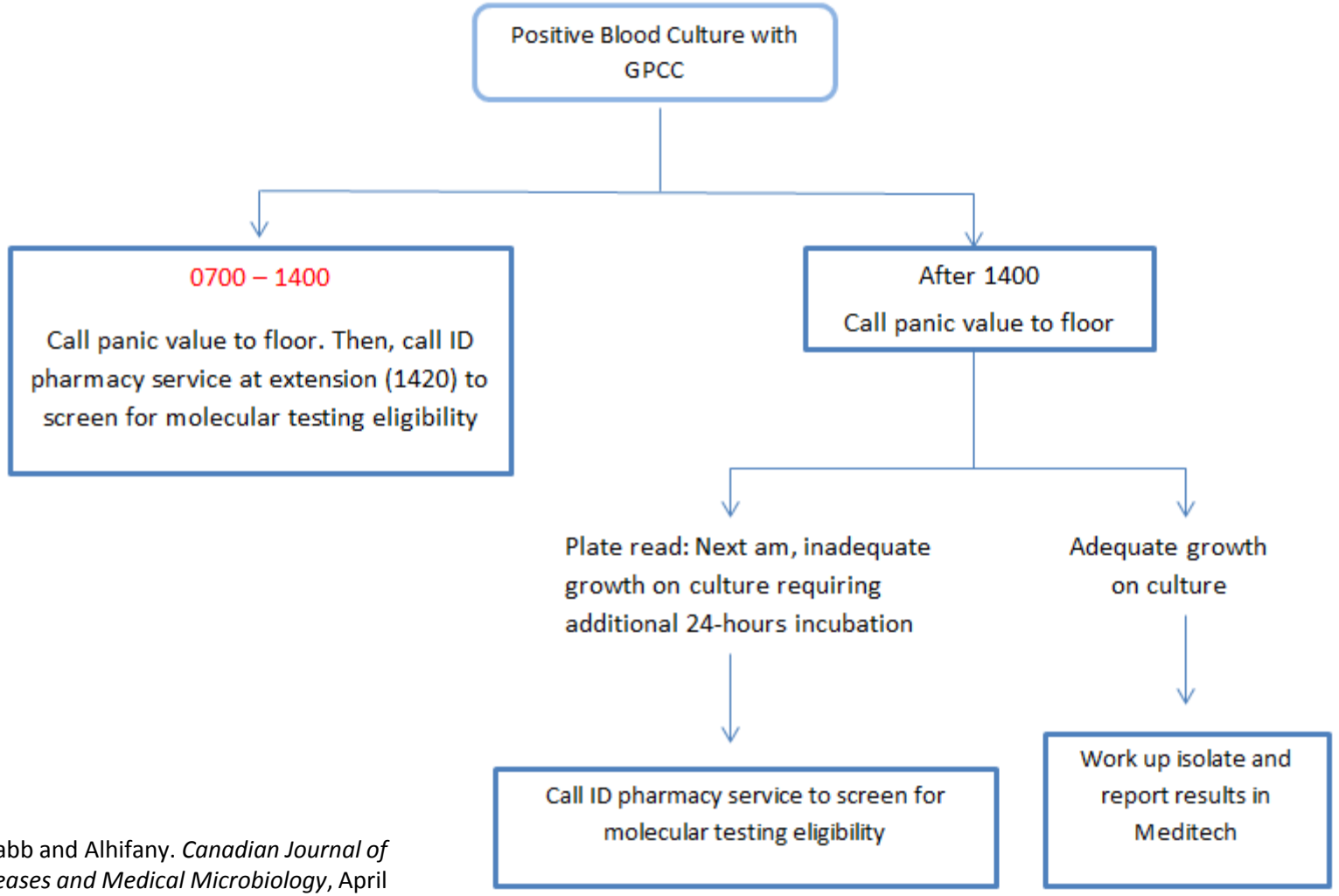
Reason for exclusion	Number of patients (n=34)
Additional infectious disease indications requiring continuation of empiric vancomycin	20
Immunocompromised host	3
Foreign device in place	5
Risk factor for MRSA	6



Almangour, Tabb and Alhifany. *Canadian Journal of Infectious Diseases and Medical Microbiology*, April 2017

Criteria for testing: Rapid diagnostic testing will be performed for positive blood cultures with gram positive cocci in clusters (GPCC) except in the following patients:

- Patients who have additional ID indications necessitating continuation of empiric vancomycin
- Immunocompromised or foreign device in place (e.g., central line) where coagulase negative staphylococcus may be an opportunistic pathogen warranting continuation of vancomycin



Almangour, Tabb and Alhifany. *Canadian Journal of Infectious Diseases and Medical Microbiology*, April 2017

Tested Patients (N = 9)

Table 1: Patients who met inclusion criteria

Age	Gender	Empiric therapy	Isolated microorganism	Plan made	Time to optimal antibiotic therapy (hours) using culture based method	Expected time avoided (hours) to optimal antibiotic therapy using new technology
61	F	Vancomycin	MSSA	Vancomycin → Nafcillin	78	74
68	M	Vancomycin	CoNS 1/1	Vancomycin discontinued	44	42
32	F	Levofloxacin	CoNS 1/1	Discharged from ED and call back was avoided	n/a	24
78	F	Vancomycin	CoNS 1/2	Vancomycin discontinued	30	28
74	F	IV Doxycycline	CoNS 1/1	Patient evaluated, antibiotic discontinued and patient discharged	49	47
49	M	Vancomycin and piperacillin/tazobactam	CoNS 1/2	Discharged from ED and call back was avoided	n/a	24
80	F	Vancomycin and ceftriaxone	Micrococcus 1/2	Vancomycin discontinued	28	26
85	F	Vancomycin and piperacillin/tazobactam	CoNS 2/2	Vancomycin discontinued	22	20
29	M	Vancomycin	CoNS 1/2	Vancomycin discontinued	31	29

Projected soft cost avoidance for ROI

- MSSA – $21,397
- SCN/Micrococcus - (8 x $ 8,720) $69,760

*Ann pharmacother*2012;46(11):1484-90, *Clin Infect Dis* 2010;51(9):1074-1080
J Antimicrob Chemother 2006;58:154-158
Canadian Journal of Infectious Diseases and Medical Microbiology, April 2017

Return on investment

- SCN contaminants (N = 41) for 3 months x 4 = 164 patients annually
- Assay cost $66.81 x 164 = $10,956 annually
- Vancomycin cost per day, $24.30/day
- Average vancomycin DOT, 4 days (range 2-6)
- Vancomycin levels $ 2.64/case x 164 = $ 433 annually
- Therefore, treatment cost for 164 patients = $24.30 x 4 days = $ 15,940 + $ 433 = $16,373 annually
- Projected annual hard cost avoidance $ 16,373 - $ 10,956 = **$ 5,417**

Goal of Diagnostic stewardship

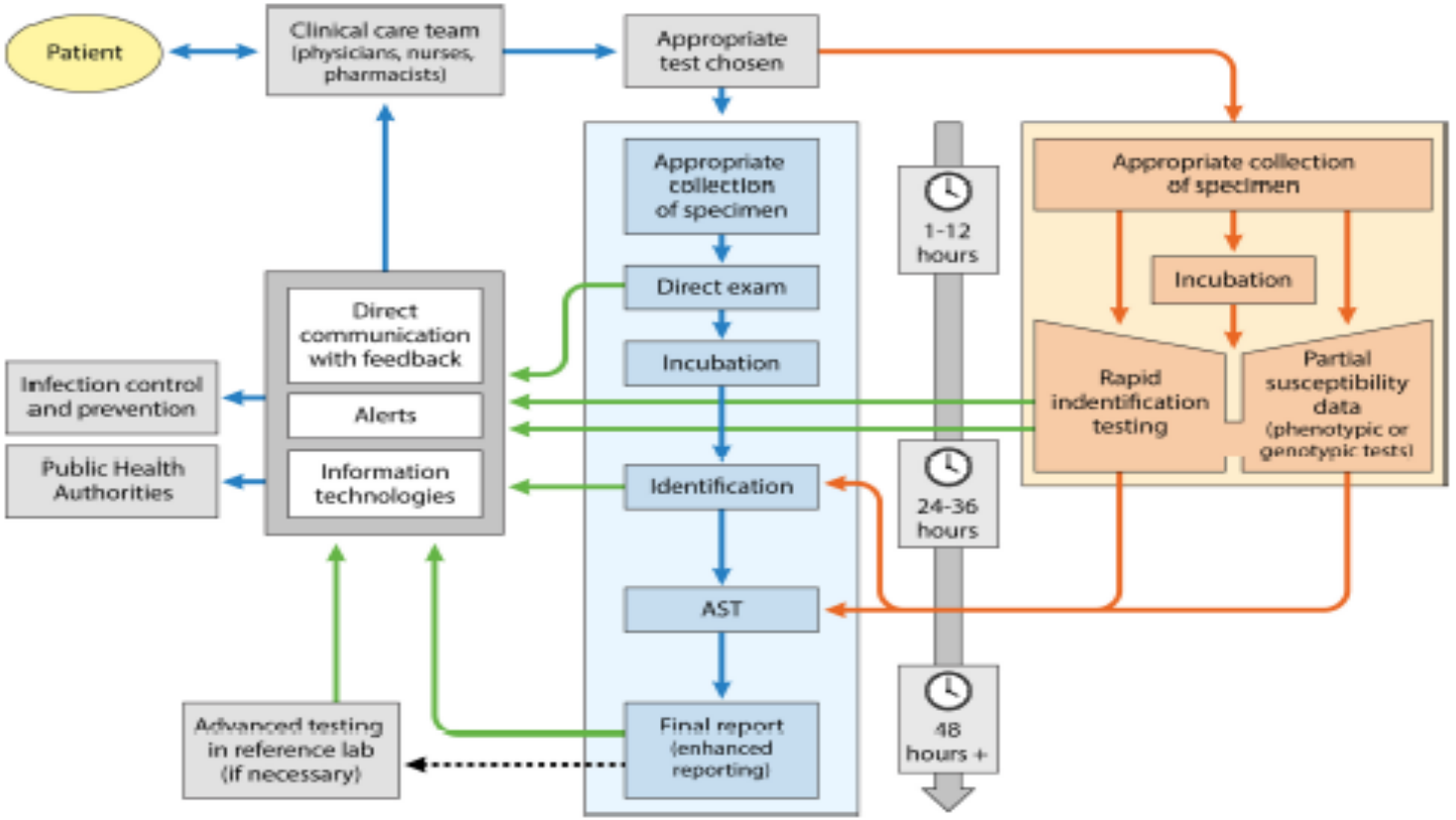


FIG 1 Workflow pathways for conventional microbiology and RDT. Implementation of RDT increases laboratory workflow complexity but can hasten the availability of results. Communication of results is a key factor. Blue arrows represent the conventional microbiology pathway, orange arrows represent the RDT pathway, and green arrows represent opportunities for the laboratory and antimicrobial stewardship teams to improve communication of results. AST, antimicrobial susceptibility testing.

Journal of clinical microbiology March 2017, volume 55; issue 3, 715 - 723

Key Roles of Microbiology

Antimicrobial Stewardship	Description	Examples
Diagnosis	Make the right diagnosis	Guidance on quality specimens RDT of BC isolates Inform about advanced tests Educate on test performance
Debridement/drainage	Drain abscesses remove foreign material	Prioritize and trace samples
Drug	Right empiric therapy	Antibiograms, supplementary testing, cascade reporting, refer isolates, notification, surveillance
Dose	Right dose	Report select MIC's
Duration	Appropriate DOT	Develop protocols to use biomarker testing to set DOT (timely PCT)
De-escalation	Time-out	Do not report skin contaminants Append clinical guidance to microbiology reports

Adapted from: Clinical microbiology review January 2017, volume 30; issue 1, 381 - 407

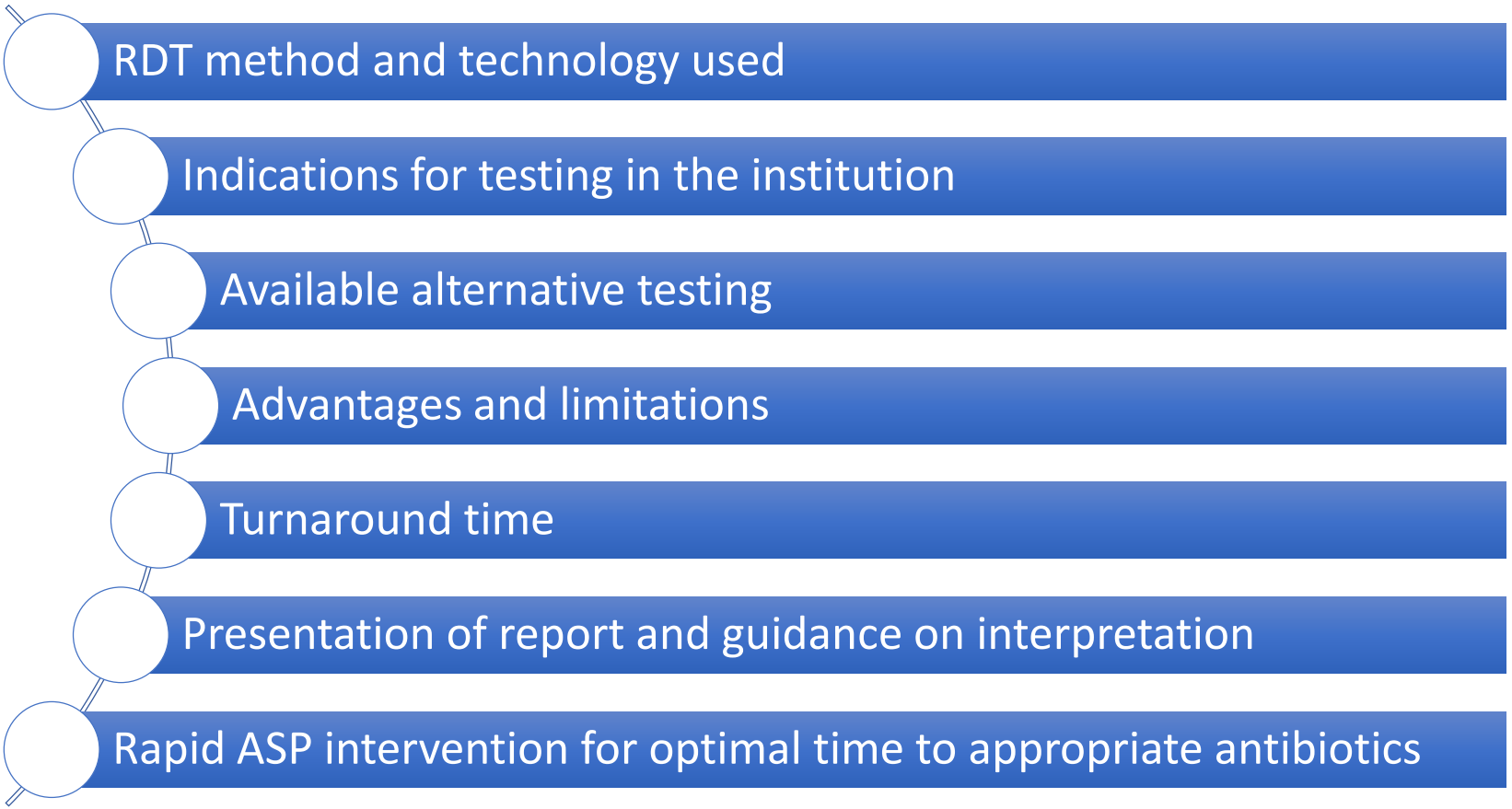
Cost-Value Analysis

- Time to appropriate antimicrobial therapy is the single most important predictor of mortality
- Identifying the causative pathogen sooner

Outcomes:	Overuse :	Actions:
Decrease overuse of antimicrobials, LOS, unnecessary admissions, morbidity and mortality	RDT add to healthcare cost Underuse: Suboptimal outcomes Inappropriate use: Low pretest probability false +	Develop diagnostic algorithms, automatic reflex testing, quick turnaround, report to ASP team for intervention

Antibiotics January 2016

Provider Education



Clinical microbiology review January 2017, volume 30; issue 1, 381 - 407

Implementing an Antibiotic Stewardship Program: Guidelines by the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America

Tamar F. Barlam,[1,a] Sara E. Cosgrove,[2,a] Lilian M. Abbo,[3] Conan MacDougall,[4] Audrey N. Schuetz,[5] Edward J. Septimus,[6] Arjun Srinivasan,[7] Timothy H. Dellit,[8] Yngve T. Falck-Ytter,[9] Neil O. Fishman,[10] Cindy W. Hamilton,[11] Timothy C. Jenkins,[12] Pamela A. Lipsett,[13] Preeti N. Malani,[14] Larissa S. May,[15] Gregory J. Moran,[16] Melinda M. Neuhauser,[17] Jason G. Newland,[18] Christopher A. Ohl,[19] Matthew H. Samore,[20] Susan K. Seo,[21] and Kavita K. Trivedi[22]

- Cascade reporting
- Rapid viral testing to limit antibiotic prescribing
- RDT on positive blood cultures
- Rapid PCT for ICU patients to assist in setting DOT
- Nonculture based fungal markers in patients with hematologic malignancies

CID 2016: 62(10):1197 - 202

Organism	Cascade (conditional reporting)
MDR Acinetobacter If isolate resistant to ≥ 3 classes of antibiotics including **meropenem** (see below)	• Report susceptibility from panel for tigecycline (**excluding** urinary and blood isolates) • If imipenem MIC ≤ 4 mcg/mL, set up etest and report susceptibility • Set up etest for minocycline and colistin and report susceptibility
MDR Pseudomonas If isolate resistant to ≥ 3 classes of antibiotics including **ceftazidime** and **meropenem** (see below)	Set up etest for ceftazidime/avibactam, ceftolozane/tazobactam, and colistin and report susceptibility
CRE Enterobacteriaceae	• Report susceptibility from panel for tigecycline (**excluding** urinary and blood isolates) • Set up etest for ceftazidime/avibactam, Meropenem/vaborbactam and colistin and report susceptibility
MRSA from **blood** cultures	If isolate has a vancomycin MIC ≥ 2 mcg/mL, set up confirmatory vancomycin etest. Only report sensitivity **interpretation** pending etest results **E-Test results**: • If vancomycin etest MIC < 2, report vancomycin etest result • If vancomycin etest MIC ≥ 2, report vancomycin e-test result and panel results for daptomycin and ceftaroline
VRE Enterococcus from **sterile body sources** resistant to linezolid (**excluding** lung samples)	If VRE enterococcus isolate is resistant to linezolid, report daptomycin MIC and interpretation
Fluconazole resistant Candida from sterile body sources (**including krusei**)	Report caspofungin and voriconazole

Revised: 12/13/2017 **Note: save all isolates requiring etest work up for further investigation if needed**

Applicable for MDR Acinetobacter and MDR Pseudomonas: Classes of Antibiotics

- Aminoglycosides (tobramycin, gentamicin, amikacin)
- Fluoroquinolones (levofloxacin, ciprofloxacin)
- Anti-Pseudomonal Cephalosporins (ceftazidime, cefepime)
- Aztreonam
- Carbapenem (meropenem, doripenem, imipenem)
- β-lactam β-lactamase inhibitor (piperacillin/tazobactam)

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Procalcitonin Kinetics

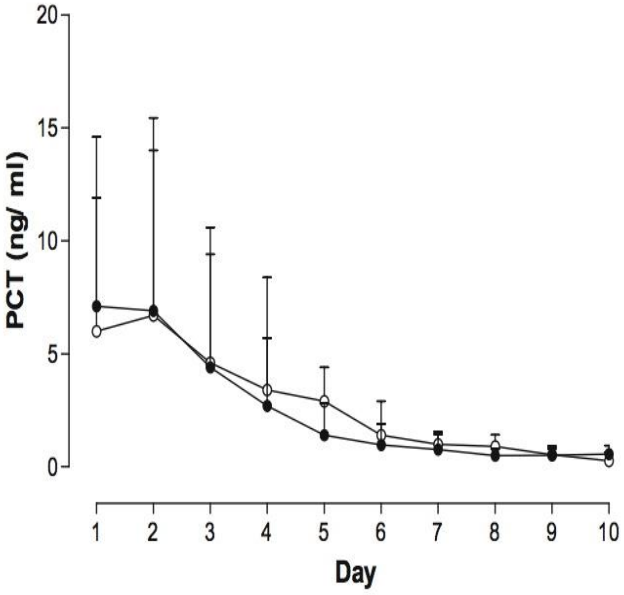


Fig. 1 Procalcitonin (*PCT*) concentrations (mean±standard deviation) in patients with PCT-guided antibiotic treatment (*filled circles*) and the control group (*empty circles*) did not show any difference

Table 2

Procalcitonin changes at various time points in patients with bacterial sepsis according to antibiotic therapy

	First-line empirical antibiotic therapy		*P* value
	Appropriate	Inappropriate	
PCT at D1 (n = 180; 129 S, 51 NS)[a]	27.2 (62.7)	29.6 (96.7)	0.92
PCT at D2 (n = 163; 117 S, 46 NS)[a]	27.4 (45.1)	40.9 (74.3)	0.09
ΔPCT D1–D2	+1.7 (35.0)	+5.2 (47.4)	0.20
PCT at D3 (n = 164; 117 S, 47 NS)[a]	24.4 (58.4)	34.4 (55.7)	0.12
ΔPCT D2–D3	-3.9 (35.9)	+5.0 (29.7)	<0.01
PCT at D4 (n = 121; 80 S, 41 NS)[a]	17.3 (45.8)	32.4 (46.2)	0.03
ΔPCT D1–D4	-9.1 (46.7)	-0.8 (102.5)	0.01
ΔPCT D3–D4	-8.3 (21.5)	-8.4 (16.6)	0.97

Changes in procalcitonin (PCT) values at various time points in patients with bacterial sepsis according to the appropriateness of the first-line empirical antibiotic therapy. S, survivors; NS, nonsurvivors. ΔPCT D1–D2, procalcitonin decrease between day 2 and day 1 after the onset of sepsis, and so forth. [a]Missing data are due to insufficient serum sample or death of patients within the 1-day, 2-day or 3-day-period following the onset of sepsis. D1, day sepsis is diagnosed.

Charles PE, Tinel C, Barbar S, et al. Procalcitonin kinetics within the first days of sepsis: relationship with the appropriateness of antibiotic therapy and the outcome. *Critical Care*. 2009;13(2):R38. doi:10.1186/cc7751.

Hohn A, Schroeder S, Gehrt A, et al. Procalcitonin-guided algorithm to reduce length of antibiotic therapy in patients with severe sepsis and septic shock. *BMC Infectious Diseases*. 2013;13:158. doi:10.1186/1471-2334-13-158.

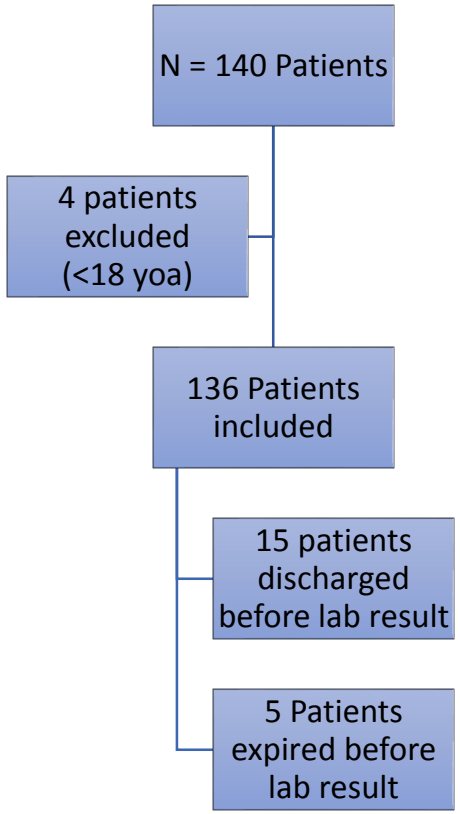
Evaluation of Procalcitonin Use

Purpose: To evaluate the current use of PCT in guiding antibiotic therapy decisions
Methods: An IRB approved, single site, retrospective chart review between December 2016 and May 2017

Data collected: age, order dates and times, lab results, ordering physician, time to results, action taken, indication, and days of therapy
Inclusion criteria: all patients ≥ 18 years old
Primary objective: determine if procalcitonin is being used to guide ABX decisions
Definitions:

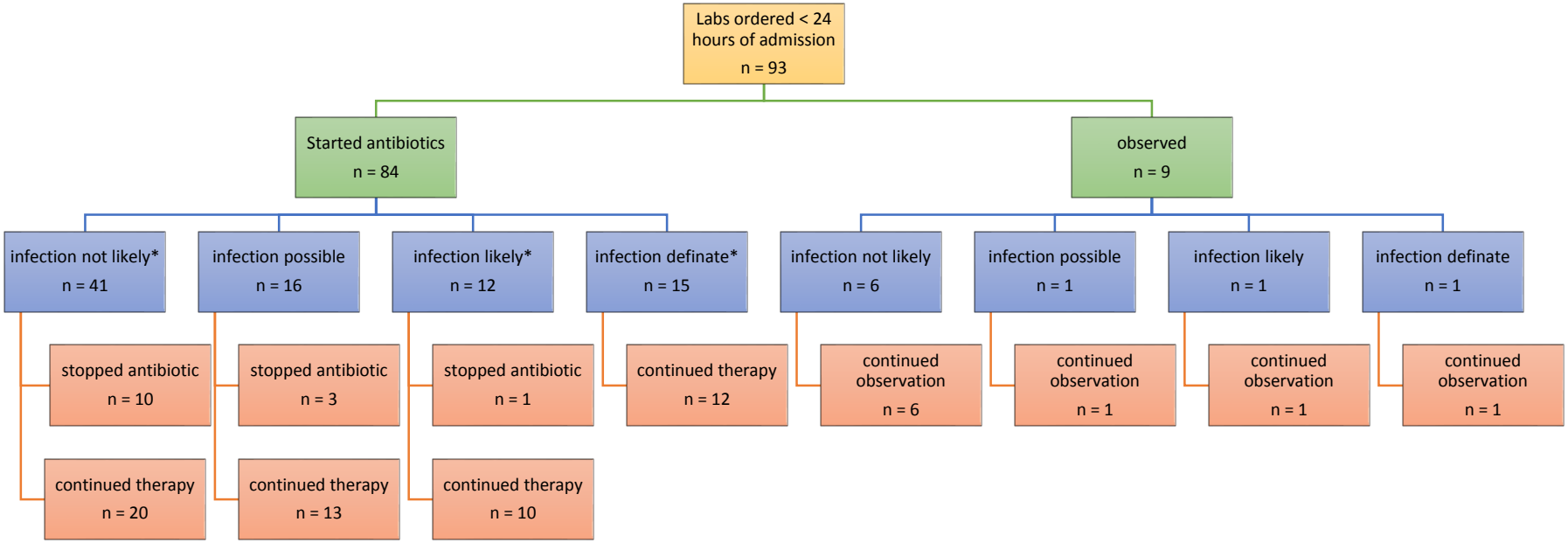
1. More than one PCT level ordered was a surrogate marker for classifying a prescriber as using a clinical pathway designed to set DOT
2. A single PCT level that returned negative for bacterial infection resulting in discontinuation of antibiotics or continued observation with no antibiotics was used to classify a prescriber as using a clinical pathway to rule out sepsis.

Results:



- More than one PCT level drawn 2.2% (3/136)
- Single PCT orders 97.8% (133/136)
- Turnaround time = 59 hours from order to result

PCT ordered ≤ 24 hours after admission



- 90 % (84/93) started on empiric antibiotics
- N = 41, PCT level resulted in infection not likely
- Antibiotic therapy continued in 50 % (20/41)

Additional Rapid Test Examples

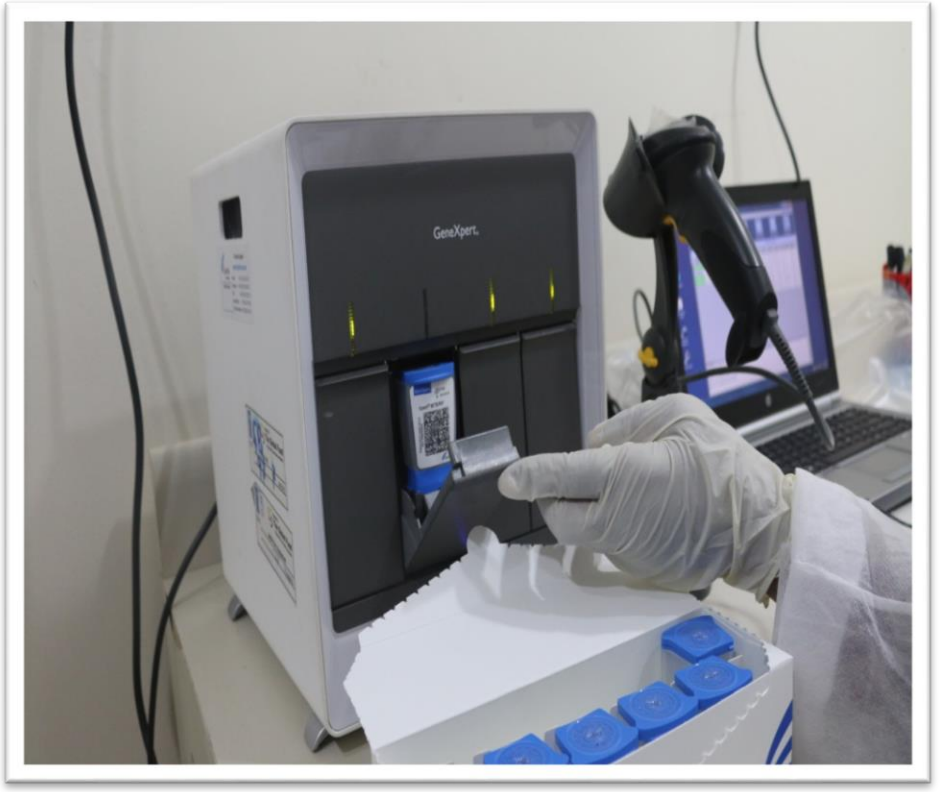
GeneXPERT

- Utilizes Multiplex PCR technology
- MRSA/SA BC
  - Provides accurate determination of Staph from gram-positive BC in 1 hour
  - Can be easily integrated into sepsis bundles
- MRSA/SA SSTI
  - Wound swab
  - Can detect in less than 1 hour
  - Identifies presumptive positive strain for correct classifications

Columbus Regional Health
Simply Better Care™

C. Difficile Identification

- Glutamate Dehydrogenase (GDH) + Toxin Enzyme immunoassay (EIA) +/- PCR
- Discordant results are set up on PCR
- GeneXPERT C.diff
  - Results in 45 minutes
  - Eliminates need for additional repeat testing
  - 93.5% sensitive
  - 94% specific



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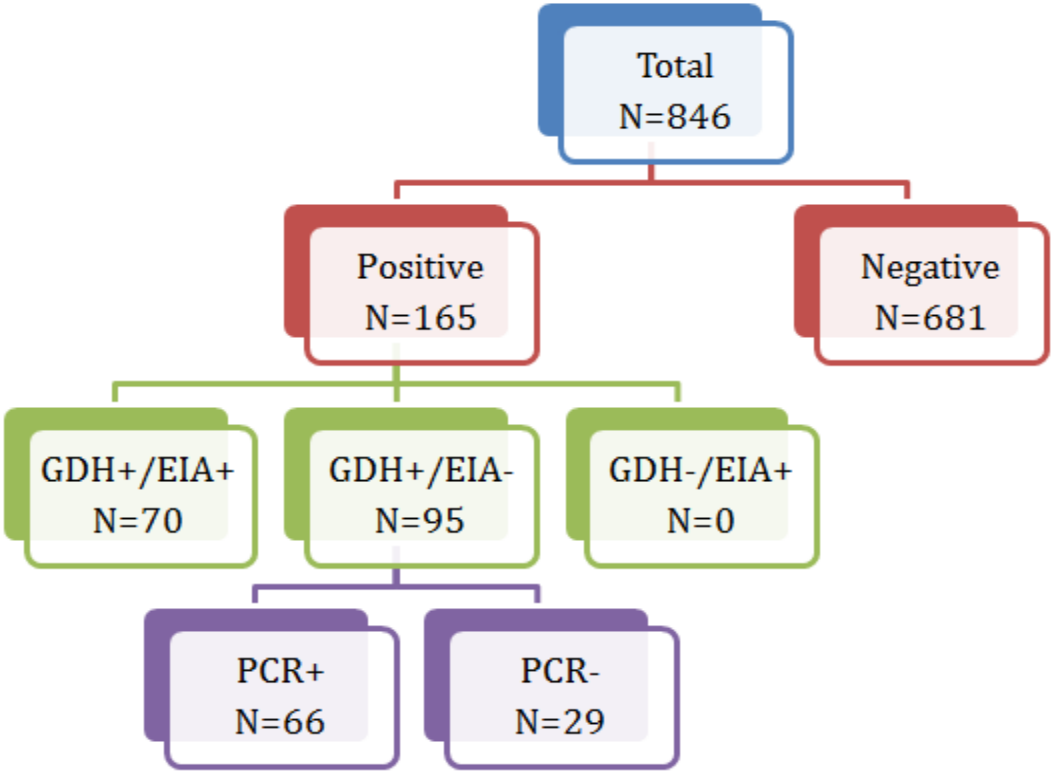
C difficile 6-Month Test Results

(5/1/2016 – 10/31/2016)



Summary:

- Rate of positive C. diff: 19.5% (165/846)
- Rate of discordant GDH/EIA results: 57.6% (95/165)
- Rate of positive PCR from discordant samples: 69.5% (66/95)

If PCR was not available, we would have missed 66 cases - 40% (66/165)

Alere™ i Influenza A&B Package Insert

- Rapid, qualitative isothermal test differentiates A &B
  - Processing time < 15 minutes
- For use with nasal or nasopharyngeal specimens
  - Direct nasal swabs
  - Nasal/Nasopharyngeal swabs (eluted in viral transport media)
  - Sensitivities of Rapid EIA Flu tests range from 50-70%
  - Alere

	Sensitivity	Specificity
Influenza A	97.9%[b] (95% CI: 92.6%, 99.4%)	86.2%[a] (95% CI: 82.8%, 89.0%)
Influenza B	92.5%[d] (95% CI: 84.6%, 96.5%)	96.5%[c] (95% CI: 94.5%, 97.8%)

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Alere I Instrument

- Influenzae A and B
- Group A Strep
- RSV

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Alere I Instrument (Group A strep)

12:50 - 12:55	Microbiology update: Throat Culture Evaluation	Background: Current IDSA guidelines recommend throat culture submission for all quick strep negative samples. Newer molecular technology with high sensitivity/specificity has been developed and was recently implemented at MMC. According to the company, this newer technology obviates the need for confirmatory throat cultures. Microbiology presented a 6 month post-implementation evaluation of the molecular rapid Group A test kit (Alere) versus reflex throat cultures. 710 throat samples with quick strep negative results were processed for culture. The following organisms were recovered: • 11 Group A Streptococci • 14 Group C Streptococci • 15 Group G Streptococci Sensitivity 98 % for GAS	• In total, it was noted that reflex cultures identified an additional 5% of patients with bacterial pharyngitis who may benefit from antibiotic therapy for infection resolution. • Microbiology will investigate reimbursement for reflex throat cultures and report back to the AST committee.

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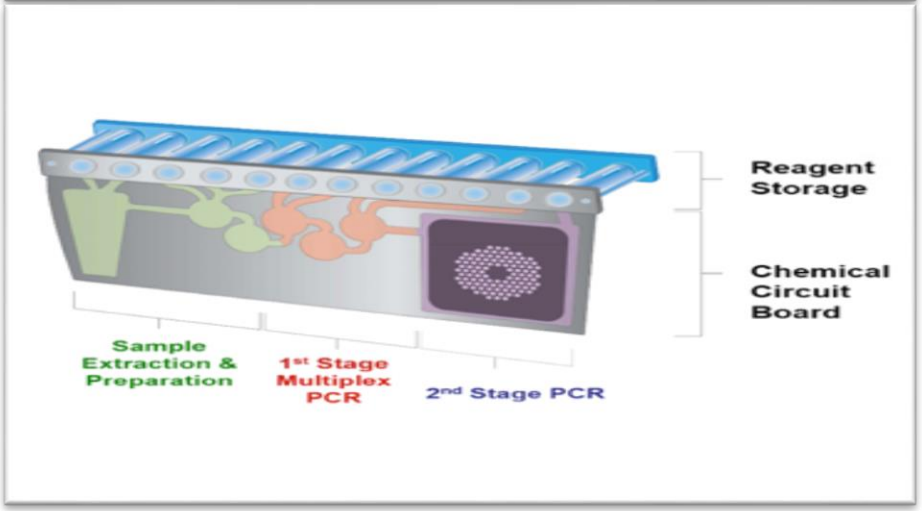
FilmArray System and Panels

- Multiplex PCR
  - Uses PCR to amplify several different DNA sequences simultaneously
  - Consists of multiple primer sets with a single PCR mixture

- BioFire's Respiratory Panel
  - New Respiratory Panel (RP2)
  - Nasopharyngeal swab
  - Looks for 21 targets
    - 17 viral
    - 4 bacterial
  - Results in 45 minutes



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FilmArray RVP Panel Targets

Pathogens Detected by FilmArray RVP	

• Adenovirus
• Coronavirus
  ○ HKU1
  ○ NL63
  ○ 229E
  ○ OC43
• Human metapneumovirus
• Human rhinovirus/ enterovirus
• Influenza
  ○ A
  ○ A/H1
  ○ A/H1-2009
  ○ A/H3
  ○ B
	• Parainfluenza
	  ○ 1
	  ○ 2
	  ○ 3
	  ○ 4
	• RSV
	• Bordetella pertussis
	• Chlamydophila pneumonia
	• Mycoplasma pneumoniae

MALDI Biotyper CA

- Matrix-Assisted Laser Desorption/Ionization Time-of-Flight Mass Spectrometry
- Identifies:
  - Gram-Positives and Gram-Negatives
  - Anaerobes
  - Yeast
- Bruker's MALDI Biotyper CA
  - Determines unique protein "fingerprint" of the organism
  - Characteristic patterns of the proteins are used to ID microorganisms by matching against an FDA cleared library

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Just because you can …..

CogenDx

DxWound Test Menu

Aerobic Bacteria, Gram-Positive

Enterococcus faecalis
Enterococcus faecium
Mycobacterium abscessus
Mycobacterium chelonae
Staphylococcus aureus
Staphylococcus lugdunensis (Coagulase-Negative)
Streptococcus agalactiae (Group B)
Streptococcus pyogenes (Group A)

Staphylococcal Virulence Gene

lukF-PV (Panton-Valentine Leukocidin, PVL)

Aerobic Bacteria, Gram-Negative

Acinetobacter baumannii
Citrobacter freundii
Enterobacter aerogenes
Enterobacter cloacae
Escherichia coli
Proteus mirabilis/vulgaris
Pseudomonas aeruginosa

Anaerobic Bacteria, Gram-Positive

Clostridium perfringens
Clostridium septicum

Anaerobic Bacteria, Gram-Negative

Bacteroides fragilis
Prevotella intermedia
Prevotella oralis

Fungi

Aspergillus flavus
Aspergillus fumigatus
Aspergillus niger
Candida albicans
Candida glabrata
Candida parapsilosis
Candida tropicalis

Antibiotic Resistance Genes

Carbapenemase
IMP
KPC
NDM
OXA-48
SME
VIM

Extended-Spectrum ß-Lactamase
CTX-M
SHV

Macrolide-Lincosamide-Streptogramin B Resistance
ermA
ermB

Oxacillin/Methicillin Resistance
mecA

Vancomycin Resistance
vanA
vanB

Refer to our DxWound clinical bulletins for details on the test specifications at cogendx.com/clinical-bulletins

Audience Question 1

Which are the following are included in rapid diagnostic test (RDT) provider education:

A. Presentation of report and guidance on interpretation
B. Indications for testing in the institution
C. Rapid ASP intervention for optimal time to appropriate antibiotics
D. RDT method and technology used
E. All the above

Audience Question 2

Prioritization risk assessments for ASP include all of the following except:

A. Anticipated frequency of non-compliance with the test or process if in place
B. Likelihood the event will occur
C. Is the proposed test or initiative labor intensive or expensive?
D. Is the current process in place effective, including good compliance?

Audience Question 3

Previous studies have identified that RDT tests result in:

A. Improved time to optimal antibiotics for MSSA
B. Reduced antibiotic exposure for coagulase negative staphylococcus BC contaminants
C. Reduced length of stay and call backs to ED
D. Reduced cost to the institution
E. All the above

Questions?

Deanne Tabb PharmD, MT (ASCP)

Infectious Disease Pharmacist

Clinical Microbiologist