



Rapid Blood Culture Diagnostics in the ED

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May 3, 2023



Blood Cultures

- Drawn as “sets”, each set contains:
 - One aerobic (O_2) bottle
 - One anaerobic (CO_2) bottle
- Two sets typically consist of 4 bottles



CULTURE BLOOD - #1 OF 2



CULTURE BLOOD - #2 OF 2

EPIC View: What You See in EPIC

In Process Microbiology Results (Last 365 days)

Date and Time	Order Name	Source	Sensitivity	Status
1/8/2015 0915	Culture Routine w/ Gram Stain			Preliminary
1/7/2015 2250	Culture MRSA			In process
1/7/2015 1855	Culture Blood - #2 of 2			Preliminary
1/7/2015 1850	Culture Blood - #1 of 2			Preliminary



CULTURE BLOOD - #1 OF 2



CULTURE BLOOD - #2 OF 2

EPIC View: What You See in EPIC

In Process Microbiology Results (Last 365 days)

Date and Time	Order Name	Source	Sensitivity	Status
1/8/2015 0915	Culture Routine w/ Gram Stain			Preliminary
1/7/2015 1855	Culture Blood - #2 of 2			In process
1/7/2015 1850	Culture Blood - #1 of 2			Preliminary

The number #1 of 2 **does not describe the bottles**, but instead, describes the “**set**”.

In this example, this patient has two sets of blood cultures ordered, a total of 4 bottles. **Information on bottles with organism growth within each set is not available in EPIC.**

Upon Arrival at NorDx..

- Bottles are placed into BD BACTEC™ machine and allowed to incubate
 - Machine performs continuous monitoring
 - Machine has sensors to detect microbial growth
 - Alarms alert when growth threshold is met
- Micro-technician immediately responds to any positive alarms



Above photo: Example of an incubation machine for blood culture bottles

Upon Arrival at NorDx..

- Bottles are placed into BD® BACTEC machine to incubate

- Continuous monitoring
- Sensors to detect growth
- Alarms alert staff

Blood culture bottles must be allowed to **incubate** to allow the organisms to grow (if present) **until a minimum threshold is met.**

- Micro-technician

This may take as little as 12 hours and as long as 72 hours, in rare cases. The **majority** of blood cultures reach detectable growth threshold **between 12-48 hours.**



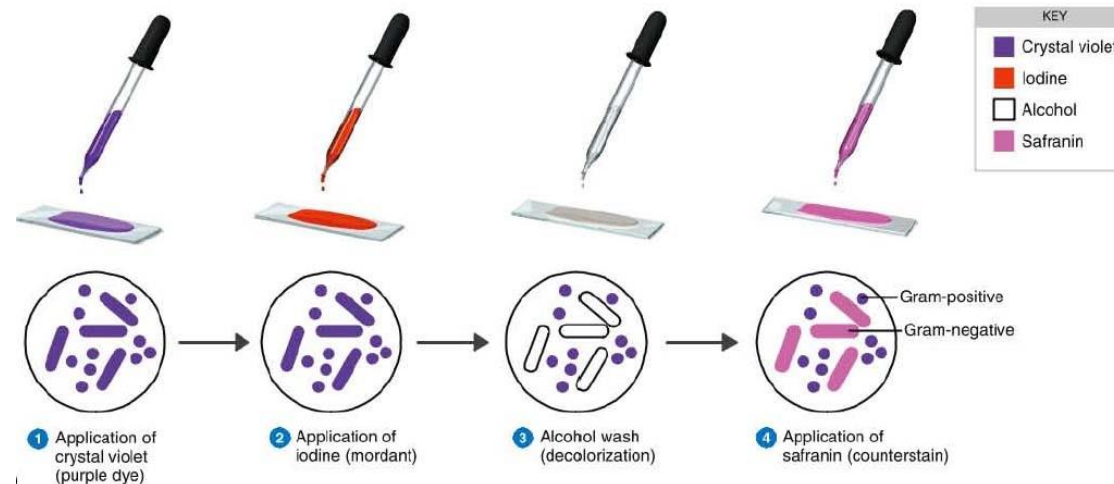
After the Alarm Goes Off: Gram-staining

The microbiologist or microbiology technician will **pull the blood culture bottle** of interest from the machine and **perform a Gram-stain**.

The Gram-stain is an important initial step that **provides broad, but critical, information** as to the organism(s) that is growing in the blood cultures, and subsequently, the patient.

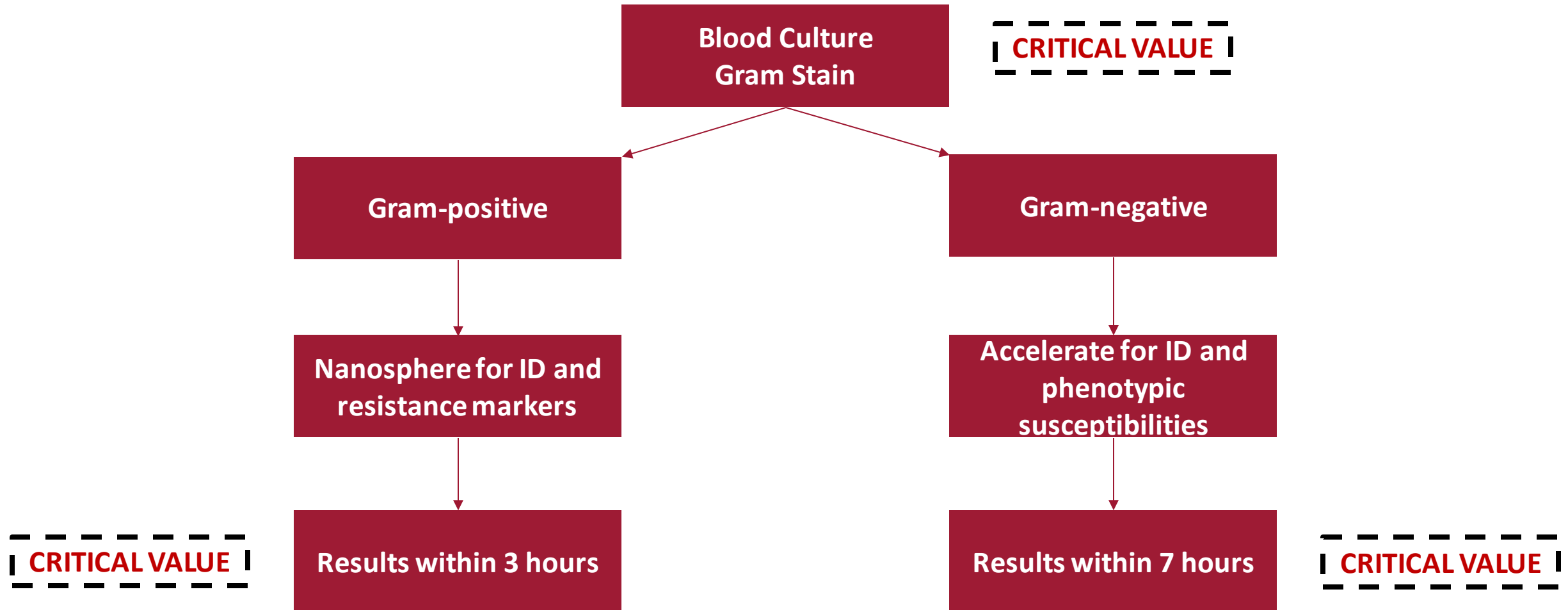
After Threshold Met

- Processing:
 - Microscopic examination (Gram-staining)



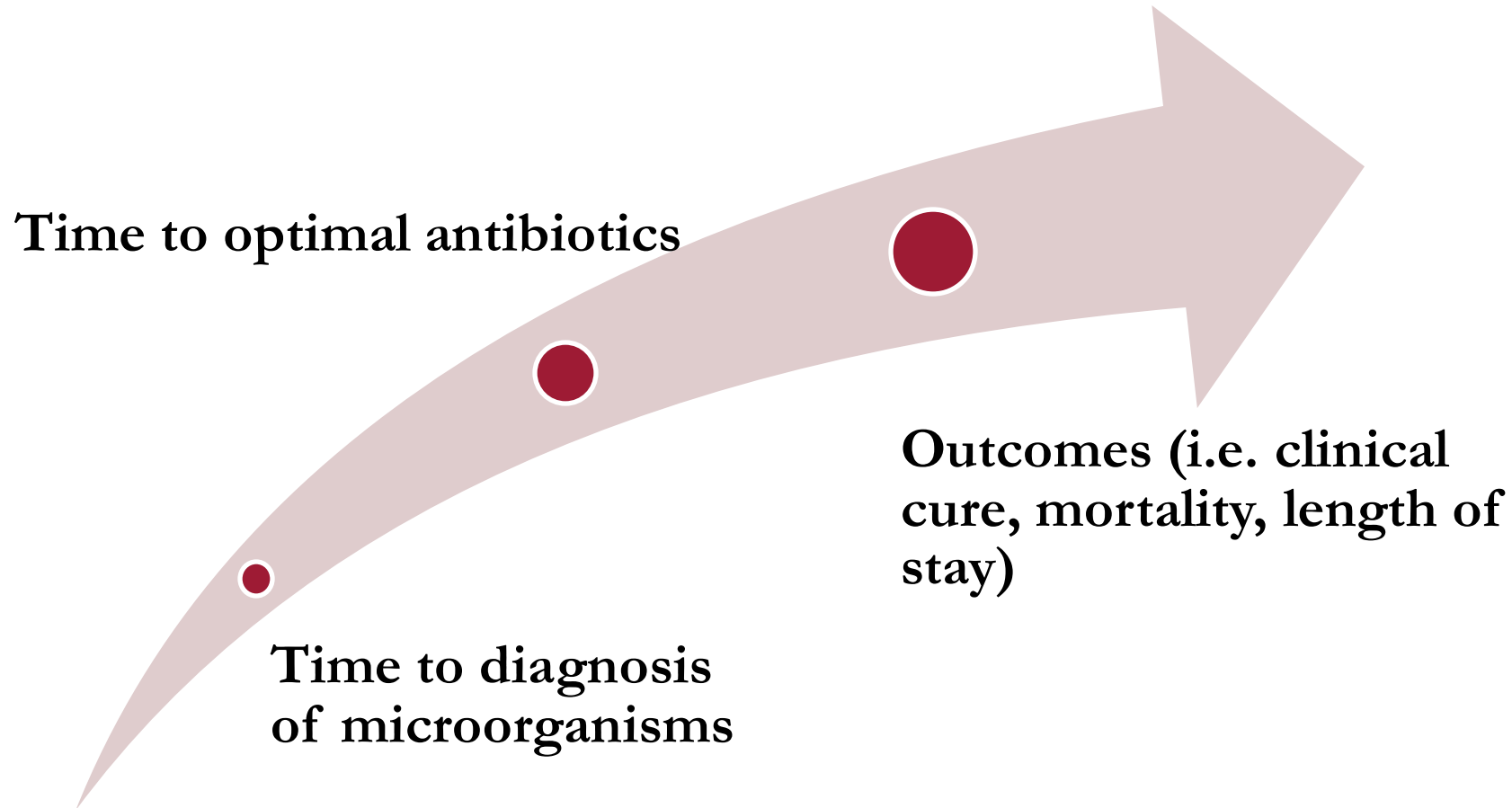
- Call is made to floor to notify of results (i.e. Gram-positive cocci or GPC, Gram-negative rod or GNR)

Rapid Blood Culture Identification



Overall Impact on Use of Rapid Diagnostics

- As the technology expands, we expect to see improvements in..



Overall Impact on Use of Rapid Diagnostics

- As the

With the ability to be provided some information earlier (what organism and what resistance genes it may harbor), we have the opportunity to provide optimal medical care quicker than before.

Time to optimal antibiotics



Outcomes (i.e. clinical cure, mortality, length of stay)



Time to diagnosis of microorganisms

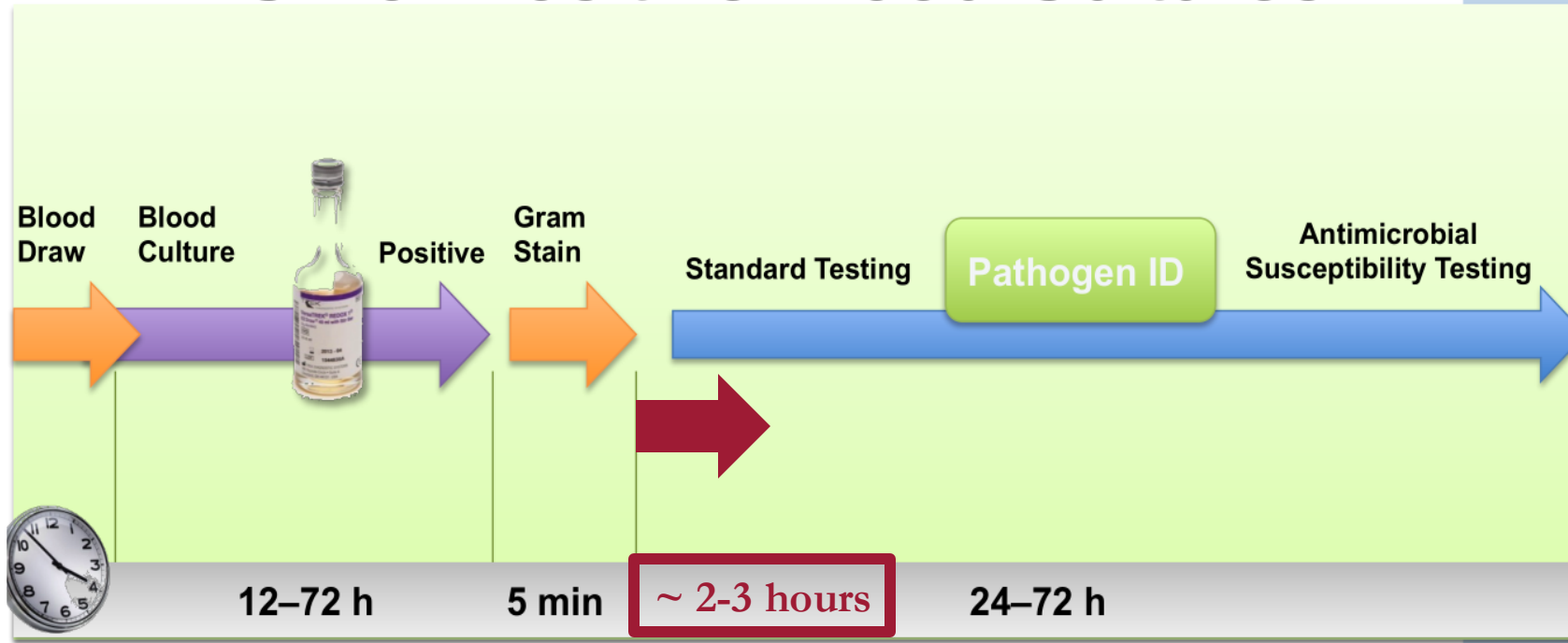


What is Nanosphere®?

- Rapid diagnostic procedure
- Currently available tests (FDA approved):
 - Blood specimens
 - Stool specimens
 - Respiratory specimens
- Technology:
 - Use of nanoparticles (13-20 nanometers in diameter)
 - Functionalized with defined pieces of DNA or RNA; or defined number of antibodies specified to detect proteins of interest

Just How Rapid is “Rapid”?

AST of Positive Blood Cultures



Results:

1. ID of organism
2. Resistance genes absence or detection

*full susceptibility requires completion of gold standard process

Can's and Cannot's of Nanosphere®

Nanosphere **CAN**:

1. Provide **identification** of most common bloodstream infection (Gram-positive) organisms **2-3 hours after it is detected as positive**.
2. **Detect the presence or absence** of the most common **resistance genes** (Ex: identification of *S.aureus* with mecA detection means it is a methicillin-resistant *S.aureus*, or MRSA)

Nanosphere **CANNOT**:

1. Make the blood culture turn positive quicker
2. Accept **direct specimens** (i.e. urine, blood, sputum, CSF directly from the patient into machine)
3. Provide full drug susceptibility results or minimum inhibitory concentrations (**MICs**)

How Can Nanosphere® Impact Patient Care?

- Give clinicians better sense of the infectious diseases state earlier during hospitalization by:
 - Providing identification of organism detected in blood culture
 - Detecting presence or absence of resistance genes
- Provide clinicians with additional information to optimize therapy and management (whether medically, surgically, etc.)

Nanosphere Accuracy: Sensitivity/Specificity for **Organism** Identification

Study Authors	Specimens Tested (n)	Sensitivity (%)	Specificity (%)
Wojewoda et al.	109	99	99
Alby et al.	78	98.6	Not reported
Samuel et al.	178	94	Not reported
Hongsermeier et al.	125	100	100

Nanosphere Accuracy: Sensitivity/Specificity for **Organism** Identification

Study Authors	Specimens Tested (n)	Sensitivity (%)	Specificity (%)
Keep in mind:		99	99
Specificity is the ability to detect the bug when it is actually present		98.6	Not reported
Sensitivity is the ability to accurately “not detect” any bugs when there is actually none present		94	Not reported
		100	100

Sensitivity/Specificity for Resistance Genes

Table 4. Detection of resistance determinants *mecA*, *vanA*, and *vanB* in prospectively collected monomicrobial blood cultures by Verigene BC-GP (*n* = 599 *S. aureus*/*S. epidermidis*, *n* = 81 *E. faecalis*/*E. faecium*).

Target	Site	TP	FP	TN	FN	Total ^a	Sensitivity (CI) ^b	Specificity (CI)
<i>mecA</i> ^c	A	41	1	36	0	78	100% (91–100)	97.3% (58–99)
	B	92	2	49	0	143	100% (96–100)	96.1% (86–99)
	C	29	3	30	0	62	100% (88–100)	90.9% (75–98)
	D	89	2	69	4	164	95.7% (89–98)	97.2% (90–99)
	E	97	6	48	1	152	99.0% (94–100)	88.9% (77–95)
	Total	348	14^d	232	5^e	599	98.6% (96–99)	94.3% (90–96)
<i>vanA</i> ^f	A	4	0	11	0	15	100% (39–100)	100% (79–100)
	B	9	0	11	0	20	100% (66–100)	100% (71–100)
	C	0	0	6	0	6	NA	100% (54–100)
	D	10	0	15	0	25	100% (69–100)	100% (78–100)
	E	3	0	12	0	15	100% (29–100)	100% (73–100)
	Total	26	0	55	0	81	100% (86–100)	100% (93–100)
<i>vanB</i> ^{g,h}	Total	0	0	0	0	0	NA	NA

Table adapted from Buchan BW et al. PLoS Med 2013

TP = true positive
 FP = false positive
 TN = true negative
 FN = false negative

Sensitivity/Specificity for Resistance Genes

So what do the resistance genes mean?

Detection of:

1. *mecA* – gene that codes for methicillin resistance. **Beta-lactam drugs** such as methicillin, nafcillin, oxacillin, cefazolin will **NOT** be effective
2. *vanA* – gene that codes for vancomycin resistance. **Vancomycin** will **NOT** be effective
3. *vanB* – gene that codes for vancomycin resistance. **Vancomycin** will **NOT** be effective

y collected monomicrobial blood cultures by

Sensitivity (CI) ^b	Specificity (CI)
100% (91–100)	97.3% (58–99)
100% (96–100)	96.1% (86–99)
100% (88–100)	90.9% (75–98)
95.7% (89–98)	97.2% (90–99)
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98.6% (96–99)	94.3% (90–96)
100% (39–100)	100% (79–100)
100% (66–100)	100% (71–100)
NA	100% (54–100)
100% (69–100)	100% (78–100)
100% (29–100)	100% (73–100)
100% (86–100)	100% (93–100)
NA	NA

TP = true positive
FP = false positive
TN = true negative
FN = false negative

Implementation of Nanosphere at MMC

To be run on blood culture specimens in which the Gram-stain results shows Gram-positive organisms

TARGETS	US/FDA-Cleared
Species	
<i>Staphylococcus aureus</i>	•
<i>Staphylococcus epidermidis</i>	•
<i>Staphylococcus lugdunensis</i>	•
<i>Streptococcus anginosus</i> Group	•
<i>Streptococcus agalactiae</i>	•
<i>Streptococcus pneumoniae</i>	•
<i>Streptococcus pyogenes</i>	•
<i>Enterococcus faecalis</i>	•
<i>Enterococcus faecium</i>	•
Genus	
<i>Staphylococcus</i> spp.	•
<i>Streptococcus</i> spp.	•
<i>Micrococcus</i> spp.	
<i>Listeria</i> spp.	•

This list encompasses all the organisms that the machine can detect.

If none of these organisms is identified by Nanosphere®, then the result will show “Not detected by molecular method”

How Can I See the Results in EPIC?

Micro Results

Snapshot Overview **Micro Results** MAR Rx i-Vent Sum by Pat Labs Treatment Team Pt Clinical Info ABx Summary SBAR Handoff Index MAR

In Process Microbiology Results (Last 365 days)
No orders found from 11/26/2014 to 11/26/2015.

Final Microbiology Results (Last 365 days)

Date and Time	Order Name	Sensitivity	Status	Description
10/2/2015 1724	Culture Blood - #1 of 2		Final	
10/2/2015 1723	Culture Blood - #2 of 2		Final	
9/20/2015 1115	Culture VRE - Now		Final	
9/20/2015 1115	Culture MRSA - Now		Final	
9/18/2015 1545	Culture Anaerobic + Aerobic Other Specimen w/Stain	Y	Final	STAPHYLOCOCCUS AUREUS
9/18/2015 1538	Culture Anaerobic + Aerobic Other Specimen w/Stain		Final	
9/18/2015 1516	Culture Anaerobic + Aerobic Other Specimen w/Stain		Final	
9/17/2015 1823	Culture Blood - #2 of 2		Final	
9/17/2015 1823	Culture Blood - #1 of 2		Final	
9/16/2015 1515	Culture Routine w/ Gram Stain	Y	Final	STAPHYLOCOCCUS AUREUS
9/16/2015 1230	Culture VRE		Final	
9/16/2015 1230	Culture MRSA		Final	
9/15/2015 2125	Culture Blood - #1 of 2		Final	
9/15/2015 2100	Rapid Blood Culture Identification		Final-Edited	
9/15/2015 2100	Rapid Blood Culture Identification		Final-Edited	
9/15/2015 2100	Culture Blood - #2 of 2	Y	Final	STAPHYLOCOCCUS AUREUS
5/10/2015 0400	Culture MRSA - Now		Final	

Micro Results

Snapshot Overview **Micro Results** MAR Rx i-Vent Sum by Pat Labs Treatment Team Pt Clinical Info ABx Summary SBAR Handoff Index MAR ADMIN

Rapid Blood Culture Identification Results Status: Edited Result - FINAL 9/21/2015 8:09 AM

Comments
#2 OF 2 ,VENIPUNCTURE, STAT

Component Results

Component
Rapid Blood Culture Identification
 Staphylococcus aureus (Mec A negative) - detected by molecular testing. MSSA (methicillin-susceptible S. aureus) Susceptibility and phenotypical confirmation to follow.
 -
 Negative for other Staphylococcus, Streptococcus, E.faecalis, E. faecium, and Listeria species.
 RAPID ORGANISM IDENTIFICATION CALLED TO LAURIE :ON
 09/17/2015 :AT 1130:BY DT02:RB.

Specimen Information
Collected: 9/15/2015 9:00 PM

Resulting Agency: NORDX SCARBOROUGH CAMPUS

How Can I See the Results in EPIC?

Micro Results

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9/20/2015 1115	Culture MRSA - Now		Final	
9/18/2015 1545	Culture Anaerobic + Aerobic C w/Stain			
9/18/2015 1538	Culture Anaerobic + Aerobic C w/Stain			
9/18/2015 1516	Culture Anaerobic + Aerobic C w/Stain			
9/17/2015 1823	Culture Blood - #2 of 2			
9/17/2015 1823	Culture Blood - #1 of 2			
9/16/2015 1515	Culture Routine w/ Gram Stain			
9/16/2015 1230	Culture VRE			
9/16/2015 1230	Culture MRSA		Final	
9/15/2015 2125	Culture Blood - #1 of 2		Final	
9/15/2015 2100	Rapid Blood Culture Identification		Final-Edited	
9/15/2015 2100	Rapid Blood Culture Identification		Final-Edited	
9/15/2015 2100	Culture Blood - #2 of 2	Y	Final	STAPHYLOCOCCUS AUREUS
5/10/2015 0400	Culture MRSA - Now		Final	

The Nanosphere® results can be found under the “Micro Results” tab and under the header “Rapid Blood Culture Identification”

Micro Results

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Specimen Information
Collected: 9/15/2015 9:00 PM
Resulting Agency: NORDX SCARBOROUGH CAMPUS

How should the results be used clinically?

Just like any other diagnostic tool or lab value, the results of the Rapid Blood Culture ID should be used in context of each **individualized patient**.

The results are meant to **add value** to the current gold-standard process of blood cultures, **NOT replace**.

Implementation of Nanosphere at MMC

Will be used on blood culture specimens where the Gram-stain results shows Gram-positive organisms

TARGETS	US/FDA-Cleared
Species	
<i>Staphylococcus aureus</i>	•
<i>Staphylococcus epidermidis</i>	•
<i>Staphylococcus lugdunensis</i>	•
<i>Streptococcus anginosus</i> Group	•
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<i>Streptococcus pneumoniae</i>	•
<i>Streptococcus pyogenes</i>	•
<i>Enterococcus faecalis</i>	•
<i>Enterococcus faecium</i>	•
Genus	
<i>Staphylococcus</i> spp.	•
<i>Streptococcus</i> spp.	•
<i>Micrococcus</i> spp.	
<i>Listeria</i> spp.	•

This list encompasses all the organisms that the machine can detect.

If none of these organisms is identified by Nanosphere®, then the result will show “Not detected by molecular method”

As a General Reference Guide

- *Staphylococcus aureus* (ID consultation highly recommended)
 - **mecA not detected** – suggests presence of a methicillin-susceptible *S.aureus* (MSSA).
 - » Rx options (preferred over vancomycin): nafcillin, oxacillin, cefazolin
 - **mecA detected** – suggests presence of a methicillin-resistant *S.aureus* (MRSA).
 - » Rx options: vancomycin, linezolid, daptomycin
- *Enterococcus faecalis* or *faecium* (ID consultation highly recommended)
 - **vanA/vanB not detected** – suggests presence of a vancomycin-susceptible *E.faecalis* or *E.faecium*.
 - » Rx options: vancomycin, ampicillin* (if susceptible, requires full susceptibility work-up)
 - **vanA/vanB detected** – suggests presence of a vancomycin-resistant *E.faecalis* or *E.faecium*.
 - » Rx options: linezolid, daptomycin** (cannot be used if suspecting respiratory infection)

Antibiotic Drug of Choice by Organism

MSSA

- Cefazolin
- Oxacillin
- Nafcillin

MRSA

- Vancomycin

Staphylococcus epidermidis (mec A negative)*

- Cefazolin
 - Oxacillin
 - Nafcillin
- *If concern for clinical infection

Staphylococcus epidermidis (mec A positive)*

- Vancomycin
- *If concern for clinical infection

Staphylococcus spp.*

- Vancomycin
- *If concern for clinical infection

Antibiotic Drug of Choice by Organism

Group A & B *Streptococcus*

- Penicillin
- Ceftriaxone

Streptococcus pneumoniae

- No meningitis
 - Ceftriaxone
- Meningitis
 - Vancomycin + Ceftriaxone (continue vancomycin until susceptibilities)

Streptococcus anginosus

- Ceftriaxone

Streptococcus spp.

- Ceftriaxone

If concern for endocarditis, consider addition of vancomycin until susceptibilities

Antibiotic Drug of Choice by Organism

E. faecalis
(van A, van B negative)

- Ampicillin

+/- ceftriaxone (if concern for endocarditis)

E. faecium
(van A, van B negative)

- Vancomycin

E. Faecium
(van A or van B
detected =VRE)

- Daptomycin
- Linezolid

Accelerate Pheno™

- Rapid diagnostic procedure using fluorescence *in situ* hybridization (FISH) followed by morphokinetic cellular analysis for phenotypic susceptibility testing
- Provides ID and limited susceptibility panels for specific gram-negative isolates:
 - Identification = 2 hours from blood culture positivity
 - Susceptibility = 4 additional hours (6 hours from blood culture positivity)
 - *E. coli*, *Klebsiella* spp, *Enterbacter* spp, *Proteus* spp, *Citrobacter* spp, *S. marcescens*, *P. aeruginosa*, *A. baumannii*



Example Accelerate Pheno ID & Susceptibility

Rapid Blood Culture ID and Susceptibility [246116133] (Abnormal) ⚠

Order Status: Completed

Specimen: Blood

Rapid Blood Culture ID and Susceptibility

Lab Status: Edited Result - FINAL

Collected: 01/21/22 1355

Updated: 01/22/22 1540

**RAPID ID AND SUSCEPTIBILITY CALLED TO: LISA BICKNELL ON:
01/22/2022 AT: 15:37 BY:CG06 ;RB.**

**ADDITIONAL ANTIMICROBIALS WILL BE REPORTED FROM THE STANDARD
SUSCEPTIBILITY TEST.**

!

SERRATIA MARCESCENS.

AMPICILLIN, CEFAZOLIN, CEFTAZIDIME/AVIBACTAM, AND

TRIMETHOPRIM/SULFAMETHOXAZOLE PERFORMANCE CHARACTERISTICS

**WERE DETERMINED AND VALIDATED BY NORDX. THEY HAVE NOT BEEN
CLEARED OR APPROVED BY THE FDA.**

**HOWEVER, THEY ARE USED FOR CLINICAL PURPOSES AND SHOULD NOT
BE REGARDED AS INVESTIGATIONAL OR RESEARCH.**

!

Susceptibility

Serratia marcescens. (11)

Antibiotic	Interpretation	Method	Status
AMIKACIN.	Sensitive	Not Specified	Final
AZTREONAM.	Sensitive	Not Specified	Final
CEFEPIME.	Sensitive	Not Specified	Final
CEFTAZIDIME.	Sensitive	Not Specified	Final
CEFTRIAXONE.	Sensitive	Not Specified	Final
CIPROFLOXACIN.	Sensitive	Not Specified	Final
ERTAPENEM.	Sensitive	Not Specified	Final
GENTAMICIN.	Sensitive	Not Specified	Final
MEROPENEM.	Sensitive	Not Specified	Final
PIPERACILLIN/TAZOBACTAM.	Sensitive	Not Specified	Final
TOBRAMYCIN.	Sensitive	Not Specified	Final
TRIMETHOPRIM/SULFA.	Sensitive	Not Specified	Final

Identification Accuracy

- Overall Identification Performance:
 - Sensitivity (true positives divided by reference positives): 91.3%
 - Specificity (true negatives divided by total reference negatives): 99.9%
- Interpretation: shouldn't show an identification when the blood culture is negative, but might not always catch the organism if the blood culture is positive

Susceptibility Accuracy

Overall AST Performance		n = 385
	Goal	Result
Essential Agreement	≥90%	96.9%
Categorical Agreement	≥90%	95.2%

Essential Agreement: % of test MICs that are within ± 1 doubling dilution of the reference method
Categorical Agreement: % of test results with the same category result (S I R) as the reference method

Susceptibility Accuracy

Antibiotic	Count	Essential Agreement	Count	Categorical Agreement
Amikacin	382/382	100%	382/382	100%
Gentamicin	384/385	99.7%	382/385	99.2%
Tobramycin	373/383	97.4%	363/383	94.8%
Aztreonam	371/382	97.1%	370/382	96.9%
Cefazolin	296/323	91.6%	276/323	85.4%
Cefepime	378/385	98.2%	377/385	97.9%
Ceftazidime	341/380	89.7%	339/380	89.2%
Ceftriaxone	374/382	97.9%	365/382	95.5%

Of note: 2021 software update so far resulting in even higher essential and categorical agreement, more data pending

Susceptibility Accuracy

Antibiotic	Count	Essential Agreement	Count	Categorical Agreement
Ertapenem	382/384	99.5%	382/384	99.5%
Meropenem	360/364	98.9%	360/364	98.9%
Piperacillin-Tazobactam	362/384	94.3%	364/384	94.8%
Ciprofloxacin	332/338	98.2%	321/338	95.0%
Ampicillin	25/25	100%	25/25	100%
Ceftazidime-Avibactam	12/12	100%	12/12	100%
Trimethoprim-Sulfamethoxazole	43/43	100%	43/43	100%

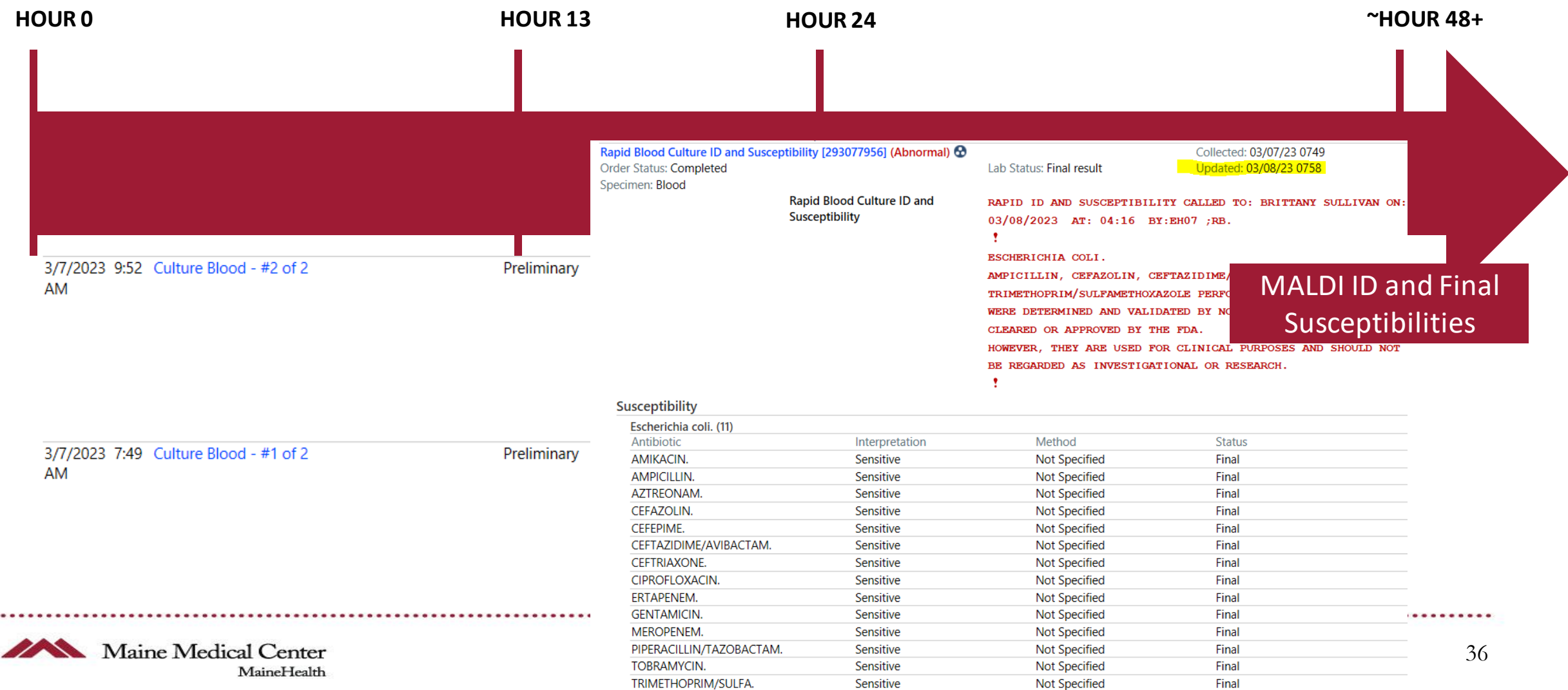
Of note: 2021 software update so far resulting in even higher essential and categorical agreement, more data pending

Clinical Utility of Accelerate Pheno™

- Early IV de-escalations
 - De-escalating to ceftriaxone, cefazolin, ampicillin for (S) organisms
- Early escalations
 - Escalating to meropenem, ceftazidime-avibactam for cefepime, pip-tazo (R) organisms
- Early IV to PO transitions for uncomplicated gram-negative bacteremia
- **Prevention of admission for uncomplicated GNR bacteremia in patients already home?**



Example Timeline for GNR Bacteremia



How Does this Impact ED Workflow for Patients Discharged?


Clinical Situations & Blood Culture Organisms Requiring ED Assessments/Readmissions

- Patients with at least 1 positive blood culture with any of the following:
 - *Staphylococcus aureus*
 - *Staphylococcus lugdunensis*
 - *Enterococcus faecalis*
 - *Enterococcus faecium*
 - Yeast

Clinical Situations & Blood Culture Organisms May Forgo ED Assessment

- Patients with suspected blood culture contaminants
 - Only 1 blood culture with the following:
 - *Staphylococcus epidermidis*
 - *Staphylococcus* species
 - *Streptococcus* species
 - *Gram-positive rod*
- **Patients with uncomplicated GNR bacteremia who are clinically improved AND on susceptible antibiotics as confirmed by rapid blood culture ID and susceptibility**

Who to Call?

Pharmacists		Service Based Coverage		
		Pediatrics- PICU	7a-7a	Peds Pharmacist Pharmacist 207-662-7976 ☎
		Pediatrics- Gen Peds	7a-7a	Peds Pharmacist Pharmacist 207-662-1497 ☎
		Pediatrics- Oncology	7a-7a	Peds Pharmacist Pharmacist 207-662-0176 ☎
		Mother Baby Care- PNC, LDR, MBC, NICU, CCN	7a-7a	Peds Pharmacist Pharmacist 207-662-0598 ☎
		Cards - R7, ACCU	7a-7a	Cards Pharmacist Pharmacist 207-662-7979 ☎
		Cards - R9W, CICU	7a-7a	Cards Pharmacist Pharmacist 207-662-7935 ☎
		Critical Care- KPV6-NeuroICU, SCU3	7a-7a	Crit Care Pharmacist Pharmacist 207-662-7980 ☎
		Critical Care- KPV6-SICU	7a-7a	Crit Care Pharmacist Pharmacist 207-662-0447 ☎
		Critical Care- KPV6-MICU, SCU2	7a-7a	Crit Care Pharmacist Pharmacist 207-662-0183 ☎
		Critical Care- SCU1, SCU4, R1	7a-7a	Crit Care Pharmacist Pharmacist 207-662-7933 ☎
		Emergency Department	7a-7a	ED Pharmacist Pharmacist 207-662-4065 ☎
		Med- R2, P2C	7a-7a	Med Surg Pharmacist Pharmacist 207-662-7936 ☎
		Med- Bean5	7a-7a	Med Surg Pharmacist Pharmacist 207-662-1916 ☎
		Med- P3CD, P6	7a-7a	Med Surg Pharmacist Pharmacist 207-662-7981 ☎
		Med - R3, P4C	7a-7a	Medicine Pharmacist Pharmacist 207-662-7977 ☎
		Med - R5, CFT1	7a-7a	Med Surg Pharmacist Pharmacist 207-662-7934 ☎
		Med - R6, Bean 2	7a-7a	Medicine Pharmacist Pharmacist 207-662-0232 ☎
		Oncology- CFT7, R4	7a-7a	Oncology Pharmacist Pharmacist 207-662-7978 ☎
		Oncology- Adult Med A	7a-7a	Oncology Pharmacist Pharmacist 207-662-0255 ☎
		OR- ASU, Main, PACU	6a-2:30p	OR Pharmacist Pharmacist 207-662-1177 ☎
		OR- Surg 2	6a-2:30p	OR Pharmacist Pharmacist 207-662-1176 ☎
		OR- SSC	6a-2:30p	OR Pharmacist Pharmacist 207-396-7616 ☎
Pharmacy Administration				
		Leader 	8a-8a	Civiello, Jen Pharmacy Admin 207-741-6824
ID Pharmacy Specialists				
		MMC General ABx Questions (ASP)	7:30a-4p	Connolly, Kristina ASP Pharmacist 207-741-0533
		ID Consult (Inpatient Teaching, A)	8a-4:30p	Mercuro, Nick Pharmacist 207-661-5170
		ID Consult (Inpt Non-Teaching, B&C)	8a-4:30p	Mercuro, Nick Pharmacist 207-661-5170
		ID MMP (Outpatient)	7:30a-4p	Schenk, Carly ASP Pharmacist 662-2745
		COVID MaineHealth Outpatient	8a-4p	Dollard, Eliza ASP Pharmacist 207-662-6934

ASP Coverage 7 days a week, including holidays!

Inpatient Team

Adults



Patricia Stogsdill
Medical Director



Kristina Connolly
ID Pharmacist



Nick Mercuro
ID Pharmacist



Victoria Mullins
ID Pharmacy Resident

Pediatrics



Jennifer Jubulis
Medical Director



Eliza Dollard
ID Pharmacist

Outpatient Team

ID Clinic/MMP ASP



Minkey Wungwattana
ID Pharmacist

Gilman Street Clinic



Carly Schenk
ID Pharmacist

Minkey also serves as the Director of the PGY2
ID Pharmacy Residency Program & leader of the
MaineHealth ASP



Rapid Blood Culture Diagnostics in the ED

Kristina Connolly, PharmD, BCIDP

Infectious Diseases Clinical Pharmacist

May 3, 2023

Special thanks to Minkey Wungwattana, PharmD and Eliza Dollard, PharmD for sharing slides!

