Lab Life After a New LIS and EMR:

Epic Successes and Lessons Learned

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Learning Objectives

1. Describe the process of implementing a new LIS/EMR
2. Describe the challenges of the build and the resolutions
3. Recall the improvements of lab workflow, provider ordering, and quality monitoring

Survey: What best describes your EMR/LIS situation?

Trendie
(<5 years)

State of terror
(upcoming)

Old hat
(>5 years)

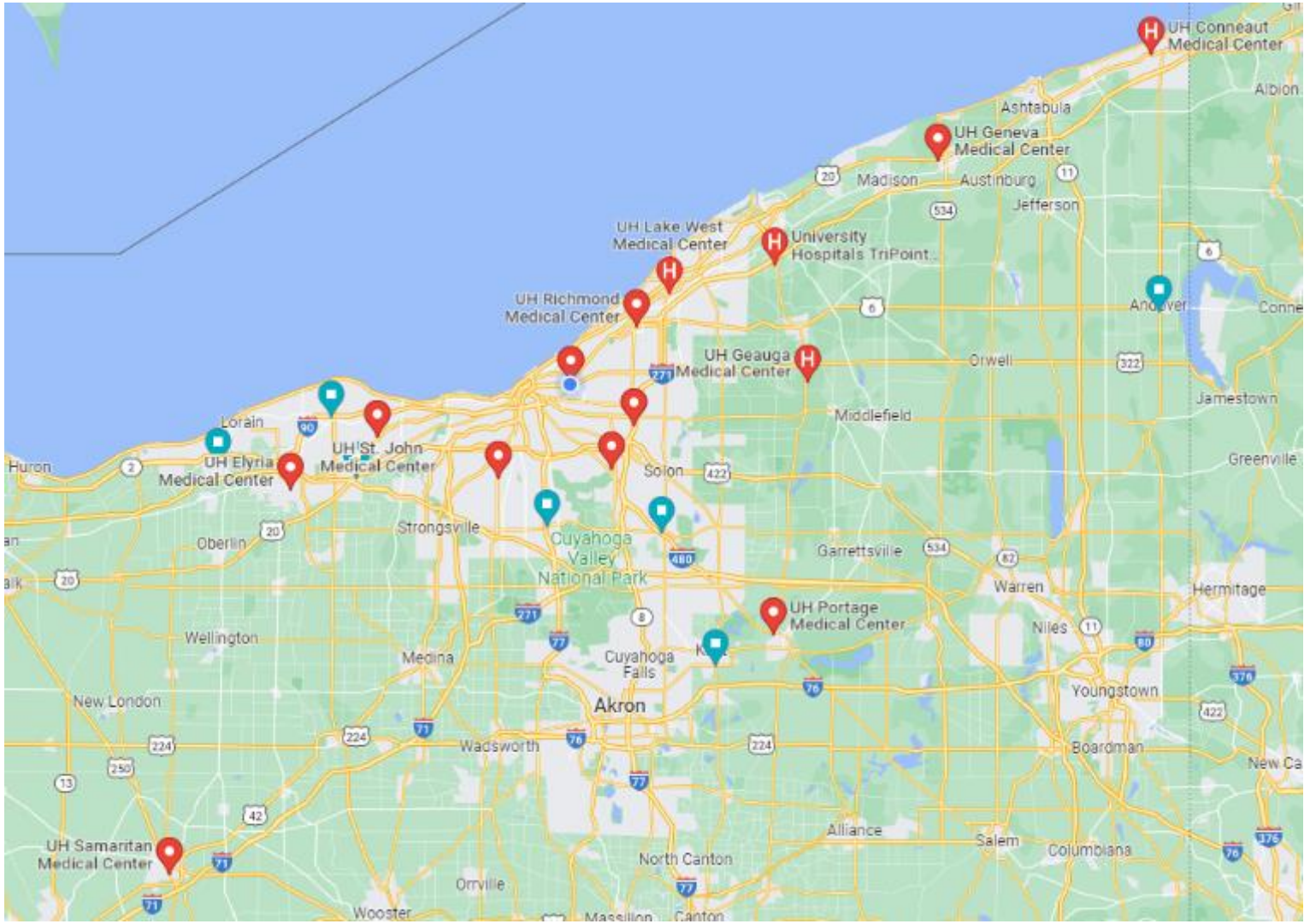
Blissfully
naïve

A Single Perspective is Better Than None

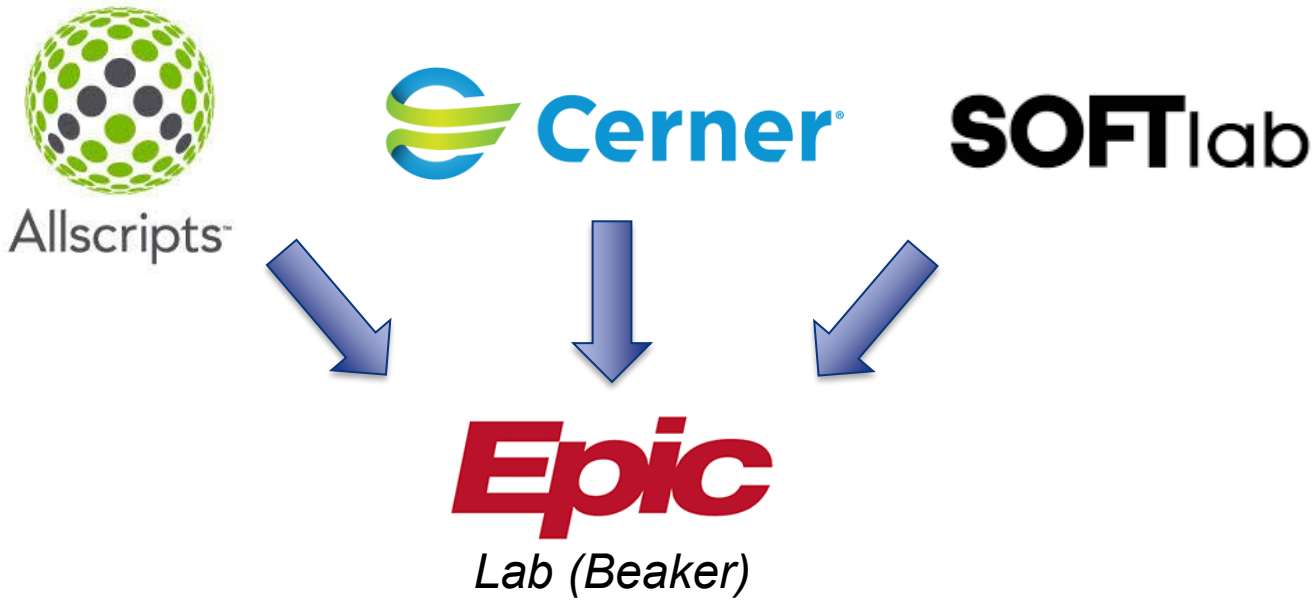
21 Hospitals
- Academic campus
- Pediatric hospital
- Community hospitals
- Rural hospitals

50 health centers & OP facilities
- Transplant patients
- Oncology patients
- Cystic fibrosis patients

Microbiology Services
- Bacteriology
- Mycobacteriology
- Mycology
- Parasitology
- Molecular/Virology



Backstory

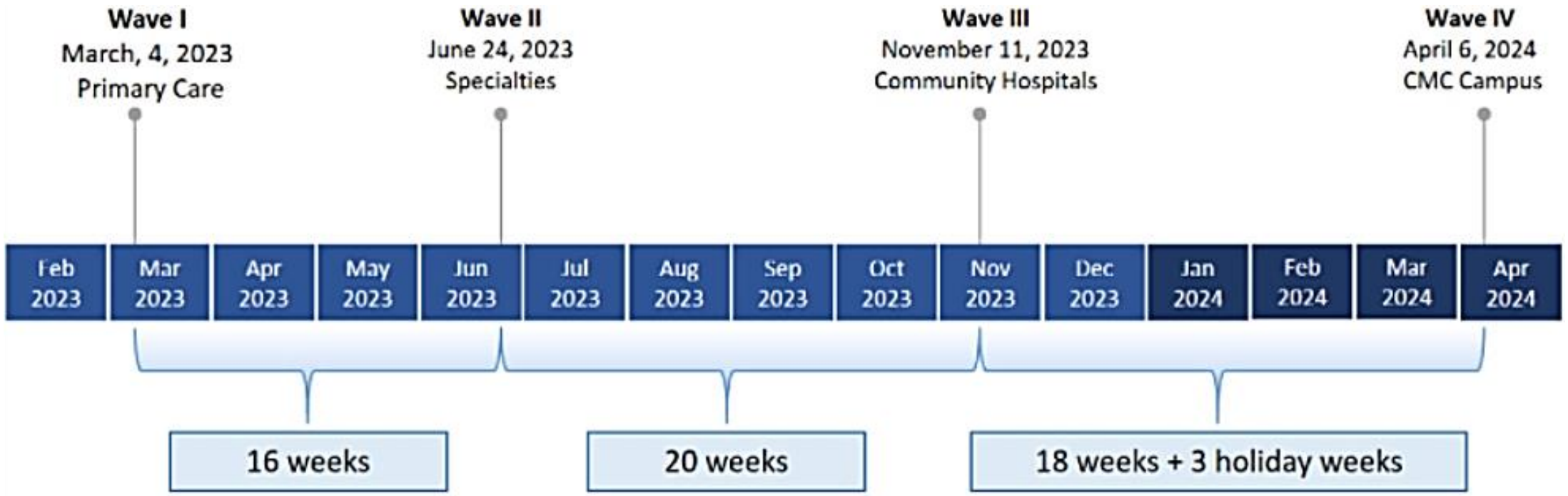


- Why?
  1. Integrated systems
     - Minimize complexity and support costs
     - Improved billing
  2. Provider satisfaction

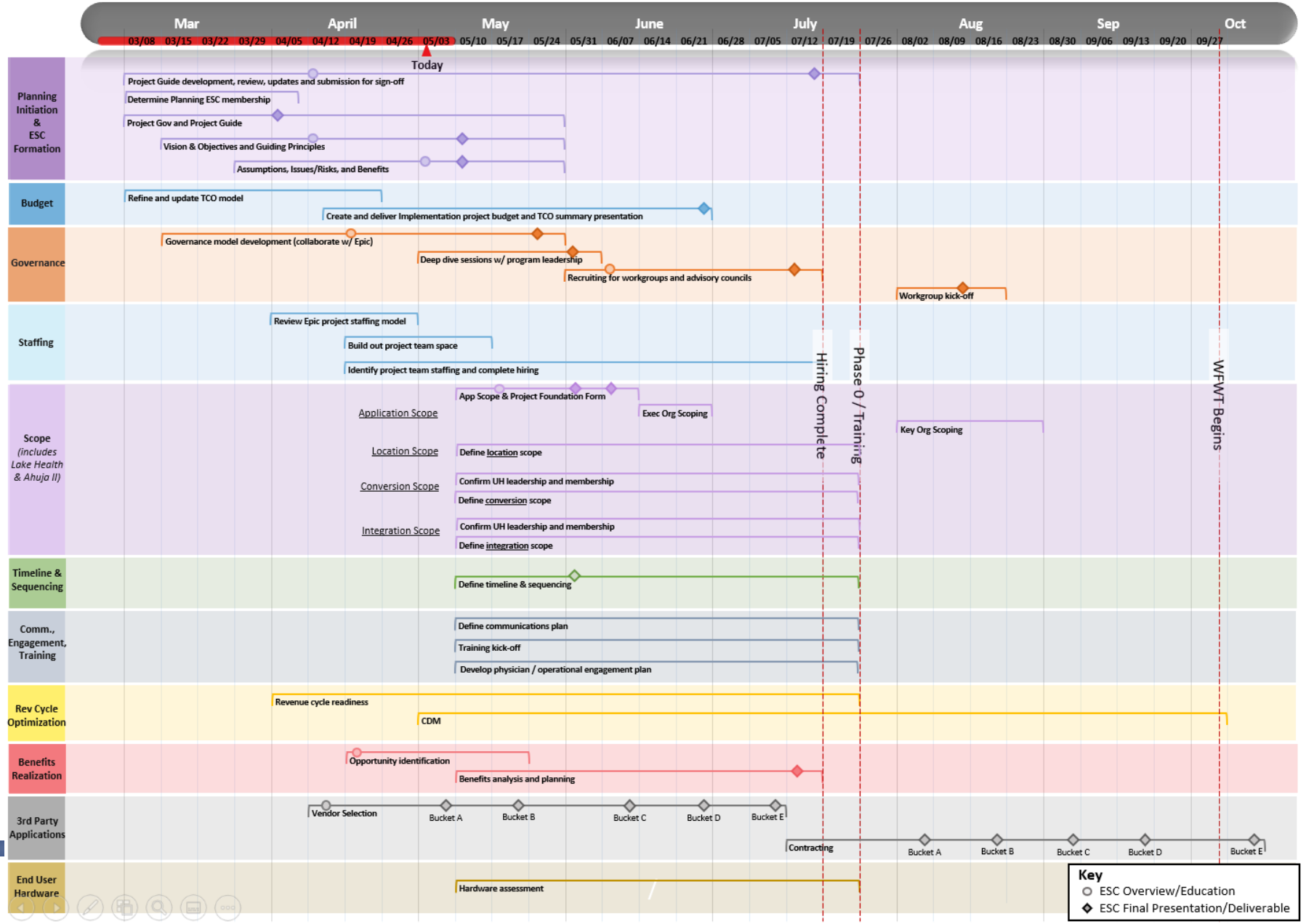
Micro's Epic Implementation Phases

- Phase 0
  - Plan and analyze project
  - Identify project team
- Phase 1
- Phase 2
- Phase 3
- Phase 4
- Phase 5

Proposed Timeline (August 2021)



UH's Epic Implementation Timeline



Project Team

- Lab Manager
  - Cassie Allman
- Micro Epic Analyst
  - Martha Adams
- Microbiology Supervisor
  - Kelly Monahan
- Bacteriology Lead
  - Amanda Palko

Micro's Epic Implementation Phases

- Phase 0
  - Plan and analyze project
  - Identify project team
- Phase 1
  - Identify variation from Foundation System
- Phase 2
- Phase 3
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Foundation System

- Promoted as “Microbiology’s build. Every laboratory is unique and some customization will be required.”

- Identifying variations/customizations
  - Weely 1-hr virtual meetings with two Epic team members

- Work expectations
  - Epic analyst = full time
    - Added contactor
  - Rest of team = 3-5 hrs per week
    - ~90 hrs per week

Example 1: Test Names

- Harmonization
  - Blood Culture
  - Culture, Blood
  - BLOOD CULTURE
  - Blood culture
  - Blood Culture (x2)

- Optimization
  - Urinalysis with culture
  - Urinalysis with reflex to culture
  - Urinalysis, complete
  - Urinalysis & Culture
  - Urinalysis with reflex microscopic and culture

Legal and Billing

  - Urinalysis
  - Urinalysis, microscopic
  - Urinalysis with reflex microscopic

Legal and Billing

Example 2: Organism List

1 Required	2 Required	70 Required	51125 Required	51130 Required	66000
Organism Id	Organism	External Name	Biotype	Phage Type	Auto-infection Update Rules - Infection
1	STAPHYLOCOCCUS	Staphylococcus			
3	STAPHYLOCOCCUS ARLETTAE	Staphylococcus arlettae			
4	STAPHYLOCOCCUS AUREUS	Staphylococcus aureus			Multidrug Resistant Organism (MDRO)
5	STAPHYLOCOCCUS AURICULARIS	Staphylococcus auricularis			
6	STAPHYLOCOCCUS CAPRAE	Staphylococcus caprae			
7	STAPHYLOCOCCUS CHROMOGENES	Staphylococcus chromogenes			
8	STAPHYLOCOCCUS COHNII	Staphylococcus cohnii			
9	STAPHYLOCOCCUS EPIDERMIDIS	Staphylococcus epidermidis			
10	STAPHYLOCOCCUS EQUORUM	Staphylococcus equorum			

- Original list of ~1,100
  - Review found ~1/3 required modification
  - Request to mirror/expand denied
- Legacy organism mapping

Example 3: AST Build

Organism IDs	Organism Name	Organism Type	Organism Group	Organism/Group/Grouper	CLSI Breakpoints Assignment
73	ABIOTROPHIA	Bacteria	Gram-Positive Cocci	"Organism" Abiotrophia species	Abiotrophia species and Granulicat
74	ABIOTROPHIA DEFECTIVA	Bacteria	Gram-Positive Cocci	"Organism" Abiotrophia species	Abiotrophia species and Granulicat
653	ABSIDIA CORYMBIFERA	Fungus	Fungus		None
654	ABSIDIA	Fungus	Fungus		None
655	ACANTHAMOEBA	Parasite	Parasite		None
75	ACHROMOBACTER	Bacteria	Gram-Negative Bacilli	"Grouper" Non Fermenters	Non-Enterobacterales
76	ACHROMOBACTER XYLOSOXIDANS SSP XYLOSOXIDANS	Bacteria	Gram-Negative Bacilli	"Grouper" Non Fermenters	Non-Enterobacterales
656	ACHROMOBACTER DENITRIFICANS	Bacteria	Gram-Negative Bacilli	"Grouper" Non Fermenters	Non-Enterobacterales
657	ACHROMOBACTER DOLENS	Bacteria	Gram-Negative Bacilli	"Grouper" Non Fermenters	Non-Enterobacterales
658	ACHROMOBACTER INSOLITUS	Bacteria	Gram-Negative Bacilli	"Grouper" Non Fermenters	Non-Enterobacterales
659	ACHROMOBACTER INSUAVIS	Bacteria	Gram-Negative Bacilli	"Grouper" Non Fermenters	Non-Enterobacterales
660	ACHROMOBACTER MARPLATENSIS	Bacteria	Gram-Negative Bacilli	"Grouper" Non Fermenters	Non-Enterobacterales
661	ACHROMOBACTER PIECHAUDII	Bacteria	Gram-Negative Bacilli	"Grouper" Non Fermenters	Non-Enterobacterales
662	ACHROMOBACTER RUHLANDII	Bacteria	Gram-Negative Bacilli	"Grouper" Non Fermenters	Non-Enterobacterales
663	ACHROMOBACTER SPANIUS	Bacteria	Gram-Negative Bacilli	"Grouper" Non Fermenters	Non-Enterobacterales
664	ACHROMOBACTER XYLOSOXIDANS	Bacteria	Gram-Negative Bacilli	"Grouper" Non Fermenters	Non-Enterobacterales
665	ACIDAMINOCOCCUS	Bacteria	Gram-Negative Cocci	"Grouper" Anaerobes	Anaerobes

- Groupers!
  - CLSI AST Categories

Foundation is…

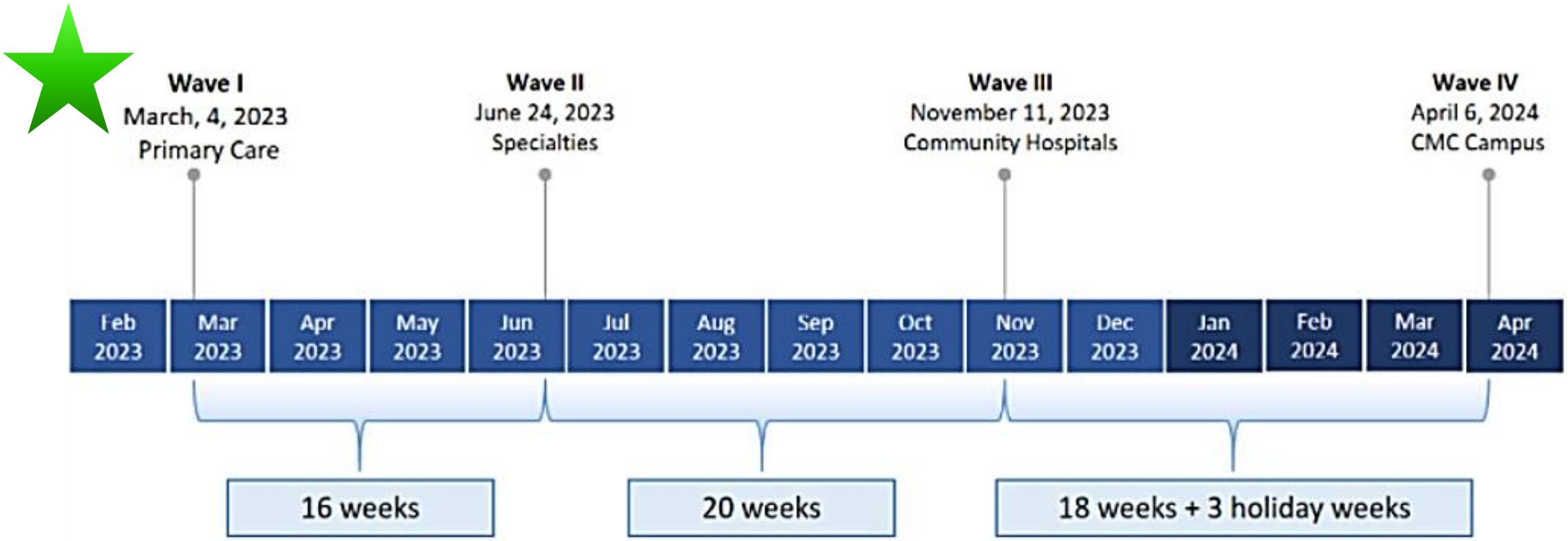
- Promoted as “Microbiology’s build. Every laboratory is unique and some customization will be required.”

- Reality…

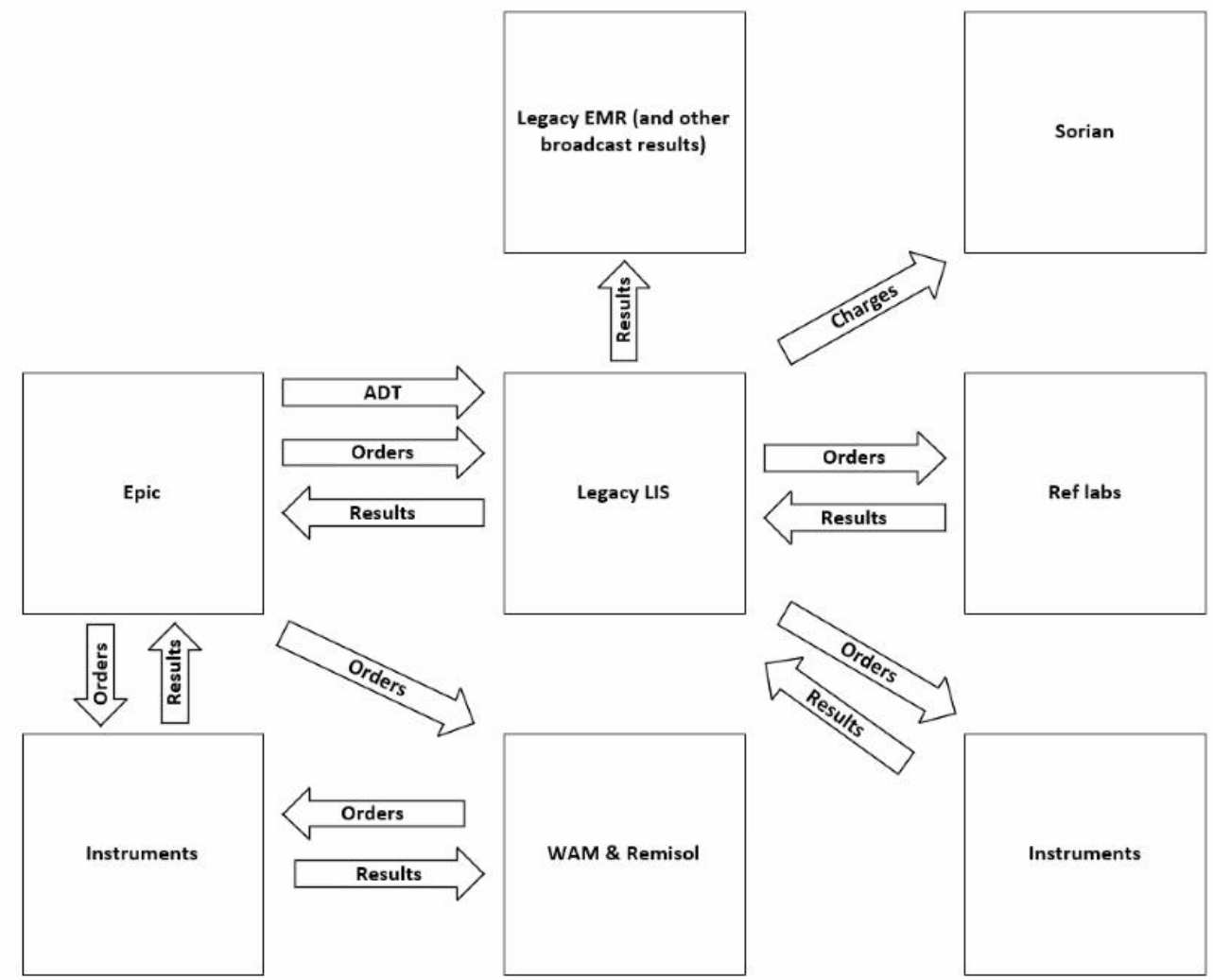
Micro's Epic Implementation Phases

- Phase 0
  - Plan and analyze project
  - Identify project team
- Phase 1
  - Identify variation from Foundation System
- Phase 2 (Dec 2022)
  - Workflow validation sessions
  - Stoplight evaluations
- Phase 3
  - System built
  - "Red light" resolutions/resolved
    - **"Nothing will delay go-live"**
- Phase 4
- Phase 5

Timeline (March 2023)



IT Complexity between Waves 1 and 2



Stratified Approach: Unsustainable

Revised Timeline (April 2023)

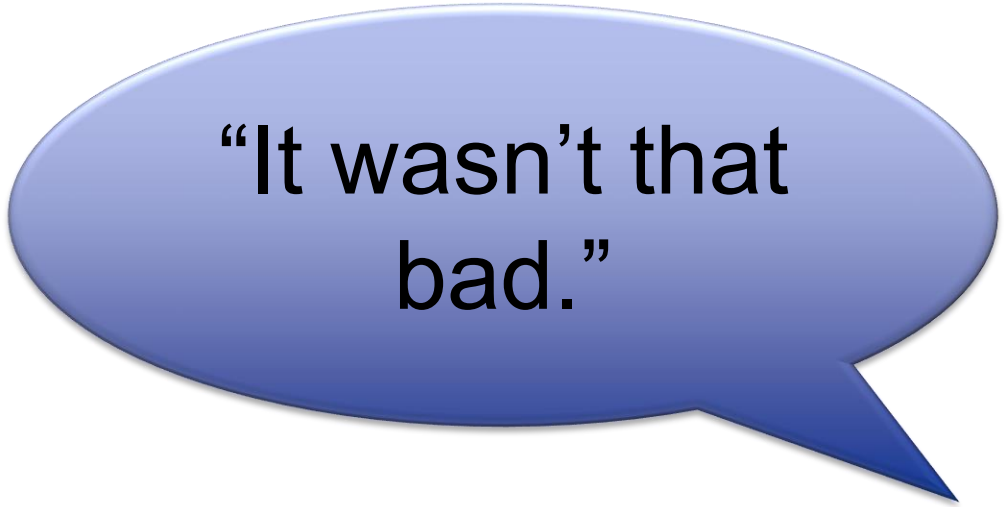
Micro's Epic Implementation Phases

- Phase 0
  - Plan and analyze project
  - Identify project team
- Phase 1
  - Identify variation from Foundation System
- Phase 2
  - Workflow validation sessions
  - Stoplight evaluations
- Phase 3
  - System built
  - "Red light" resolutions/resolved
- Phase 4
  - Conduct workflow test
  - Finalize micro build and test
  - Train end users
- Phase 5
  - System live

Epic/Beaker Go-Live

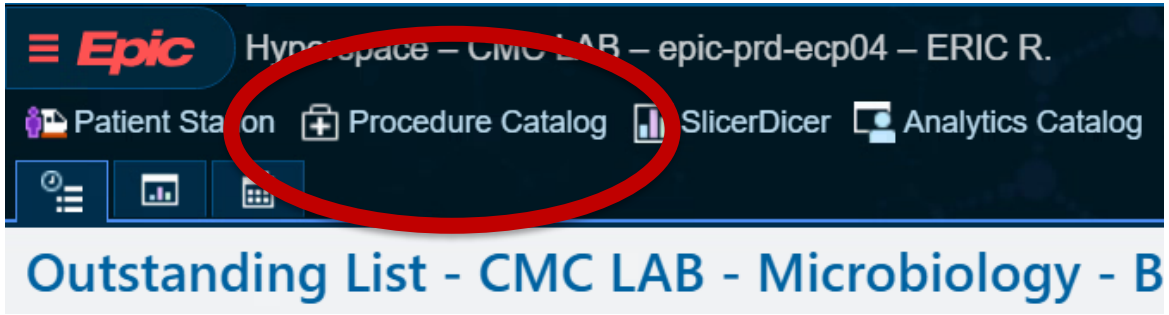
- Wins
  - Command Center
  - Support at the elbow
  - No significant delay increase
  - Centralization of Lake Health
    - ~17% increase in volume
  - Overhauling cascade reporting
  - Automatic organism and AST comments

- Challenges
  - Things that worked in TST didn't work in PROD
  - Beaker training insufficient
  - Labels



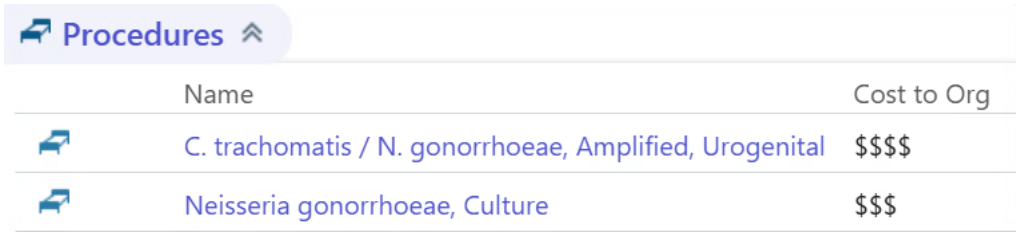
Subsequent Challenges

- Procedure catalog
- Preference lists and order sets
- Maintain legacy LIS simultaneously
  - Final cutover 1 month later
- Procedural vs Non-procedural ordering
  - Specimen Types and Sources



The Wrong Decisions

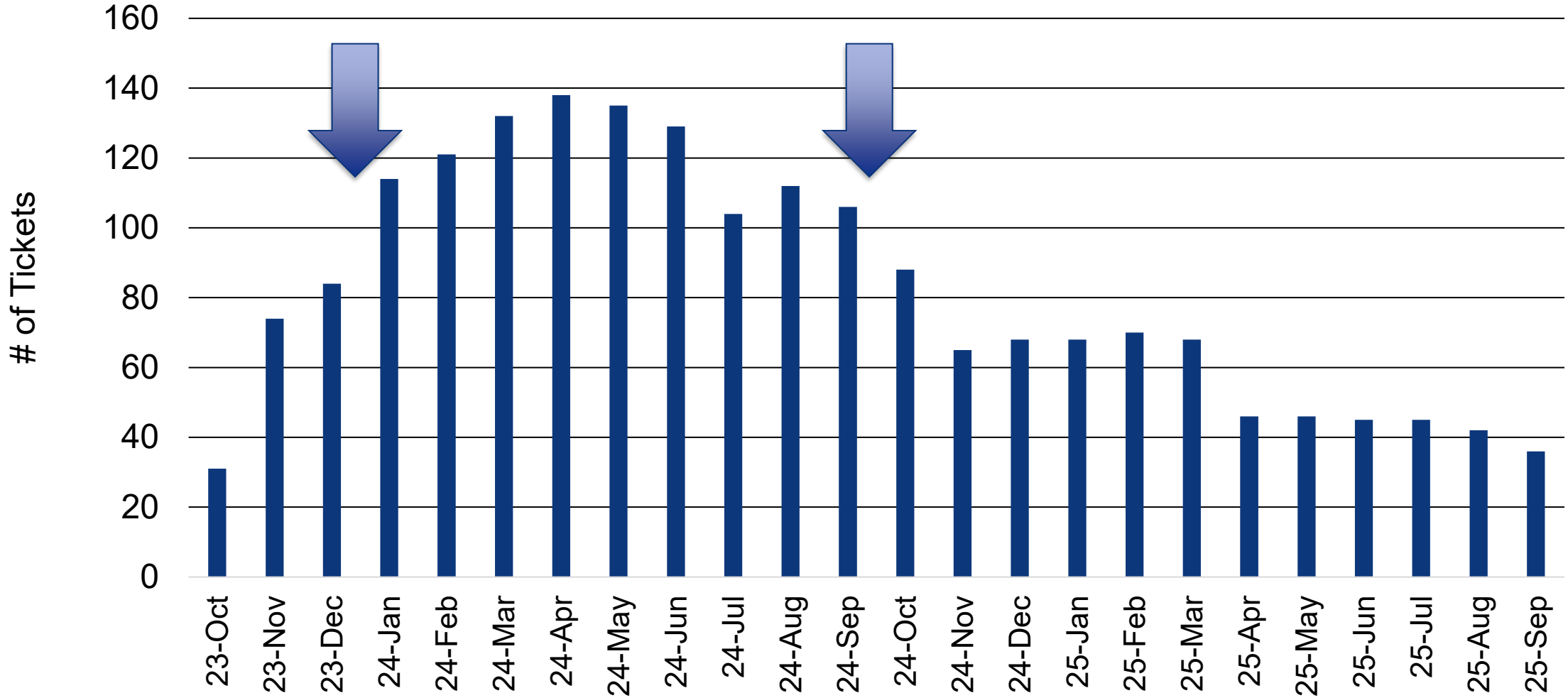
- Harmonize Specimen Types and Sources
- Staggered go-lives at different sites
- Controversial dollar signs
- Outpatient providers see all tests
- Dedicate more resources earlier
  - Hire second internal Epic analyst
- Make microbiology its own lab
- Builds beyond micro (especially non-main campus)
  - Bugsy Infection Control Inpatient Clinical System
  - Willow Inpatient Pharmacy System



Micro's Epic Implementation Phases

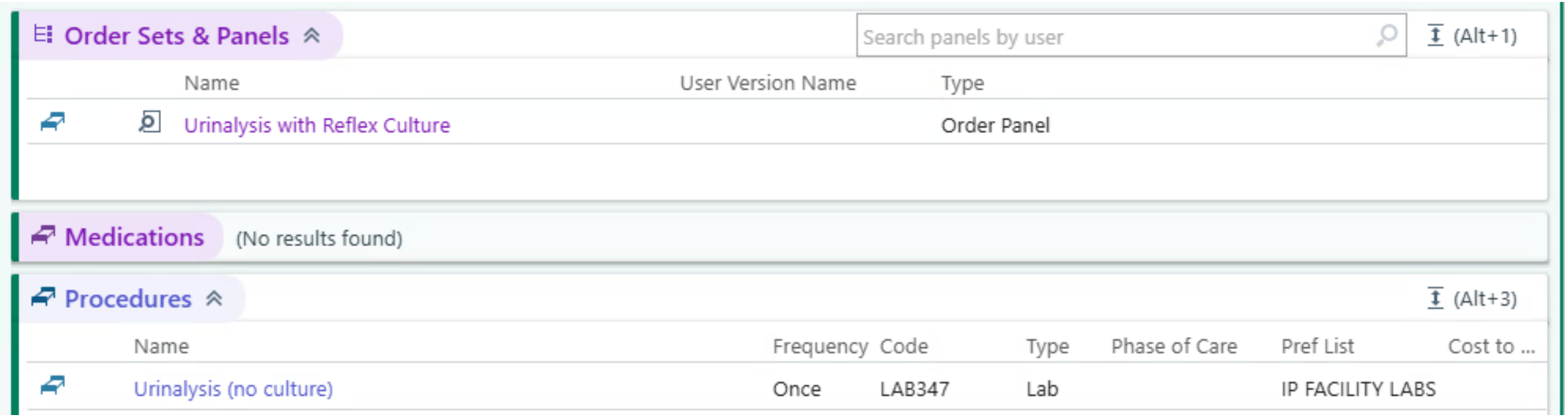
- Phase 0
  - Plan and analyze project
  - Identify project team
- Phase 1
  - Analyst(s) attend training at Epic and complete certification
  - Identify variation from Foundation System
- Phase 2
  - Workflow validation sessions
  - Stoplight evaluations
- Phase 3
  - System built
  - "Red light" resolutions/resolved
- Phase 4
  - Conduct workflow labs
  - Finalize micro build and test
  - Train end users
- Phase 5
  - System live
  - Fix phase (~3 months)
  - Optimize phase (~6 months)

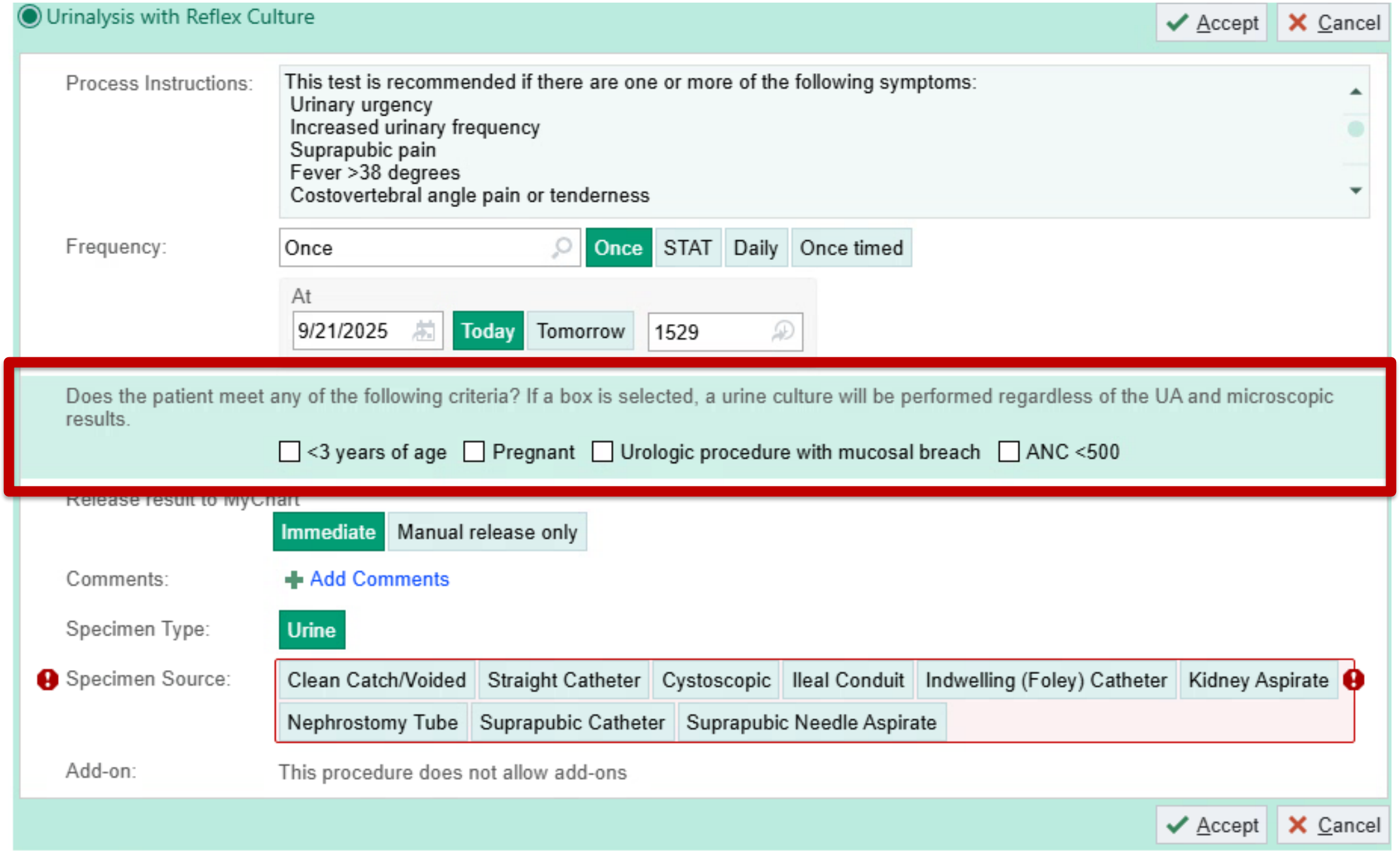
Microbiology-Related Change Controls



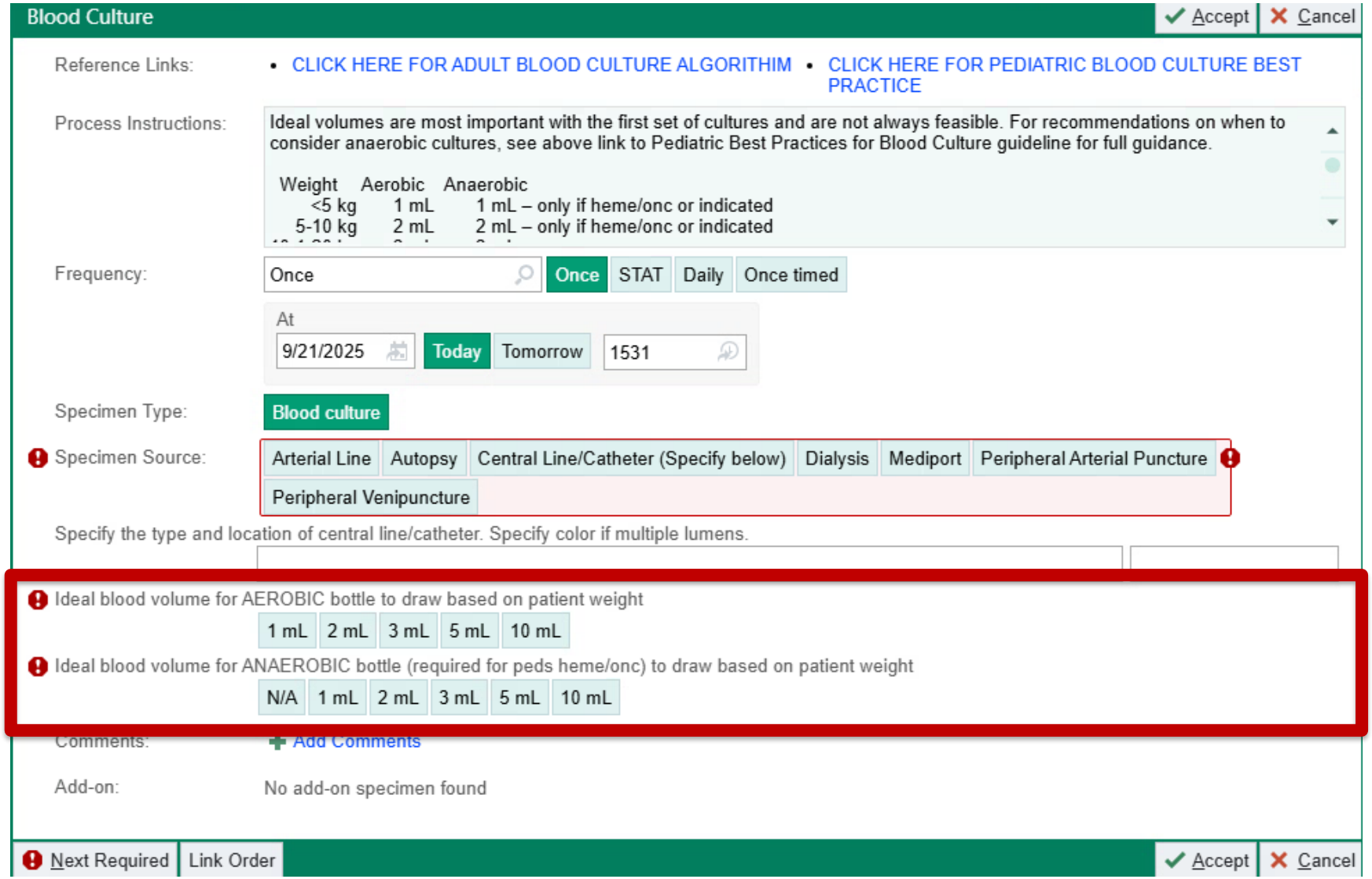
Change Control: Urinalysis Test Names

- Urinalysis with Reflex Microscopic and Culture
  - Urinalysis with Reflex Culture
- Urinalysis with Reflex Microscopic
  - Urinalysis (no culture)

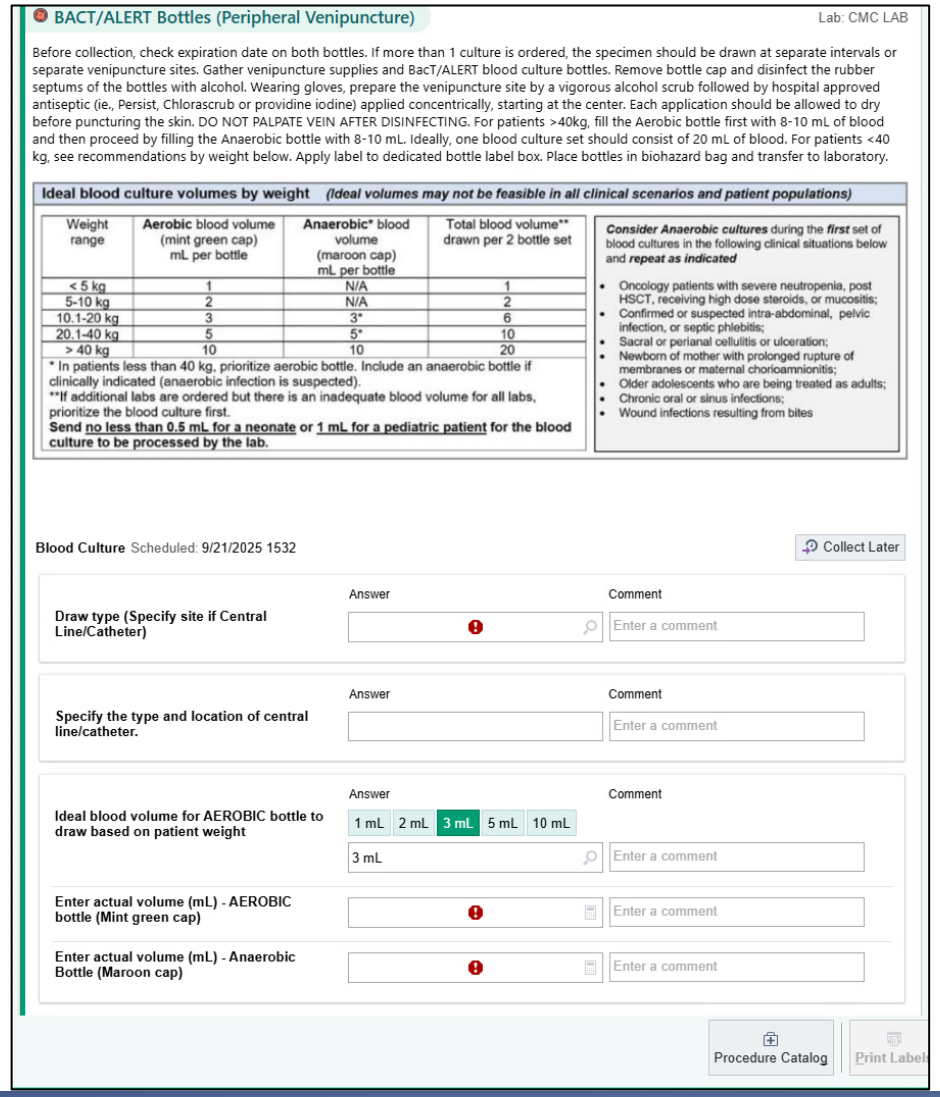



Urinalysis with Reflex Culture
Accept
Cancel
Process Instructions:
This test is recommended if there are one or more of the following symptoms:
Urinary urgency
Increased urinary frequency
Suprapubic pain
Fever >38 degrees
Costovertebral angle pain or tenderness
Frequency:
Once
Once
STAT
Daily
Once timed
At
9/21/2025
Today
Tomorrow
1529
Does the patient meet any of the following criteria? If a box is selected, a urine culture will be performed regardless of the UA and microscopic results.
<3 years of age
Pregnant
Urologic procedure with mucosal breach
ANC <500
Release result to MyChart
Immediate
Manual release only
Comments:
Add Comments
Specimen Type:
Urine
Specimen Source:
Clean Catch/Voided
Straight Catheter
Cystoscopic
Ileal Conduit
Indwelling (Foley) Catheter
Kidney Aspirate
Nephrostomy Tube
Suprapubic Catheter
Suprapubic Needle Aspirate
Add-on:
This procedure does not allow add-ons
Accept
Cancel

Change Control: Pediatric Blood Culture Volumes



Change Control: Pediatric Blood Collector View



BACT/ALERT Bottles (Peripheral Venipuncture)

Lab: CMC LAB

Before collection, check expiration date on both bottles. If more than 1 culture is ordered, the specimen should be drawn at separate intervals or separate venipuncture sites. Gather venipuncture supplies and BacT/ALERT blood culture bottles. Remove bottle cap and disinfect the rubber septums of the bottles with alcohol. Wearing gloves, prepare the venipuncture site by a vigorous alcohol scrub followed by hospital approved antiseptic (ie., Persist, Chlorascrub or providine iodine) applied concentrically, starting at the center. Each application should be allowed to dry before puncturing the skin. DO NOT PALPATE VEIN AFTER DISINFECTING. For patients >40kg, fill the Aerobic bottle first with 8-10 mL of blood and then proceed by filling the Anaerobic bottle with 8-10 mL. Ideally, one blood culture set should consist of 20 mL of blood. For patients <40 kg, see recommendations by weight below. Apply label to dedicated bottle label box. Place bottles in biohazard bag and transfer to laboratory.

Ideal blood culture volumes by weight *(Ideal volumes may not be feasible in all clinical scenarios and patient populations)*

Weight range	**Aerobic** blood volume (mint green cap) mL per bottle	**Anaerobic*** blood volume (maroon cap) mL per bottle	Total blood volume** drawn per 2 bottle set
< 5 kg	1	N/A	1
5-10 kg	2	N/A	2
10.1-20 kg	3	3*	6
20.1-40 kg	5	5*	10
> 40 kg	10	10	20

* In patients less than 40 kg, prioritize aerobic bottle. Include an anaerobic bottle if clinically indicated (anaerobic infection is suspected).
**If additional labs are ordered but there is an inadequate blood volume for all labs, prioritize the blood culture first.
Send no less than 0.5 mL for a neonate or 1 mL for a pediatric patient for the blood culture to be processed by the lab.

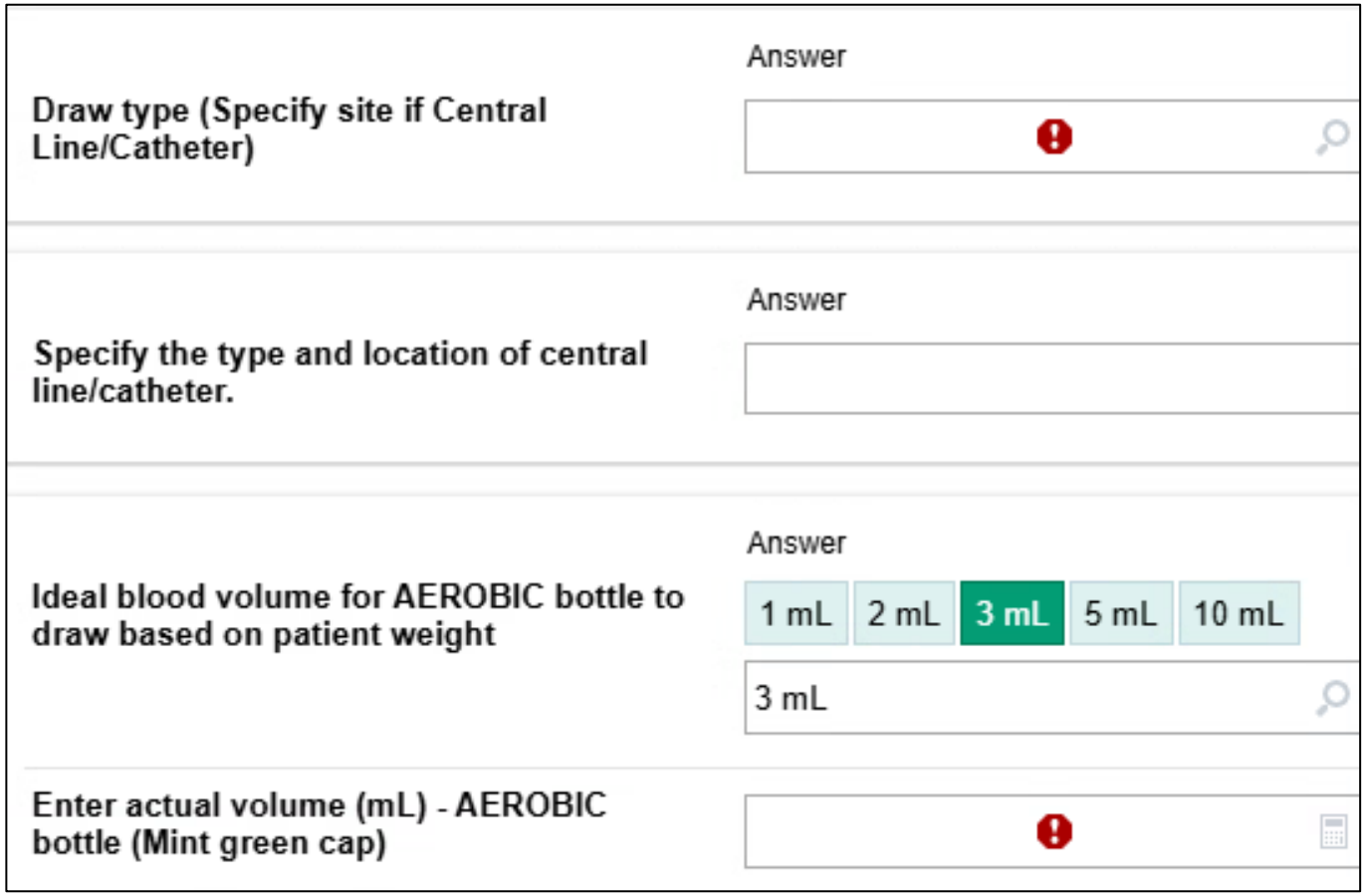
Consider Anaerobic cultures during the ***first*** set of blood cultures in the following clinical situations below and ***repeat as indicated***

- Oncology patients with severe neutropenia, post HSCT, receiving high dose steroids, or mucositis;
- Confirmed or suspected intra-abdominal, pelvic infection, or septic phlebitis;
- Sacral or perianal cellulitis or ulceration;
- Newborn of mother with prolonged rupture of membranes or maternal chorioamnionitis;
- Older adolescents who are being treated as adults;
- Chronic oral or sinus infections;
- Wound infections resulting from bites

Blood Culture Scheduled: 9/21/2025 1532 — Collect Later

	Answer	Comment
Draw type (Specify site if Central Line/Catheter)		Enter a comment
Specify the type and location of central line/catheter.		Enter a comment
Ideal blood volume for AEROBIC bottle to draw based on patient weight	1 mL | 2 mL | 3 mL | 5 mL | 10 mL; 3 mL	Enter a comment
Enter actual volume (mL) - AEROBIC bottle (Mint green cap)		Enter a comment
Enter actual volume (mL) - Anaerobic Bottle (Maroon cap)		Enter a comment

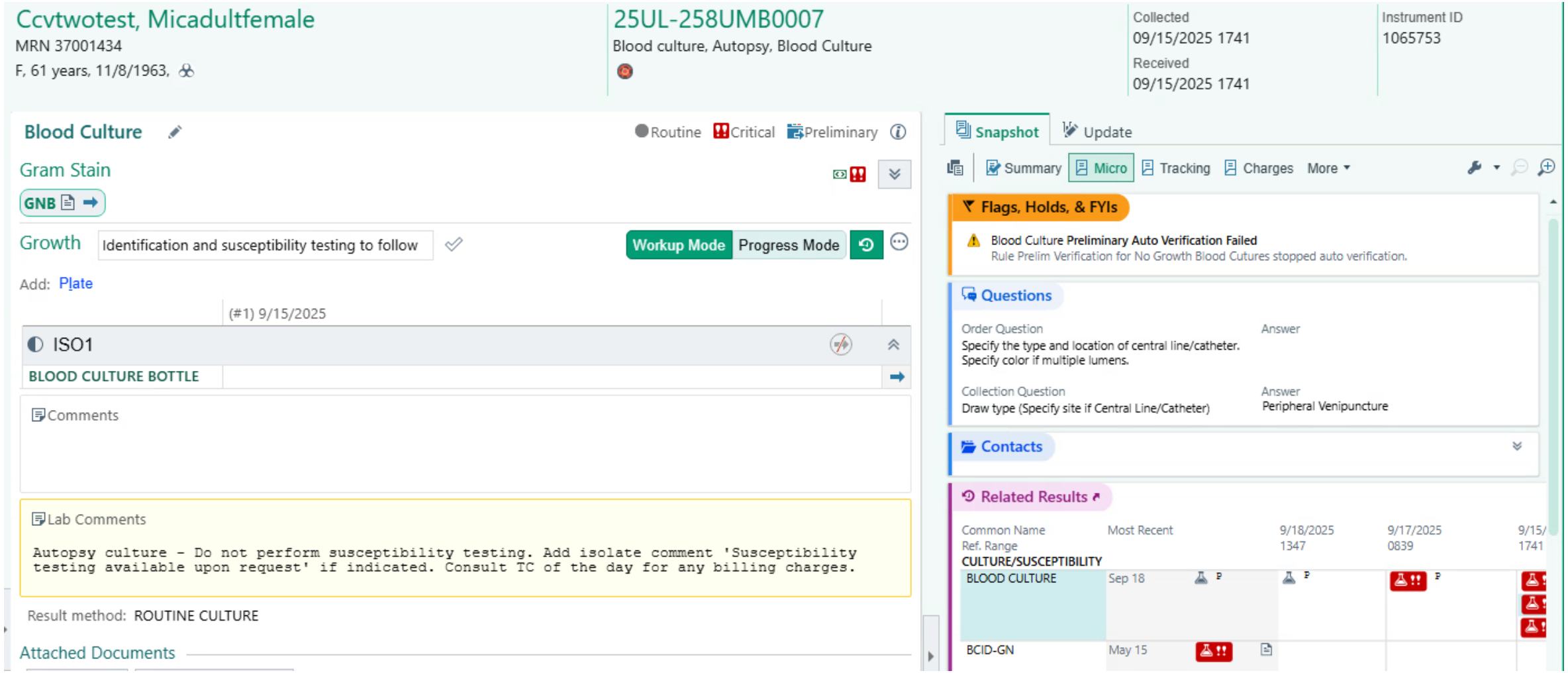
Procedure Catalog | Print Label



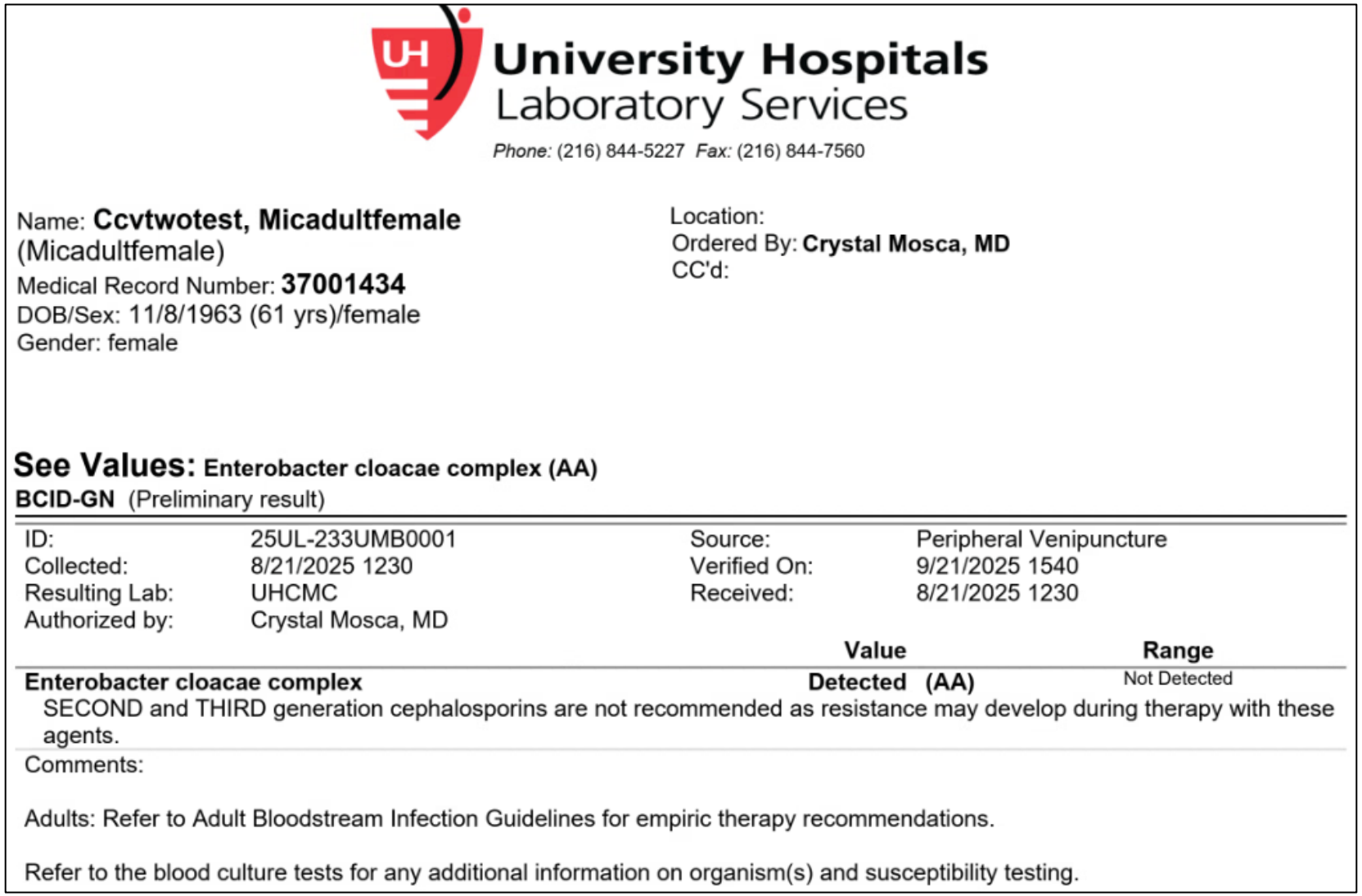
	Answer
Draw type (Specify site if Central Line/Catheter)	
Specify the type and location of central line/catheter.	
Ideal blood volume for AEROBIC bottle to draw based on patient weight	1 mL | 2 mL | 3 mL | 5 mL | 10 mL; 3 mL
Enter actual volume (mL) - AEROBIC bottle (Mint green cap)	

Change Control: Improved Lab Staff Guidance

Change Control: Improved Lab View



Change Control: Ongoing Provider Guidance



University Hospitals
Laboratory Services

Phone: (216) 844-5227 *Fax:* (216) 844-7560

Name: **Ccvtwotest, Micadultfemale** (Micadultfemale)
Medical Record Number: **37001434**
DOB/Sex: 11/8/1963 (61 yrs)/female
Gender: female

Location:
Ordered By: **Crystal Mosca, MD**
CC'd:

See Values: Enterobacter cloacae complex (AA)
BCID-GN (Preliminary result)

ID:	25UL-233UMB0001	Source:	Peripheral Venipuncture
Collected:	8/21/2025 1230	Verified On:	9/21/2025 1540
Resulting Lab:	UHCMC	Received:	8/21/2025 1230
Authorized by:	Crystal Mosca, MD		

	Value	Range
Enterobacter cloacae complex	**Detected (AA)**	Not Detected

SECOND and THIRD generation cephalosporins are not recommended as resistance may develop during therapy with these agents.

Comments:

Adults: Refer to Adult Bloodstream Infection Guidelines for empiric therapy recommendations.

Refer to the blood culture tests for any additional information on organism(s) and susceptibility testing.

Additional Wins Post Go-Live

- Critical Calls
- Organism Mapping
- Result Checking

Ongoing Improvements

- Optimizing test ordering
  - Preference lists & order sets
  - BPAs
- Improving lab workflows and interventions
  - Organism hard stops
  - Pop-up messages
  - Expired blood culture bottles and bottle volumes
- Sherlocks
  - Blood culture contamination
  - MyChart AST viewing

Take-home Points

- Switching your LIS/EMR is survivable (and enjoyable?)
  - Every lab is unique
    - May require additional FTEs
    - Recommend Epic analyst familiar with your laboratory
  - Don’t become siloed during build
  - IT drove decision-making
    - Timelines
    - Legacy data
- Remodeling has its benefits
- Optimization never ends
  - Expect 2-3 yrs to return to a steady state

Acknowledgments

- Fantastic Four
- Microbiology staff
- Colleagues
  - Lab medicine
  - ID
  - IP&C
  - Other stakeholders
- EPIC team

Questions?