How Our Microbiology Lab's Lean Redesign Supported Improved Workflow, Helped Balance Staffing, and Contributed to Gains in Antimicrobial Stewardship Outcomes

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Who is University Health Care System

- 3 Acute Care Hospitals consisting of 831 beds
- 6 Outlying Medical Complexes in the community
- 4 Prompt Care Clinics
- 4 Community Clinics
- 4 Rehabilitation and Assisted Living Facilities

- The system serves 25 counties in the Central Savannah River Area or as it's known locally the "CSRA"

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University Health Care System

- Generates nearly $1 Billion for state and local economy
- 18 years consumer choice by NRC
- 7 Years “A” rating in patient safety from LeapFrog
- Becker’s Top 100 Hospitals with great Orthopedic, Neurosurgery and Spine
- Top 10% of Hospitals Nationally in Patient Safety from Healthgrades

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healthgrades

CareChex® A Division of COMPARION®

University Hospital Lab Goes Beyond the System

- Biggest testing lab in community
- Serves and integrates three service lines
- Holds approximately 60% of the local market share for lab testing

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UH Lab Clients

Serves several other facilities

- Several Critical Access Hospitals
- Long Term Acute Care (LTAC) Facility
- Rehabilitation Facility

All of which will refer patients who need a higher level of acute care to University Hospital

Some admit our bundled payment patients as well

All of these patients have the potential to be our outcomes

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UH Lab - Microbiology

Staff 50/50 split with very senior techs and new grad techs.

Awesome team of people

But had not seen change in decades!

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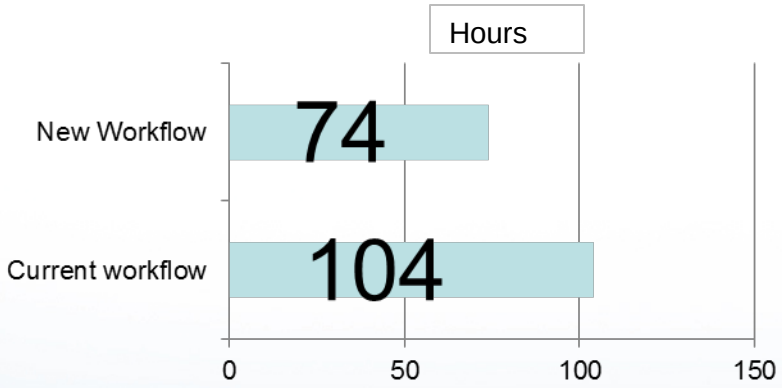
Micro technology needed upgrading

- Used traditional chemical ID methodology from inception
- The MIC testing process was a batch process
- Additionally Blood Culture testing was traditional plating and growth from positive bottles

The New Workflow

- Implemented MALDI-TOF ID workflow in May 2016
- Moved to less workflow impeding MIC process with reduced batch sizes
- Started multiple plate reading benches



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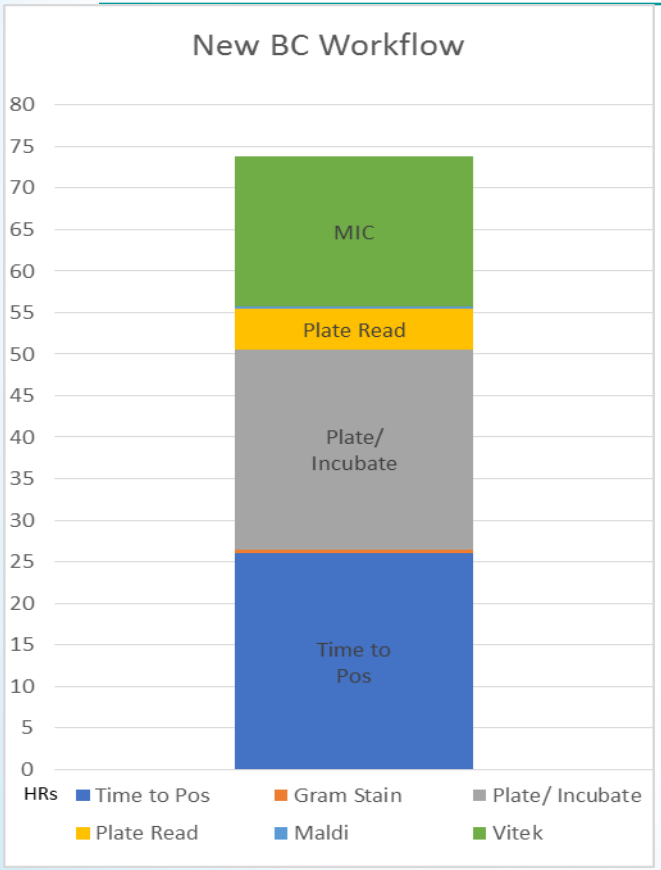
New Workflow Still Requires Experience BUT a lot less effort!



- Plate reading on day shift only
- ID and MICs on day shift only
- Depending on time of plating some cultures are too young at first read

- No more complaints on workload

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Accelerate Promises to Change the Game

Promised Rapid ID and MIC on positive Blood Cultures with a <2min set up

Due to the gains already seen from the workflow/ technology changes,

Staff buy-in was easy at this point!

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The Laboratory Utilization Committee (LUC)

Designed in 2012 to provide an effective efficient testing formulary for our Laboratory

Chaired by the system CMO

Committee members include

- Medical Staff members
  - Lead Hospitalist
  - Infectious Disease
  - Oncology Surgeon
  - Laboratory Medical Director
  - Chief of Pathology
- Hospital Administration
- Lab Management
- Radiology
- Performance Improvement
- Pharmacy
- Infection Prevention

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It Was A Team Effort

The Accelerate Pheno™ system went on as part of the LUC agenda In March 2016 and stayed every month as these questions were addressed

Each member had input:

- TATs and cost per inpatient stay
- Sepsis readmission rates
- Costs per antibiotic day
- CDI rate and targets
- C-Suite
- Medical Staff CME

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The Performance Verification Program (PVP) Opportunity

- Allows us to install a Pheno™ system prior to FDA
- Allows us to start our CLSI Validation early
- Gave us the chance to prove what the system could do to the LUC and therefore the Medical Staff and the C-Suite
- Data collected would give us the advantage in the hospital system for capital funding, IT resources and system level support

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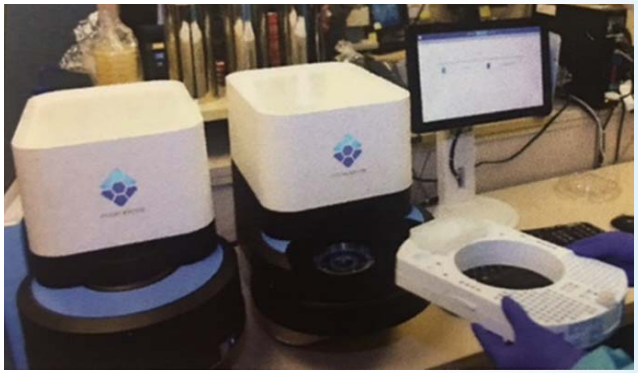
LUC and The PVP Opportunity

- LUC agreed that this would be the best way to prove outcomes and project priority
- Very low risk opportunity to assess
- The PVP would also put the lab in position to offer this test clinically ASAP after FDA approval



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Validation begins

Installation and training

Initial QC protocol for CLSI

Correlation and precision performed

Actual TAT was monitored

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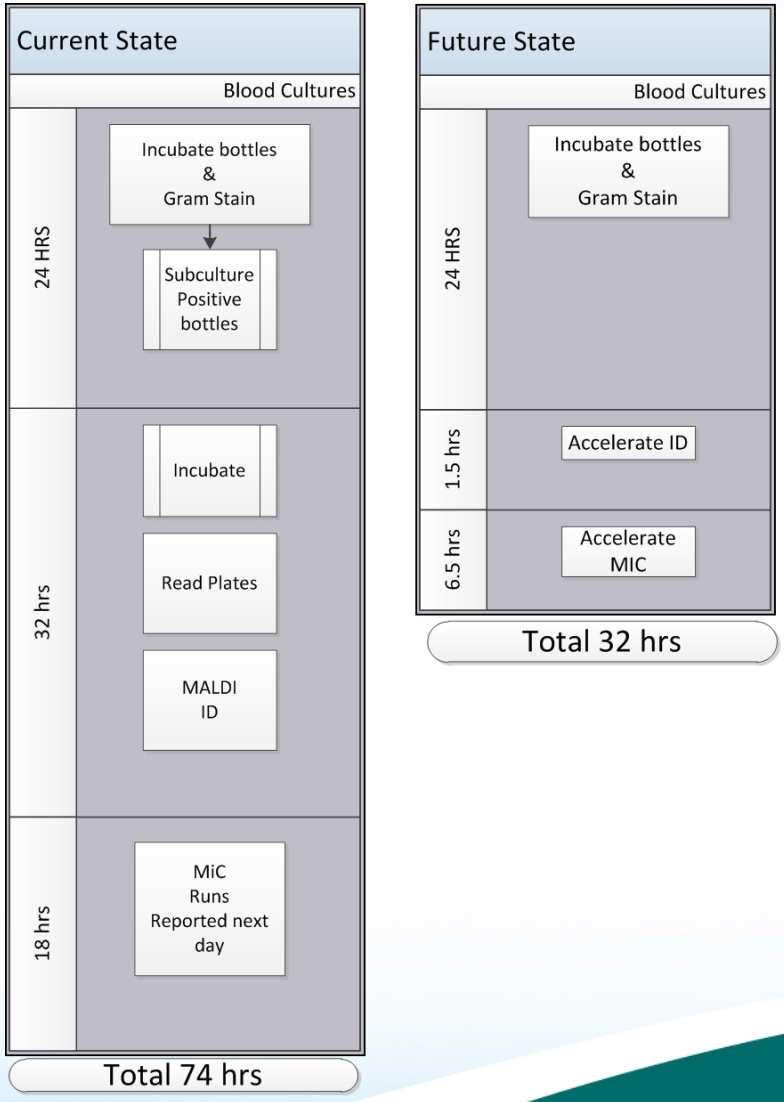
Blood Culture Workflow

Current State vs Accelerate



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A Few Issues in the Lab

- Kits were halted
- Blood used for seeded challenges was contaminated
- Mechanical failures
- Technical User Errors

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Validation outcomes

OVERALL ID PERFORMANCE (n=48 runs)	
100% Sensitivity	99.7 % Specificity

OVERALL AST PERFORMANCE	
96.7% Categorical Agreement	94.9 % Essential Agreement

&

The panel covered 97% of the positive blood cultures seen in our lab

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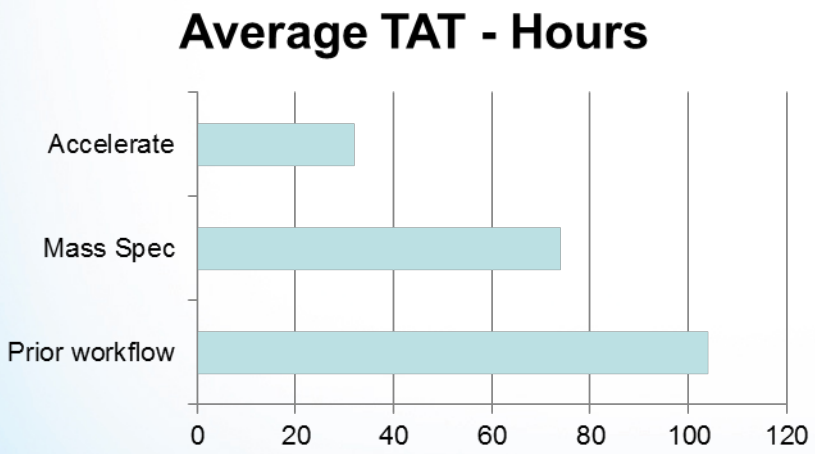
Why LUC rules PVP a success

The historical and newly established MALDI-TOF TAT was pulled for 25 positive blood cultures and compared to the Accelerate Pheno™ system TAT

The TAT used included time to positivity + time to MIC



Accelerate was 42 hrs faster on average then with Maldi-TOF

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A timely result is only as good as the timely reaction

LUC evaluates actual utility of the result

The current workflow would NOT provide immediate action:

- ID was not involved unless requested
- ASP Pharmacist

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Workflow ……Beyond the Lab

Current state:

- Call ordering physician at positive bottle with gram stain result
- Next day report traditional ID and MIC into the IT system
- ID/ MIC in MDs inbox for action when noted

New Workflow:

- Positives are called to the ordering physician upon the Accelerate ID
- New IT workflows allow the “finaled” result to be sent to the Epic In-box of the ordering physician, the ASP pharmacist and to Infectious Disease

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LUC Creates Priority for Scarce Resources

- Pharmacy Staffing
- IT / LIS
- Capacity
- Capital budgeting

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Go-Live:
May 1st 2017

MICHAEL HOLAHAN/STAFF

University Hospital medical technologist Cynthia Myers demonstrates how to use the new Accelerate Pheno System Thursday afternoon at University Hospital.

Hospital will be first to use new testing system

By Tom Corwin
Staff Writer

University Hospital will be the first in the country to use a newly approved testing system that can cut the time to identify causes of serious infections from days to a couple of hours and also rapidly identify what specific antibiotic will work against it, officials said.

With company officials on hand, University unveiled the Accelerate PhenoTest BC Kit system just a week after Accelerate Diagnostics Inc. of Tucson, Ariz., received approval from the Food and Drug Administration to market it.

"This is the very first institution, not just in your geography, not in the region, not in the state but the first facility in the United States to adopt this technology," said Ron Price, senior vice president and head of commercial operations at Accelerate.

The new system can identify 14 different common bacteria known to cause serious infections in two hours and then identify which antibiotics it is sensitive to in about eight hours versus the 48 hours it would normally take to culture bacteria and get that information, said Dr. Kailash Sharma, medical director of laboratory services at University.

"It can save up to 40 hours," he said.

Bacterial infections strike two million people a year and kill at least 23,000, according to the Centers for Disease Control and Prevention. It comes up in potential diagnoses in a quarter to a third of the patients hospitalized at University, said Dr. Kevin Nash, medical director of the hospitalist program at University.

See SYSTEM on PAGE 8A

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Post Go-live

MRSA - 50hrs sooner

Outcome:

The patient's empiric therapy was Pip/Tazo, Gent and Vanco. The therapy was de-escalated to just Vanco based on the result

Klebsiella - 54hrs sooner

Outcome:

The patient's empiric regimen of Dapto was inappropriate and the patient's therapy was immediately corrected to Ceftriaxone

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Post Go-Live

E. Coli - 54hrs sooner

Outcome:

The physician was grateful to be able to optimally treat the patient on an outpatient basis as the patient would not agree to be admitted

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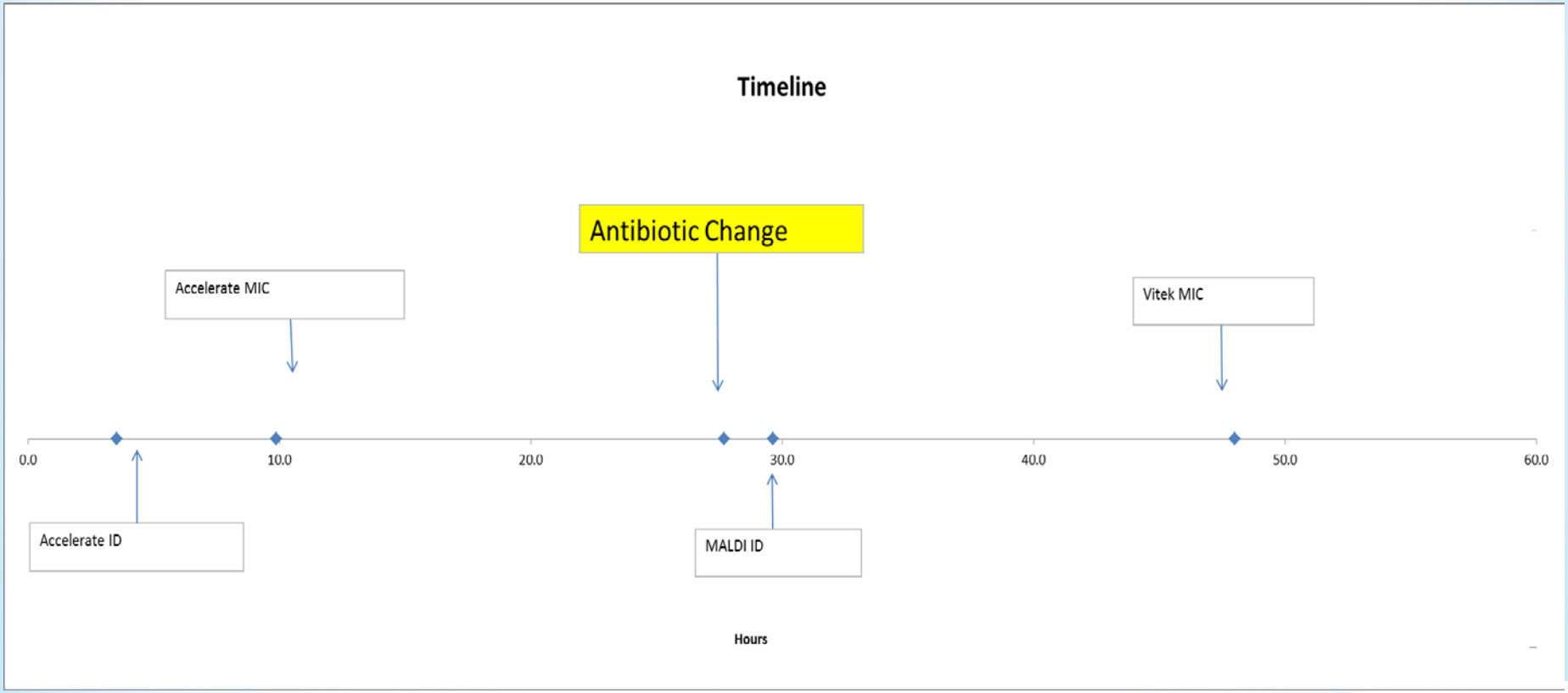
Again….A timely result is only as good as the timely reaction



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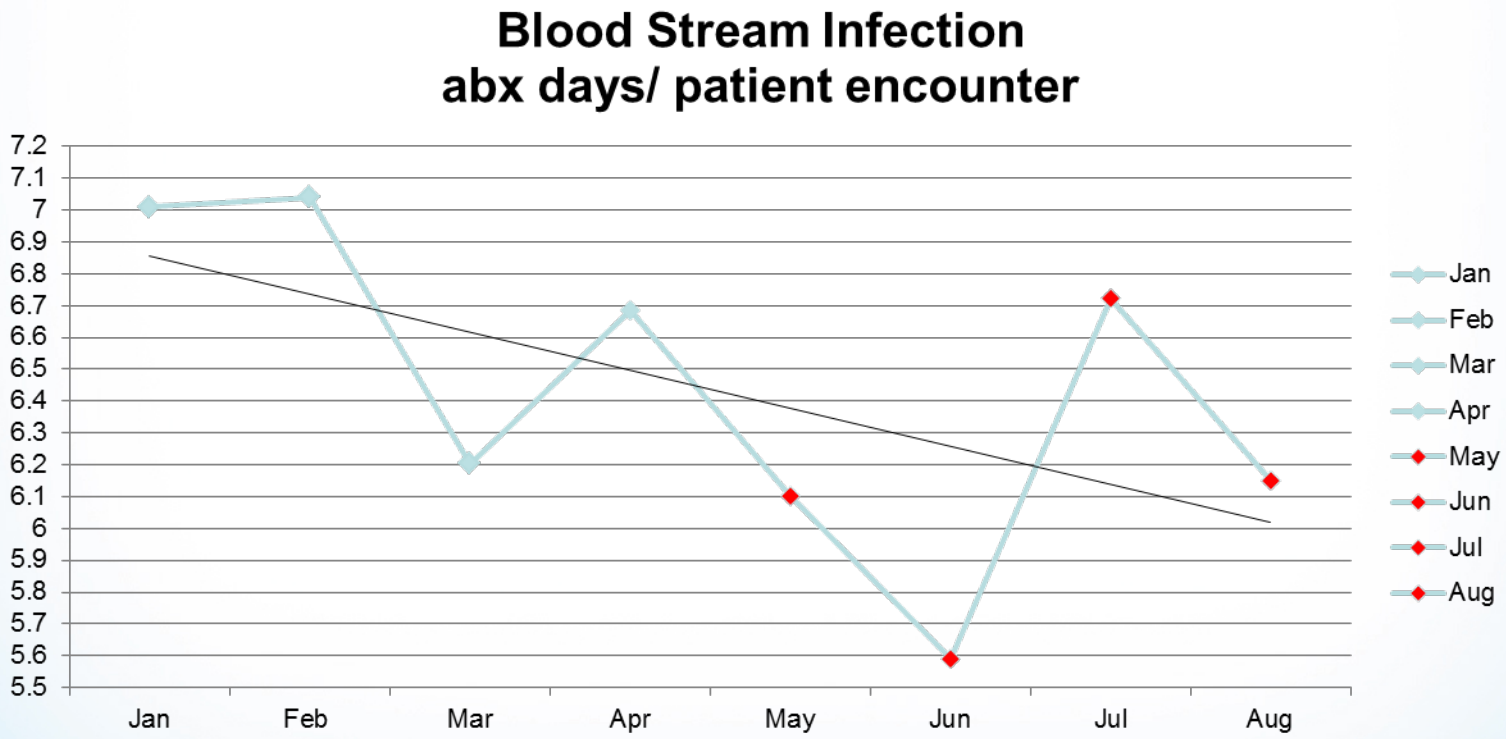
Starting to see the numbers drop

* Patients who had an Accelerate result to trigger the process



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Abx days/ Patient encounter also equate to costs

Avg reduction/ encounter	0.3	days/ enct
Avg Cost per each 0.1 abx days	$2,023	per mth
Avg Cost per 0.3 abx days	$6,069	per mth
x 4 mths since go-live	$24,276	4 mths
Goal is 0.5 reduction	$10,115	per mth
Goal annual	$121,380	annually

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Other Outcomes to Monitor

It’s not just ABX Days

- BSI Mortality rates (sepsis)
- Cost per inpatient stay beyond Abx
- Sepsis (BSI) readmission rates
- C Diff Infection rates

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What can we do better?

Continuous Flow and Eliminate Batch review

- Antibiotic Stewardship Pharmacist 24/7 or a mechanism to assist in antibiotic selection

Create a Pull Environment

- Currently training Core Lab techs to run Accelerate 24/7

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Looking Forward

- UHS is very early in
- Data Collection Continues

Initial numbers demonstrate that …..

The Game Has Changed!

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