



Sentara Healthcare and Data Innovations

Keith Blackshear and Jeffrey Sanders
June 22, 2020



Topics

- Meet the Presenters
- About Sentara Healthcare
- Sentara Laboratory Services
- Sentara and DI
 - History
 - Disciplines
- COVID-19 Impact
- Questions

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SECTION ONE

Meet the Presenters

Keith Blackshear

Jeffrey Sanders

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Keith Blackshear

- Clinical Laboratory Support Coordinator, Hematology & Urinalysis
- B.S., Biology, Univ. of S. Carolina
- MLS internship at Augusta Health in Fishersville, VA
- Pursuing MBA at Univ. of Southern Indiana
- 5+ years with Sentara Healthcare

Jeffrey Sanders

- 23+ years of IT experience
- Started at UNC Health – Pardee Hospital
- 17+ years at Sentara Healthcare
- 8+ years in my current role
- Over 80 Windows based servers supported
- Over 20 applications supported
 - (ex. Instrument Manager, BioRad QC, Haemonetics SafeTrace TX, Biomerieux Myla, Roche Infinity, Abbott RALS, Systemlink Histotrac)

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Sentara Healthcare At-a-Glance

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Small Beginnings

- 1888: Retreat for the Sick
- 1892: School of Nursing opens
- 1903: Norfolk Protestant Hospital



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Growth and Expansion

- 1972 - State's First Merger of Two Non-Profit Hospitals: Norfolk General & Leigh Memorial
- 1984 - Optima Health Plan Started
- 1987 – The “Sentara” brand name was born.
- 1988 - Hampton General Hospital Merger
- 1991 - Bayside Hospital Merger
- 1995 - Sentara Medical Group Formed
- 1998 - Virginia Beach General Hospital Merger
- 2002 - Williamsburg Community Hospital Merger
- 2006 - Obici Hospital Merger
- 2006 - Sentara Heart Hospital Opened
- 2009 - Potomac Hospital Merger
- 2011 - RMH Healthcare Merger
- 2011 - Martha Jefferson Hospital Merger
- 2011 - Opening of Sentara Princess Anne Hospital
- 2013 - Halifax Regional Health System Merger

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Growth and Expansion



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Mission Statement:

We Improve Health Every Day

- Headquartered in Norfolk, Virginia
- 130 year not-for-profit history
- 12 hospitals
- 4 medical groups
- 3,800+ provider medical staff
- Nearly 30,000 Members of the Team
- Health plans (Optima Health and Virginia Premier)
- Outpatient campuses
- Advanced Imaging Centers
- Home health and hospice
- Rehab and therapy centers
- Nursing and assisted living centers
- Medical transport ambulance
- Nightingale air ambulance



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SECTION THREE

Sentara Laboratory Services

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Laboratory Services

- More than 700 laboratory professionals at 12 Sentara hospitals and 5 Limited Service Laboratories.
- Nearly 8 million billable lab tests performed in 2019
- Sentara Reference Laboratory is Hampton Roads' only full-service reference laboratory and operates hospital-based laboratories, ambulatory care center laboratories, dedicated Patient Service Centers and supports a wide range of physician offices, clinics, businesses, schools and insurance providers in Hampton Roads.
- Accredited by the College of American Pathologists and the Virginia Department of Health.
- Transfusion services and histocompatibility/immunology are accredited by the American Association of Blood Banks (AABB) and the American Society of Histocompatibility and Immunogenetics (ASHI), respectively.
- The only biosafety Level 3 microbiology laboratory performing mycobacteriology in the region.
- Named Medical Laboratory Observer's 2016 Lab of the Year.

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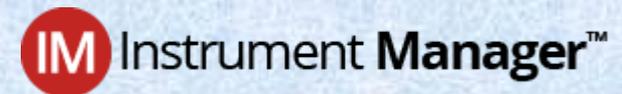
SECTION FOUR

Sentara and Data Innovations

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Instrument Manager Architecture

- Currently have four Production Systems
 - **Hemo/Coag**
 - **Chemistry (Roche)**
 - **Martha Jefferson Chemistry (Roche)**
 - **LIS**
 - **One stand alone Test system**
- Over of 200 Instrument Connections*
 - **Across 16 physical locations**
 - **Other instruments are running, but not interfaced**
- Servers are virtualized using VMWare virtual servers



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Sentara and Data Innovations

Two Phases of Instrument Interfacing at Sentara

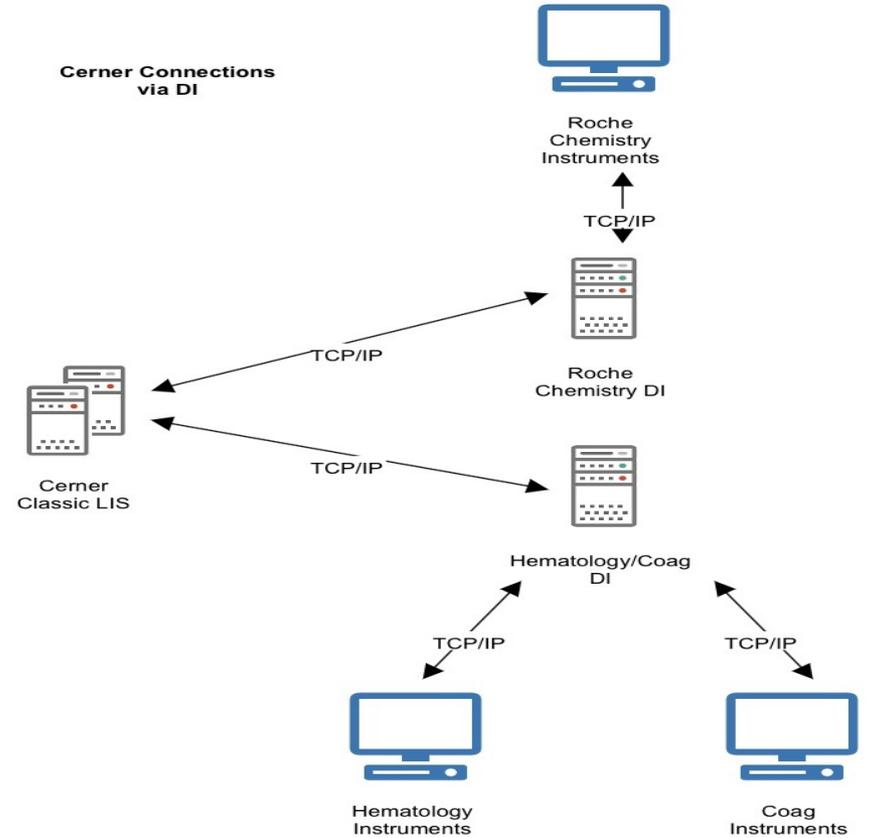
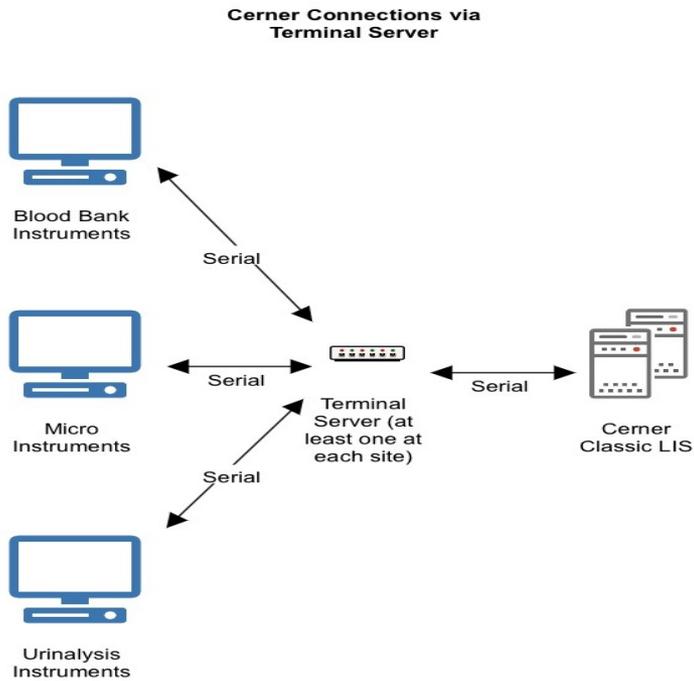
- Cerner Classic
 - **Mix of Instrument Manager and Direct Connection to Cerner via Terminal Servers**
- Epic Beaker/Haemonetics SafeTrace TX
 - **Beaker Roll out Started 2015**
 - **100% Instrument Manager**



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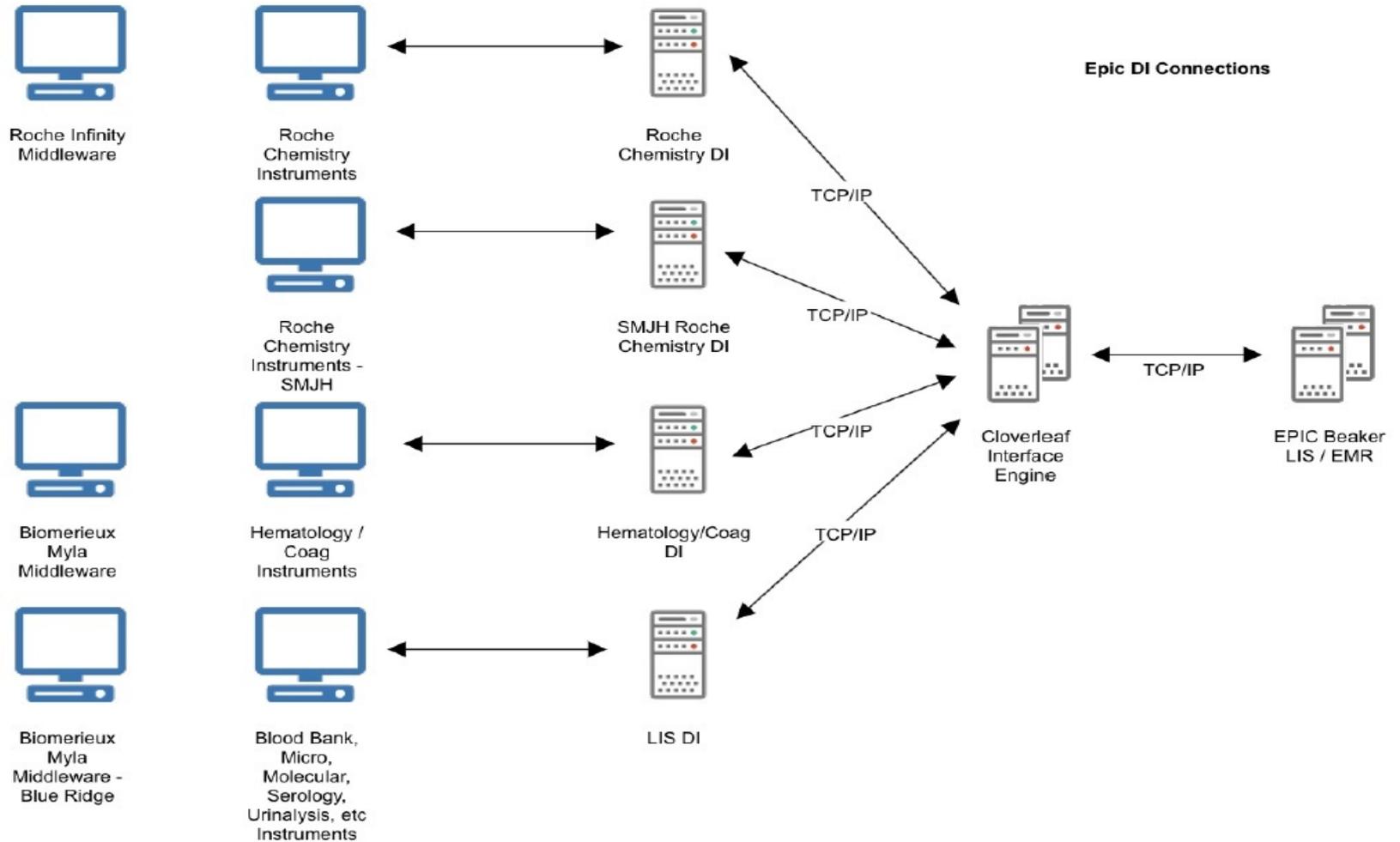
Cerner Classic



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Epic Beaker

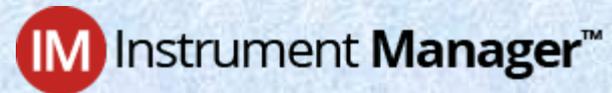


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Lab Disciplines

- Coagulation
- Hematology
- Urinalysis
- Chemistry
- Processing/Total Lab Automation
- Transfusion Services
- Microbiology

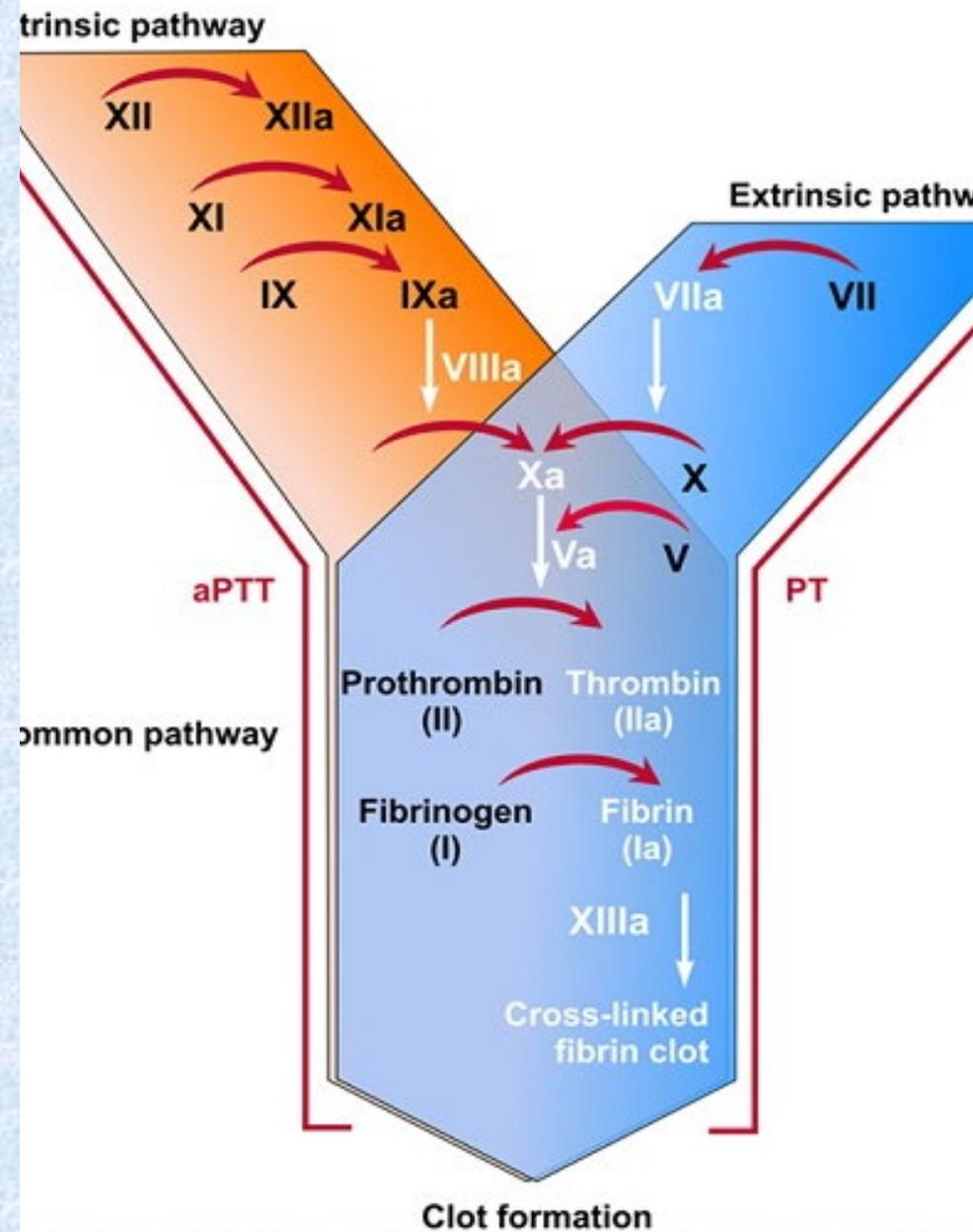


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Coagulation

- Analyzers
- Outgoing requests
- Incoming results
 - QC ID
 - Error Codes
 - Resolution of non-numeric results
 - Test dilution results
 - Test comments
 - “No value” rule



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Coagulation – QC ID

- Utilizing unsolicited QC in Epic Beaker
- IM converts analyzer QC file name to Epic Beaker barcode lot ID

QC Material Summary

Name: SPAH CITROL 1
Type: Control [0]
Status: Active [1]
Manufacturer: DADE
Effective date: 6/14/2020

Lot Information

Lot number: 564813
Lot status: Active [1]
Expiration date: 12/10/2022

Unsolicited QC Setup

Barcode lot ID: SPAH COAG 1
Prevent unsolicited related QC order:

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Coagulation – QC ID

Rules Setup - SPAH CS-2500

SPAH CS-2500

Tree View

- Incoming result
 - Live
 - Outgoing request
 - Incoming result
 - Before Message Queued Internally
 - New RuleQC ID**
 - If: {Specimen ID} {Contains} {Value ListQC Name}
 - Then: {Set} {Specimen ID} = {Value ListQC Beaker}
 - Else:
 - Error Codes
 - Suppress Dilution results
 - "<" Translation rule
 - Supress Dilution
 - Stop sending test dilution
 - Suppress TEST comment
 - Stop sending test dilution

Value List Items

Row Enabled	QC Name	QC Beaker
<input type="checkbox"/>		
<input checked="" type="checkbox"/>	QC01	SPAH COAG 1
<input checked="" type="checkbox"/>	QC AbnFbg528688	SPAH ABN FIB
<input checked="" type="checkbox"/>	QC03	SPAH COAG 3
<input checked="" type="checkbox"/>	QC02	SPAH ABN FIB
<input checked="" type="checkbox"/>	QCCitrol 548056	SPAH COAG 1
<input checked="" type="checkbox"/>	QCCitrol 548487	SPAH COAG 3
<input checked="" type="checkbox"/>	QCCitrol1562236	SPAH DD1
<input checked="" type="checkbox"/>	QCCitrol2562136	SPAH DD2
<input checked="" type="checkbox"/>	QC AbnFbg528693	SPAH ABN FIB
<input checked="" type="checkbox"/>	QC05	SPAH DD1
<input checked="" type="checkbox"/>	QC06	SPAH DD2
<input checked="" type="checkbox"/>	QCCitrol 548094	SPAH COAG 1
<input checked="" type="checkbox"/>	QCCitrol 556515	SPAH COAG 3
<input checked="" type="checkbox"/>	QC AbnFbg528697	SPAH ABN FIB

Tree View | Grid View

If: {Specimen ID} {Contains} {Value ListQC Name}
 Then: {Set} {Specimen ID} = {Value ListQC Beaker}
 Else:

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Coagulation – Error Codes

- Prevents release of questionable results

The screenshot displays the 'Rules Setup - SPAH CS-2500' application. The main window shows a tree view of rules. The selected rule is 'Error Codes', which is part of a larger rule structure under 'Incoming result' and 'Before Message Queued Internally'. The rule logic is as follows:

- If: {Error Name(s)}-{On Test}-{Value List:Tests} = {Value List:Codes}-{AND}-{Result}-{On Test}-{Value List:Tests}-{Is Numeric}
- Then: {Suppress Test}-{Value List:Tests}-{Result}
- Else:

The 'Value List Items' table on the right side of the interface contains the following data:

Row Enabled	Tests	Codes
<input type="checkbox"/>		
<input checked="" type="checkbox"/>	51142	H
<input checked="" type="checkbox"/>	51142	V
<input checked="" type="checkbox"/>	51142	L
<input checked="" type="checkbox"/>	51142	I
<input checked="" type="checkbox"/>	52032	H
<input checked="" type="checkbox"/>	52032	V
<input checked="" type="checkbox"/>	52032	I
<input checked="" type="checkbox"/>	52032	L
<input type="checkbox"/>	52032	N
<input type="checkbox"/>	51142	N
<input type="checkbox"/>	51552	N
<input checked="" type="checkbox"/>	51552	L
<input checked="" type="checkbox"/>	51552	I
<input checked="" type="checkbox"/>	51552	V
<input checked="" type="checkbox"/>	51552	H
<input checked="" type="checkbox"/>	51142	A
<input checked="" type="checkbox"/>	52032	A
<input checked="" type="checkbox"/>	51726	A
<input checked="" type="checkbox"/>	51552	A
<input checked="" type="checkbox"/>	52170	A

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Coagulation – Resolution of “<” or “>” Results

- Non-numeric values accompanying results are treated as error codes

Rules Setup - SPAH CS-2500

SPAH CS-2500

Tree View

- [-] Error Codes
 - [-] Supress Dilution results
 - [+] "**<**" Translation rule
 - If: {Error Code(s)}-{On Test} "25004" = "<"
 - Then: {Set} {Result} {On Test} "25004" = "<" {Concatenated With} {Result} {On Test} "25004"
 - Else:
 - [-] Supress Dilution
 - [-] Stop sending test dilution
 - [-] Suppress TEST comment
 - [-] Stop sending test dilution
 - [-] No Value Rule
 - [+] "**>**" Translation rule
 - If: {Error Code(s)}-{On Test} "25004" = ">"
 - Then: {Set} {Result} {On Test} "25004" = ">" {Concatenated With} {Result} {On Test} "25004"
 - Else:

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Coagulation – Test Dilution Results

- Analyzer sends a dilution value with every test result
- Dilution result interferes with results posting to Epic Beaker

Rules Setup - SPAH CS-2500

SPAH CS-2500

Tree View

Value List Items

Row Enabled TEST

Row Enabled	TEST
<input type="checkbox"/>	
<input checked="" type="checkbox"/>	52032
<input checked="" type="checkbox"/>	51142
<input checked="" type="checkbox"/>	51552
<input checked="" type="checkbox"/>	51726
<input checked="" type="checkbox"/>	25004

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Coagulation – Test Comments

- Siemens CS-2500 analyzer sends a “Final Information (Auto Output)” comment with test results
- Causes confusion for nurses and physician

Rules Setup - SPAH CS-2500

SPAH CS-2500

Tree View

Incoming result

- Before Message Queued Internally
 - New RuleQC ID
 - Error Codes
 - Suppress Dilution results
 - "<" Translation rule
 - Suppress Dilution
 - Stop sending test dilution
 - Suppress TEST comment**
 - If: {Test Comment(s)} {On Test} {Value List:TEST} = "Final Information (Auto Output)"
 - Then: {Set} {Test Comment(s)} {On Test} {Value List:TEST} = ""
 - Else:
 - Stop sending test dilution
 - No Value Rule
 - ">" Translation rule

Value List Items

Row Enabled	TEST
*	
<input checked="" type="checkbox"/>	52032
<input checked="" type="checkbox"/>	51142
<input checked="" type="checkbox"/>	51552
<input checked="" type="checkbox"/>	25004
<input checked="" type="checkbox"/>	51726

Coagulation – No Value

- Suppresses non-numeric results

The screenshot displays the 'Rules Setup - SPAH CS-2500' window. The 'Tree View' on the left shows a rule configuration for 'Incoming result' > 'Before Message Queued Internally' > 'No Value Rule'. The rule logic is as follows:

- If: ({Result} {On Test} {Value List:Coag Test} {Contains} {Value List:Result})
- Then: {Suppress Test} {Value List:Coag Test}
- Else:

The 'Value List Items' table on the right lists the following items:

Row Enabled	Coag Test	Result
<input type="checkbox"/>		
<input checked="" type="checkbox"/>	51142	--
<input checked="" type="checkbox"/>	52032	--
<input checked="" type="checkbox"/>	51726	--
<input checked="" type="checkbox"/>	51552	--
<input checked="" type="checkbox"/>	51142	*****
<input checked="" type="checkbox"/>	51552	*****
<input checked="" type="checkbox"/>	51726	*****
<input checked="" type="checkbox"/>	52032	*****
<input checked="" type="checkbox"/>	51552	*****
<input checked="" type="checkbox"/>	55004	*****
<input checked="" type="checkbox"/>	25004	*****

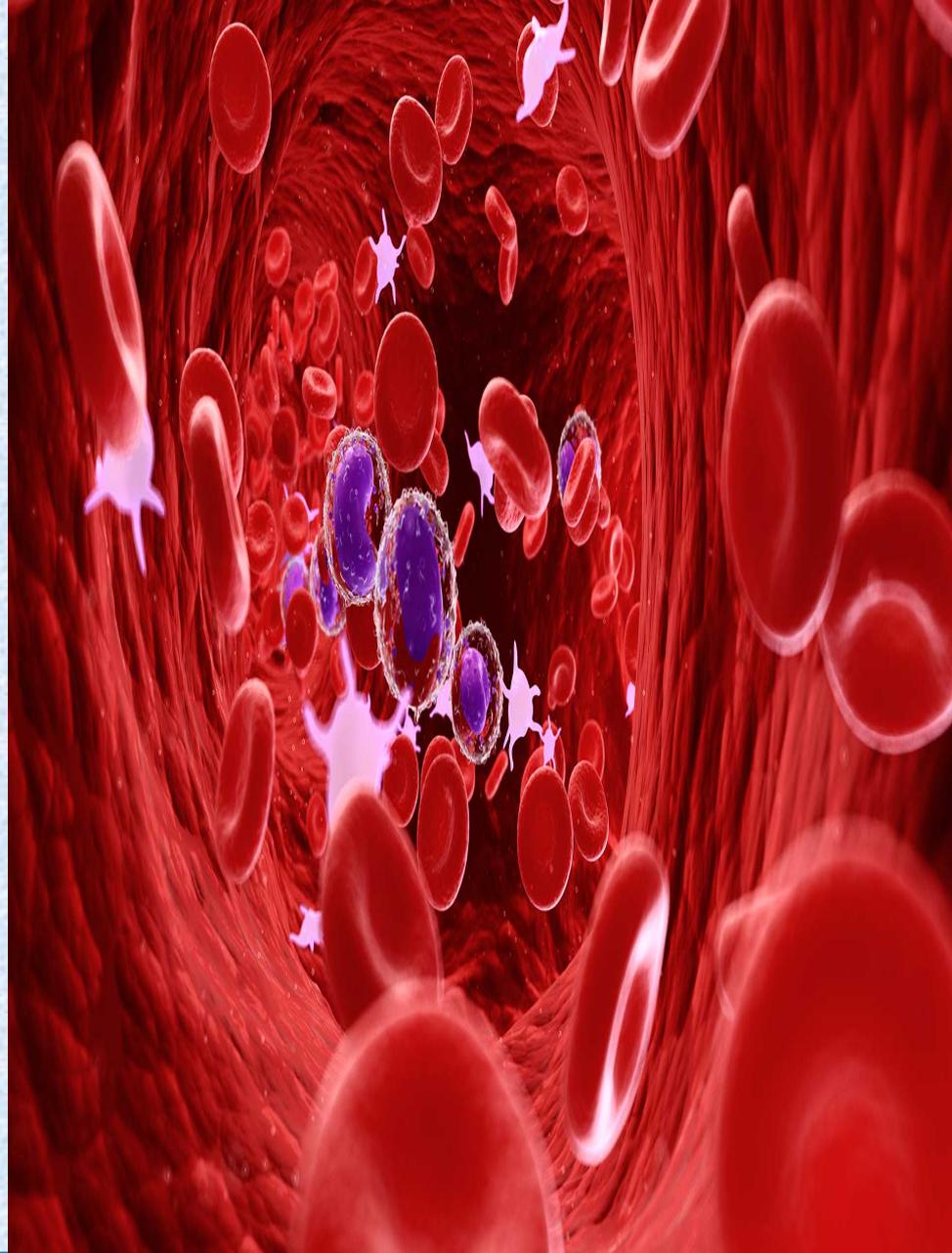
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Hematology

- Instrumentation
- CBC Components
- Outgoing request rules
 - **H&H&MCHC**
 - **WBC & nRBC**
 - **Run Count**
- Sysmex analyzer flagging
- Error code resolution

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Hematology – Outgoing Requests

- Add MCHC to H&H
- Add nRBC% and nRBC# to WBC

The screenshot displays a software interface with a menu bar (System, Configuration, Diagnostics, Security, Specimen Management, SSR, DC, SR, MM, MA, Laboratory Intelligence, Reports, Window, Help) and a title bar (SLH XN-2000). The main area shows a tree view of a rule configuration under the heading "Before Message Sent to this Connection".

- run count**
 - MCHC added to H&H**
 - If: {Test Ordered} "51630" {AND} {Test Ordered} "51636" {AND} {NOT} {Test Ordered} "52364"
 - Then: {Add Test} "51812"
 - Else:
 - add SC**
 - If: {Test Ordered} "52364"
 - Then: {Add Test} "NRBC%" {AND} {Add Test} "NRBC#" {AND} {Add Test} "RDW-SD"
 - Else:

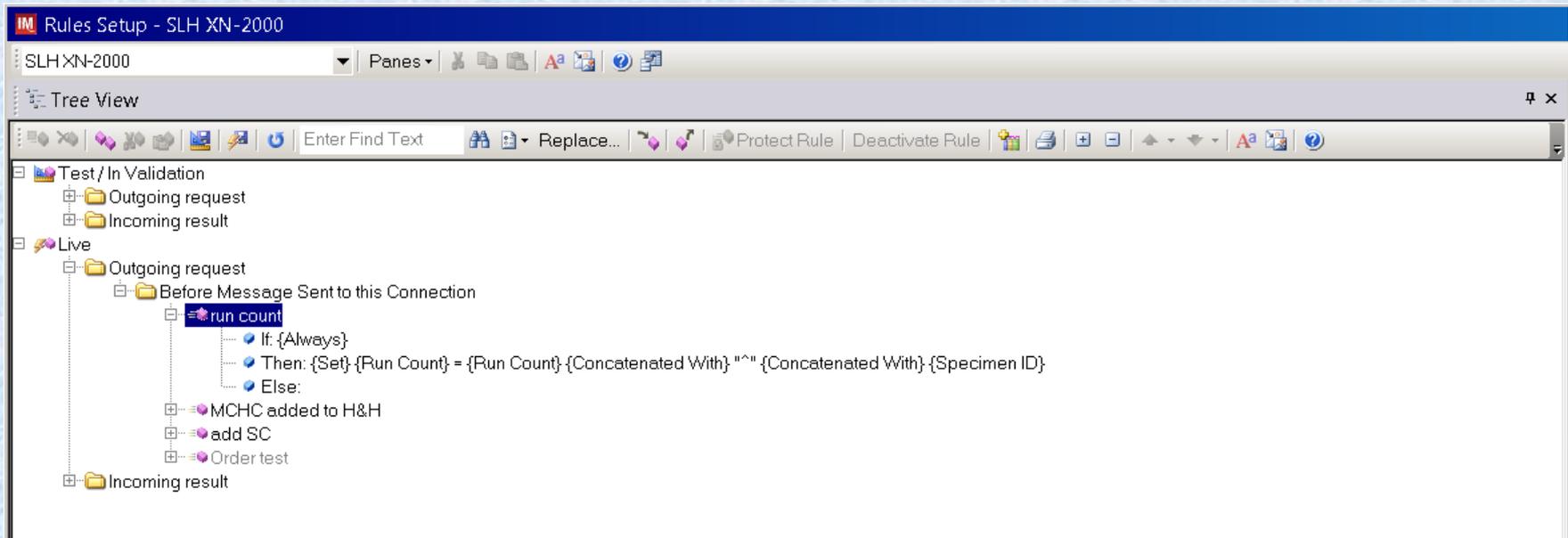
At the bottom, there are tabs for "Tree View" and "Grid View".

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Hematology – Run Count

- Creates a list of tests that IM will accept from analyzer



Hematology – Run Count

- Tests not in the run count are suppressed

The screenshot displays the LIS interface with the following components:

- Menu Bar:** System, Configuration, Diagnostics, Security, Specimen Management, SSR, DC, SR, MM, MA, Laboratory Intelligence, Reports, Window, Help.
- Tree View:** A hierarchical tree structure showing rules. The rule 'Suppress Run Count' is selected and highlighted in blue. Its logic is: If: $\{ \text{Test Resulted} \} \{ \text{Value List:Test} \} \{ \text{AND} \} \{ \text{Run Count} \} \{ \text{NOT} \} \{ \text{Contains} \} \{ \text{Specimen ID} \}$; Then: $\{ \text{Suppress Test} \} \{ \text{Value List:Test} \}$; Else: (empty).
- Properties Panel:** Shows the rule's details:

Property	Value
Description	Suppress Run Count
If	$\{ \text{Test Resulted} \} \{ \text{Value List:Test} \} \{ \text{AND} \} \{ \text{Run Count} \} \{ \text{NOT} \} \{ \text{Contains} \} \{ \text{Specimen ID} \}$
Then	$\{ \text{Suppress Test} \} \{ \text{Value List:Test} \}$
- Value List Items Table:** A table on the right side of the interface showing test results. The columns are 'Row Enabled' and 'Test'. The 'Test' column contains specimen IDs.

Row Enabled	Test
<input type="checkbox"/>	62666
<input checked="" type="checkbox"/>	53006
<input checked="" type="checkbox"/>	62759
<input checked="" type="checkbox"/>	53002
<input checked="" type="checkbox"/>	53000
<input checked="" type="checkbox"/>	60312
<input checked="" type="checkbox"/>	51490
<input checked="" type="checkbox"/>	61801
<input checked="" type="checkbox"/>	53106
<input checked="" type="checkbox"/>	62224
<input checked="" type="checkbox"/>	61806
<input checked="" type="checkbox"/>	51984
<input checked="" type="checkbox"/>	51812
<input checked="" type="checkbox"/>	51810
<input checked="" type="checkbox"/>	51814
<input checked="" type="checkbox"/>	51636
<input checked="" type="checkbox"/>	52044
<input checked="" type="checkbox"/>	52264

Hematology – Sysmex Flagging

- Added flagging components to CBC test
 - 667: Instrument Flag
 - 668: Linearity flag
 - 927: Slide Review Flag
- Purpose is to logically organize analyzer flags so proper test is reflexed

CBC with Differential

Result reported:			Hemogram(1) + Auto diff(1)						
Res	Component	Value	Units	!	Δ	L	IE	R	Ref. Range
1	INSTRUMENT FLAG	No							
1	LINEARITY FLAG	No							
1	SLIDE REVIEW FLAG	No							
1	WBC	9.6	K/uL						4.0-11.0
1	RBC	4.26	M/uL						3.80-5.80
1	HGB	13.3	g/dL						13.1-17.2
1	HCT	38.7	%		▼				39.3-51.6
1	MCV	91	fL						80-95
1	MCH	31	pg						26-34
1	MCHC	34	g/dL						31-36
1	RDW	13.4	%						10.0-15.5
1	PLT	111	K/uL		▼				140-440
1	MPV	11.1	fL						9.0-13.0

CBC with Differential

Result reported:			Hemogram(2) + No diff						
Res	Component	Value	Units	!	Δ	L	IE	R	Ref. Range
Linked manual diffs:									
2	INSTRUMENT FLAG	Yes							
Comment: Lymphopenia Leukocytopenia									
2	LINEARITY FLAG	No							
2	SLIDE REVIEW FLAG	Yes							
Comment: Thrombocytopenia									
2	WBC	1.8	K/uL		▼				4.0-11.0
2	RBC	5.20	M/uL						3.80-5.80
2	HGB	16.4	g/dL						12.6-17.1
2	HCT	46.7	%						37.8-52.2
2	MCV	90	fL						80-95

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Hematology – Sysmex Flagging

System Configuration Diagnostics Security Specimen Management SSR DC SR MM MA Laboratory Intelligence Reports Window Help

SHRH XN2000

Tree View

Value List Items

Before Message Queued Internally

- Add NO to 667 668 927
- Suppress No Results Rule
- Abnormal IP Message error 667 Manual Diff
 - If: {Error Name(s)} {On Test} {Value List:AbnormalIPMessage} = "A"
 - Then: {Set} {Result} {On Test} "667" = "YES" {AND} {Add} {Test Comment(s)} {Value List:AbnormalIPMessage} {On Test} "667" {AND} {Suppress Test} {Value List:AbnormalIPMessage}
 - Else:
- Abnormal IP Message error 927 slide review
- Abnormal IP Message error 667 Manual Diff

Tree View Grid View

If: {Error Name(s)} {On Test} {Value List:AbnormalIPMessage} = "A"
 Then: {Set} {Result} {On Test} "667" = "YES" {AND} {Add} {Test Comment(s)} {Value List:AbnormalIPMessage} {On Test} "667" {AND} {Suppress Test} {Value List:AbnormalIPMessage}
 Else:

Row Enabled	AbnormalIPMessage
* <input type="checkbox"/>	
<input checked="" type="checkbox"/>	WBC_Abn_Scattergram
<input checked="" type="checkbox"/>	NRBC_Abn_Scattergram
<input checked="" type="checkbox"/>	Neutropenia
<input checked="" type="checkbox"/>	Neutrophilia
<input checked="" type="checkbox"/>	Lymphopenia
<input checked="" type="checkbox"/>	Lymphocytosis
<input checked="" type="checkbox"/>	Leukocytopenia
<input checked="" type="checkbox"/>	Leukocytosis
<input checked="" type="checkbox"/>	Monocytosis
<input checked="" type="checkbox"/>	Eosinophilia
<input checked="" type="checkbox"/>	Basophilia

System Configuration Diagnostics Security Specimen Management SSR DC SR MM MA Laboratory Intelligence Reports Window Help

SHRH XN2000

Tree View

Value List Items

Before Message Queued Internally

- Add NO to 667 668 927
- Suppress No Results Rule
- Abnormal IP Message error 667 Manual Diff
- Abnormal IP Message error 927 slide review
 - If: {Error Name(s)} {On Test} {Value List:AbnormalIPMessage} = "A"
 - Then: {Set} {Result} {On Test} "927" = "YES" {AND} {Add} {Test Comment(s)} {Value List:AbnormalIPMessage} {On Test} "927" {AND} {Suppress Test} {Value List:AbnormalIPMessage}
 - Else:
- Abnormal IP Message error 667 Manual Diff

Tree View Grid View

If: {Error Name(s)} {On Test} {Value List:AbnormalIPMessage} = "A"
 Then: {Set} {Result} {On Test} "927" = "YES" {AND} {Add} {Test Comment(s)} {Value List:AbnormalIPMessage} {On Test} "927" {AND} {Suppress Test} {Value List:AbnormalIPMessage}
 Else:

Row Enabled	AbnormalIPMessage
* <input type="checkbox"/>	
<input checked="" type="checkbox"/>	RBC_Abn_Distribution
<input checked="" type="checkbox"/>	Dimorphic_Population
<input checked="" type="checkbox"/>	Anisocytosis
<input checked="" type="checkbox"/>	Microcytosis
<input checked="" type="checkbox"/>	Macrocytosis
<input checked="" type="checkbox"/>	Hypochromia
<input checked="" type="checkbox"/>	Anemia
<input checked="" type="checkbox"/>	Erythrocytosis
<input checked="" type="checkbox"/>	RET_Abn_Scattergram
<input checked="" type="checkbox"/>	Reticulocytosis
<input checked="" type="checkbox"/>	PLT_Abn_Scattergram

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Hematology – Sysmex Flagging/Mixing Error

- Mixing Error action message converted to a Linearity flag

The screenshot displays a software interface with a menu bar at the top containing: System, Configuration, Diagnostics, Security, Specimen Management, SW, DC, SW, MM, MA, Laboratory Intelligence, Reports, Window, and Help. Below the menu bar is a toolbar with icons for various functions. The main area shows a tree view on the left with the following items: New Rule Suppress 0.0 IPF, Rule, - Rule, Suppress N.L.H, Bar Code Error Reads, and Action Message Mixing Error. The 'Action Message Mixing Error' item is selected, and its configuration is shown in the main pane. The configuration includes: If: {Error Name(s)}-{On Test} "ACTION_MESSAGE_Sample_Mixing_Failure?" = "A", Then: {Add Test} "668" {AND} {Set} {Result} {On Test} "668" = "YES" {AND} {Add} {Test Comment(s)} "Mixing Error" {On Test} "668" {AND} {Suppress Test} "ACTION_MESSAGE_Sai", and Else:.

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Hematology – Outside Linearity

- CBC results outside linearity will create a linearity flag in Epic Beaker to prevent auto-verification

The screenshot displays the Epic Beaker configuration interface. The main window shows a tree view of rules, with the 'Outside Linearity' rule selected. The rule logic is as follows:

- If: $(\{Result\} \{On Test\} \{Value List:TestCode\} < \{Value List:lowlimit\}) \{OR\} (\{Result\} \{On Test\} \{Value List:TestCode\} > \{Value List:upperlimit\})$
- Then: $\{Add Test\} "668" \{AND\} \{Set\} \{Result\} \{On Test\} "668" = "YES" \{AND\} \{Add\} \{Test Comment(s)\} "Exceed Linearity" \{On Test\} "668"$
- Else:

The 'Value List Items' table on the right lists the test codes and their corresponding low and upper limits:

Row Enabled	TestCode	lowlimit	upperlimit
<input type="checkbox"/>			
<input checked="" type="checkbox"/>	52364	0.01	500.47
<input checked="" type="checkbox"/>	52044	0.01	8.31
<input checked="" type="checkbox"/>	51636	0.1	24.5
<input checked="" type="checkbox"/>	51630	0.1	68.5
<input checked="" type="checkbox"/>	51984	0.1	5004
<input checked="" type="checkbox"/>	52052	0.45	25.8
<input checked="" type="checkbox"/>	PLT-O	2	423

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Hematology – “Q” Scores

- “Q” Score: Probability of presence of abnormal cells in a sample

The screenshot displays a software interface for configuring rules. The main window shows a tree view of rules, with 'Suspect IP Message Suppress' selected. The rule logic is as follows:

```
If: (( {Result} {On Test} {Value List: SuspectIPMessage} {Is Numeric} ) {AND} ( {Result} {On Test} {Value List: SuspectIPMessage} <= {Value List: highnumber} ))
Then: {Suppress Test} {Value List: SuspectIPMessage}
Else:
```

The 'Properties' pane shows the rule details:

Property	Value
Description	Suspect IP Message Suppress
If	(({Result} {On Test} {Value List: SuspectIPMessage} {Is Numeric}) {AND} ({Result} {On Test} {Value List: SuspectIPMessage} <= {Value List: highnumber}))
Then	{Suppress Test} {Value List: SuspectIPMessage}
Else	

The 'Value List Items' table lists various parameters and their corresponding highnumber values:

Row Enabled	SuspectIPMessage	highnumber
* <input type="checkbox"/>		
<input checked="" type="checkbox"/>	Blasts?	100
<input checked="" type="checkbox"/>	Immature_Gran?	100
<input checked="" type="checkbox"/>	Left_Shift?	110
<input checked="" type="checkbox"/>	NRBC?	100
<input checked="" type="checkbox"/>	Atypical_Lympho?	150
<input checked="" type="checkbox"/>	RBC_Lyse_Resistance?	100
<input checked="" type="checkbox"/>	Abn_Lympho/L-Blasts?	130
<input checked="" type="checkbox"/>	RBC_Agglutination?	100
<input checked="" type="checkbox"/>	Turbidity/HGB_Interference?	100
<input checked="" type="checkbox"/>	Iron_Deficiency?	300
<input checked="" type="checkbox"/>	HGB_Defect?	300
<input checked="" type="checkbox"/>	Fragments?	100
<input checked="" type="checkbox"/>	PLT_Clumps?	180
<input checked="" type="checkbox"/>	PLT_Clumps(S)?	180
<input checked="" type="checkbox"/>	Blasts/Abn_Lympho?	130
<input checked="" type="checkbox"/>	Turbidity/HGB_Interference	100
<input checked="" type="checkbox"/>	Iron_Deficiency?	120
<input checked="" type="checkbox"/>	Abn_Lympho?	100

Hematology – Bar Code Read Errors

- Results are suppressed if bar code read fails

The screenshot displays the LIS interface for patient SLH XN-2000. The 'Tree View' on the left shows a hierarchy of rules, with 'Bar Code Error Reads' selected. The rule logic is as follows:

```
If: {Specimen ID}-{Contains} "ERR00"  
Then: {Suppress Test}-{Value List:TEST}  
Else:
```

The 'Properties' pane at the bottom shows the rule details:

Property	Value
Description	Bar Code Error Reads
If	{Specimen ID}-{Contains} "ERR00"
Then	{Suppress Test}-{Value List:TEST}

On the right, the 'Value List Items' table lists test codes and their suppression status:

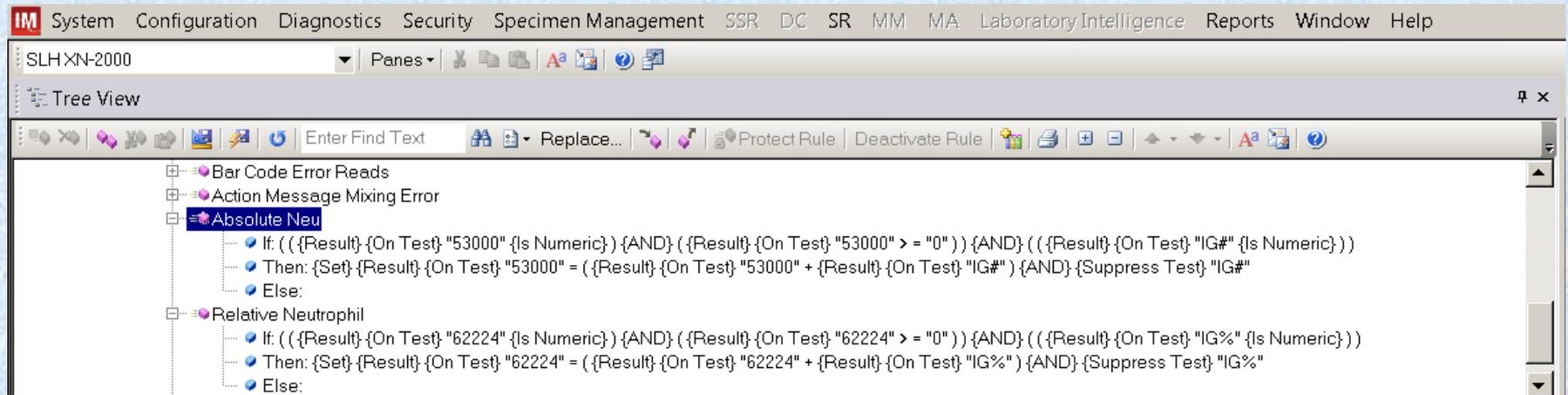
Row Enabled	TEST
<input type="checkbox"/>	
<input checked="" type="checkbox"/>	62666
<input checked="" type="checkbox"/>	53006
<input checked="" type="checkbox"/>	62759
<input checked="" type="checkbox"/>	53002
<input checked="" type="checkbox"/>	53000
<input checked="" type="checkbox"/>	60312
<input checked="" type="checkbox"/>	51490
<input checked="" type="checkbox"/>	61801
<input checked="" type="checkbox"/>	53106
<input checked="" type="checkbox"/>	62224
<input checked="" type="checkbox"/>	61806
<input checked="" type="checkbox"/>	51984
<input checked="" type="checkbox"/>	51812
<input checked="" type="checkbox"/>	51810
<input checked="" type="checkbox"/>	51814
<input checked="" type="checkbox"/>	51636
<input checked="" type="checkbox"/>	52044
<input type="checkbox"/>	52264

Proprietary and confidential

Proprietary and confidential

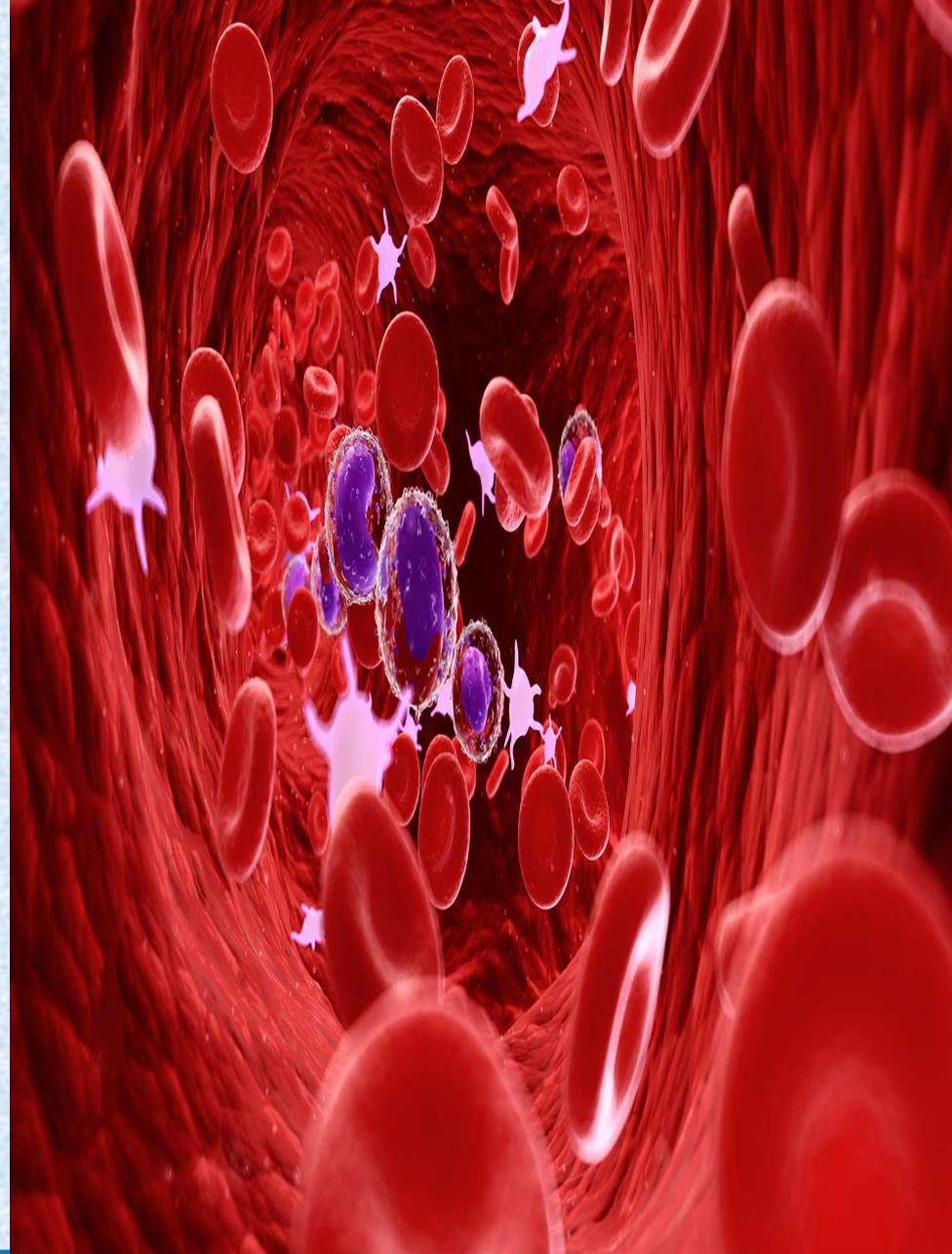
Hematology – Immature Granulocytes (IG)

- Sentara currently not reporting IG
- Rule adds IG% and IG# to Neut% & Neut#



Hematology

- Honorable Mentions
 - Positive_Diff,
Positive_Morph,
Positive_Count
 - Rounding rule
 - IPF 0.0 rule
 - “-” rules



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Urinalysis

- Clinitek Specimen ID/Patient ID issue
- Result “fixes”
 - **Trace Blood results**



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Chemistry

- Special Roche/DI build
- Auto-verification
- Dilutions
- Calculations
- Linear limits



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Chemistry

Patient Name	Specimen ID	Sequence Number	Rack	Position	Specimen Dilution /	Priority	Specimen Completion Status
			5051	3		R	Tests Held
			4014	2		S	Tests Held

Patient Name: [REDACTED]
 Patient ID: [REDACTED]
 Date of Birth: [REDACTED]
 Sex: M
 Location - Facility: EPICBOC
 Ordering Physician:
 Collection Date/Time: 6/12/2020 11:10:58
 Specimen Comment(s):
 Specimen Type: P

Test Worksheet

Connection Name	Test Name	Result	Re...	Units	Result Date/Time	Test Comment(s)	Error Code(s)	Previous Result	Previous Result Date/Time	Test Status	Error Name(s)
*											
SNVMC-C6000-2	TP-UR RAN...	150.7	F	mg/dL	6/12/2020 12:27:47 PM	Wait For Dilution				Held for Verification	>ABS
SNVMC-C6000-2	TP-UR RAN...	570.3	C	mg/dL	6/12/2020 12:27:47 PM					Held for Verification	N

Proprietary and confidential

Proprietary and confidential

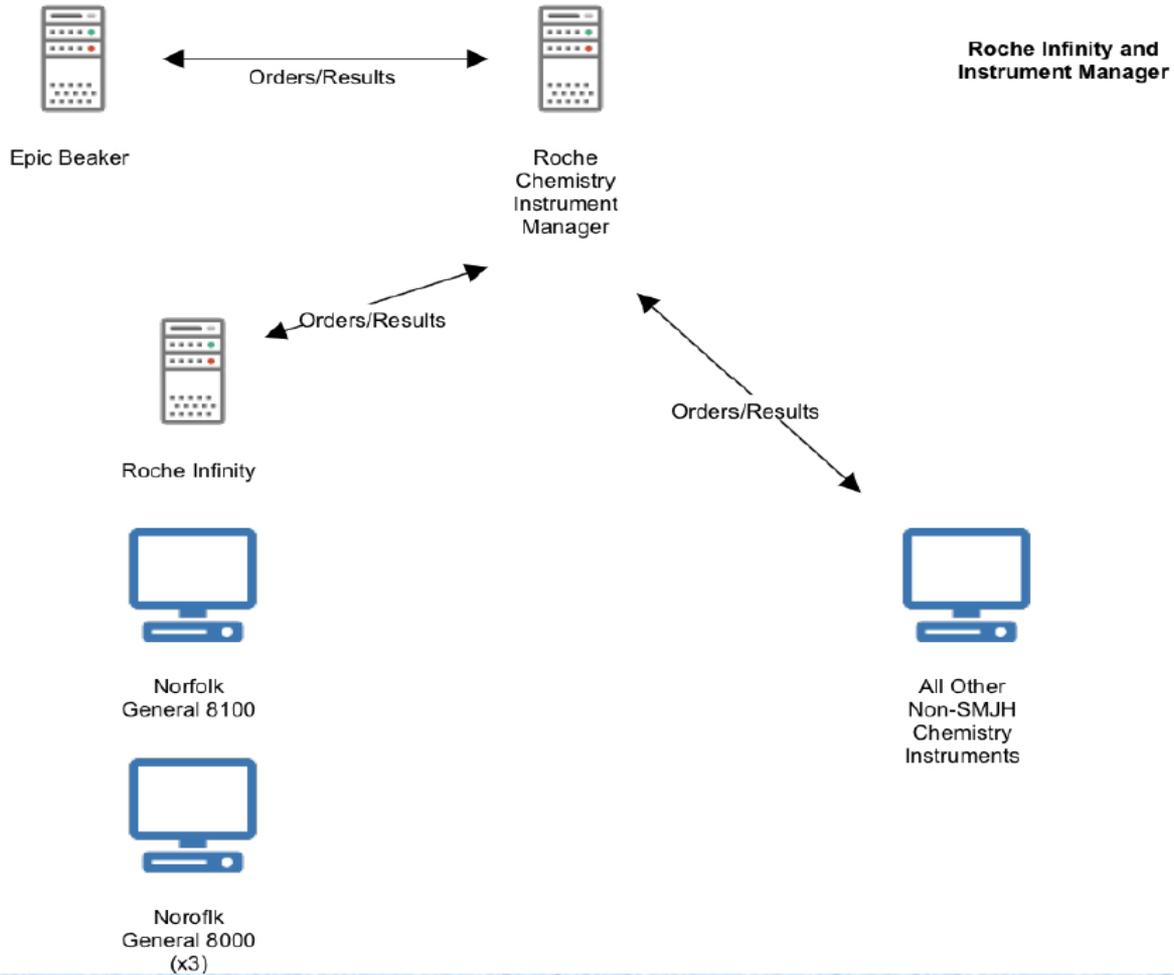
Specimen Processing

- Coming in 2020...Total Lab Automation!!!
- Roche 8100
 - **Infinity software (SNGH)**
 - Sending orders/results
 - Roche DI



Proprietary and confidential

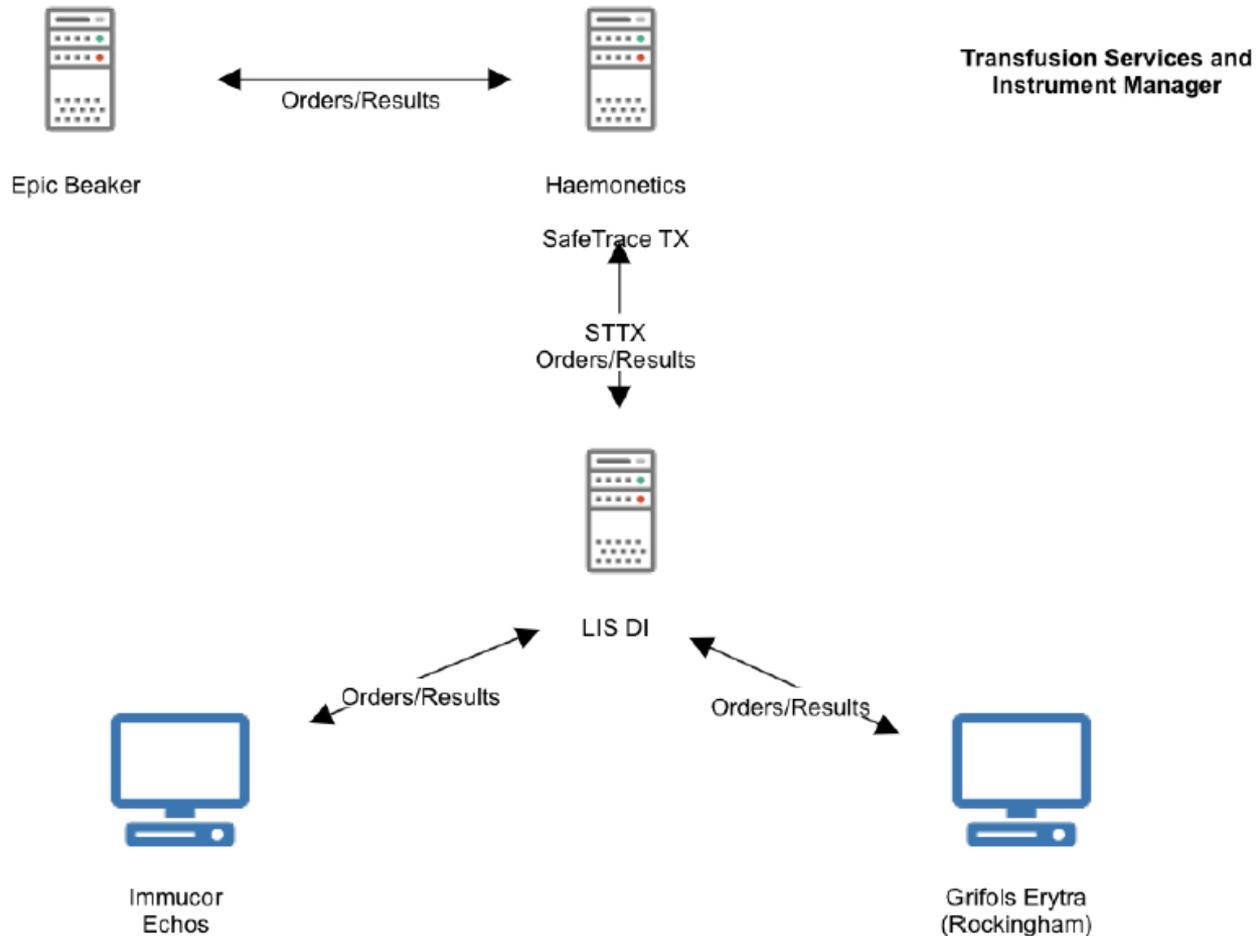
Specimen Processing/Total Lab Automation



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Transfusion Services



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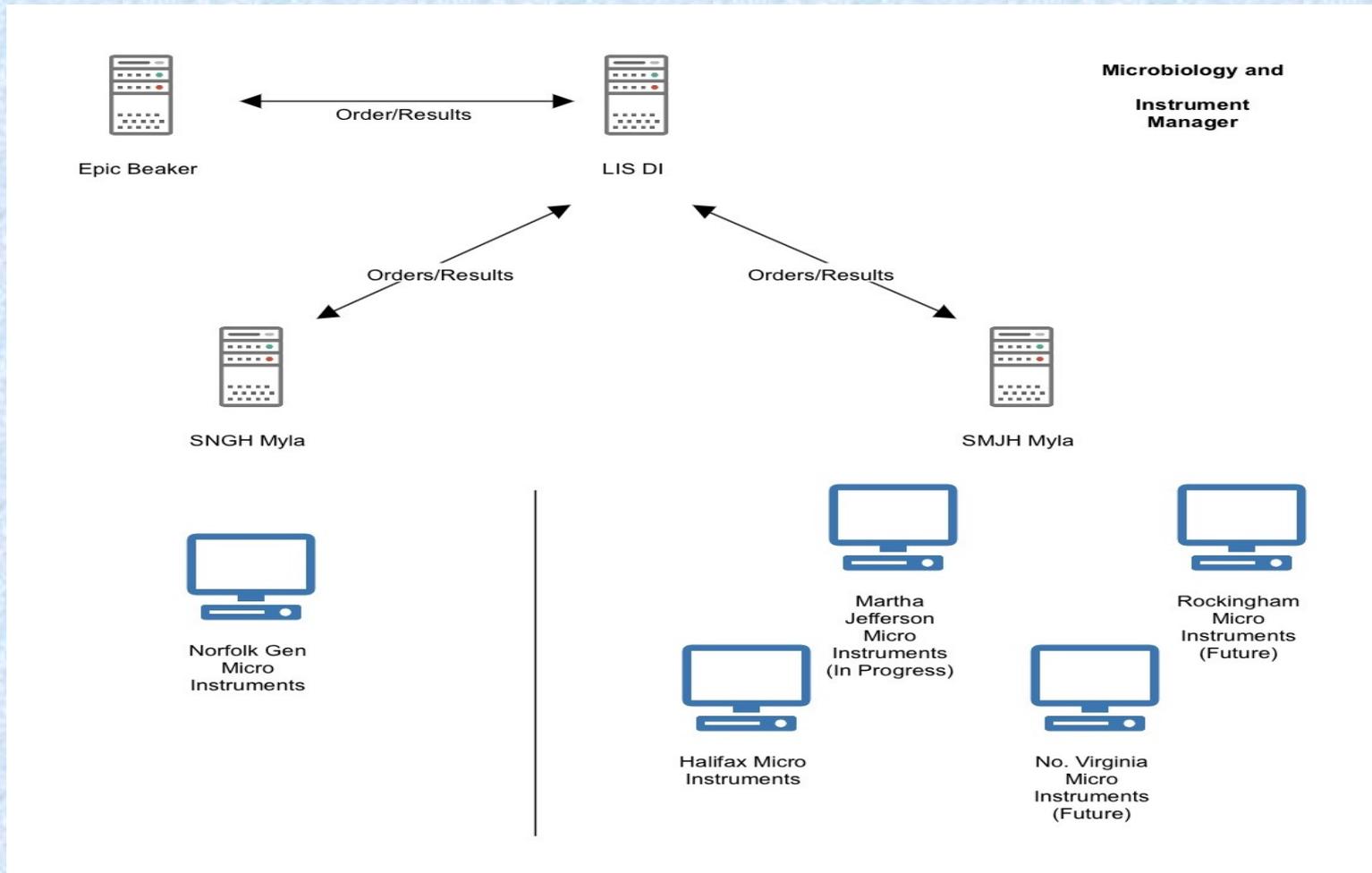
Transfusion Services

- IM, SafeTrace and Epic Beaker
 - **No Epic BB module**
 - **SafeTrace serves as BB module**
 - **SafeTrace integrates to instrumentation via DI**
- No reflex testing
- Rules Processing
 - **No blood type, DI will hold results**
 - **Crossmatch results cross**
 - **Incompatible results held**
 - Comments held



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Microbiology



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Microbiology

- Integration of Myla as middleware
 - Order sent to DI, then to Myla, then to instrument
 - Myla doesn't integrate directly to Epic
- Rules Processing
 - **SNGH: One of first sites to integrate Myla & DI**
 - DI rep on site to assist w/ build
 - **Sending/receiving orders**
 - **BCI Codes/Tables**
 - Antibiotics
 - Organism IDs

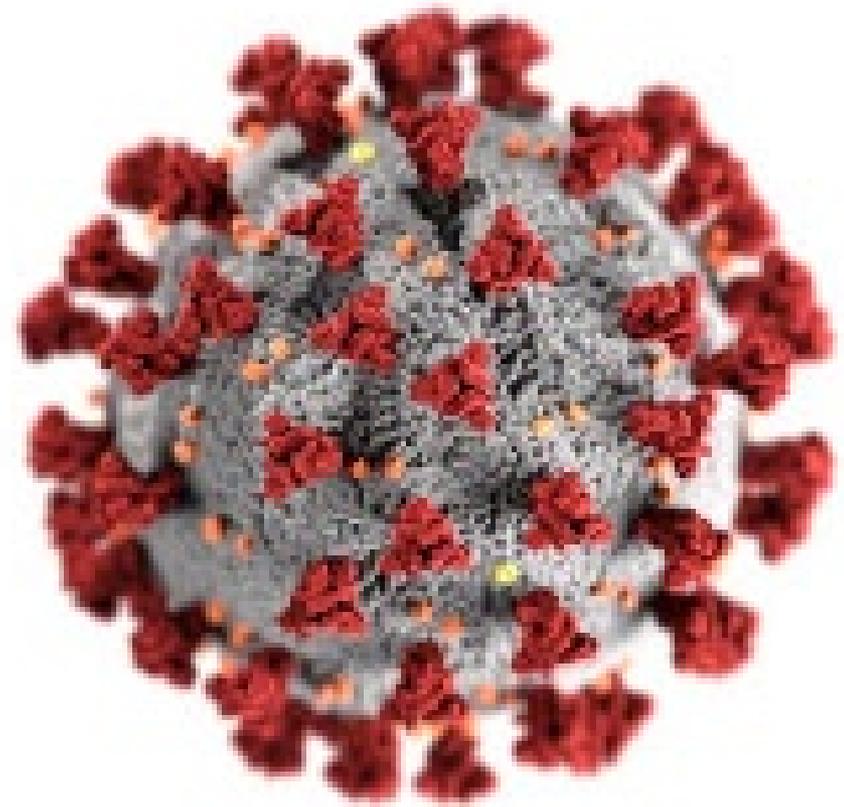


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COVID-19 Impact

Test are currently run on:

- **Abbott m2000 (SNGH)**
 - Purchased specifically for Covid-19
 - Used in the COVID Lab
- **Roche Cobas 6800 (SNGH)**
 - Used in the Molecular Dept
- **GeneXpert DX (SNGH, SNVMC, SMJH, SRMH)**
 - Used in the Microbiology Dept
- **Diasorin Liaison MDX (SNGH) (Non-Interfaced)**
 - Used in the Molecular Dept
- **Diasorin Liaison XL (Fall 2020)**
 - Purchased Specifically for Covid-19
- **Hologic Panther (SNGH) (Possible)**



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COVID Lab

Anatomy of Building a COVID-19 Lab in 10 Days

General Support (SNGH Facilities/Construction & RG Electric)

EPIC/Interface Builds (Beaker Team and LIS Technical Team)

New Plumbing (SNGH Pipe Shop/B&Z Plumbing)

Computer (Desktop Support)

New Freezer (Purchasing/Receiving)

New Electrical (CPI Services)

Biosafety Cabinet (SNVMC Lab)
(SMJH Engineering who Transported it!)

Phone (Communications)

Data Cables (Schick)

Label Printer (IT Construction)



New Door (RG Electric)

Bench (SNGH Core Lab)
Fabricating Top (SNGH Facilities)

Heat Block (EVMS)

Bench (SNGH Molecular Lab)

Remove Old Furniture & Clean Floors (ESD)

Signage/Support (Lab Safety)

Centrifuge (ODU)

Sink and Counter (SNGH Facilities)

Chair (Serology Lab)

Flammable Cabinet (SNGH Core Lab)

Abbott m2000 (Purchasing/Receiving)

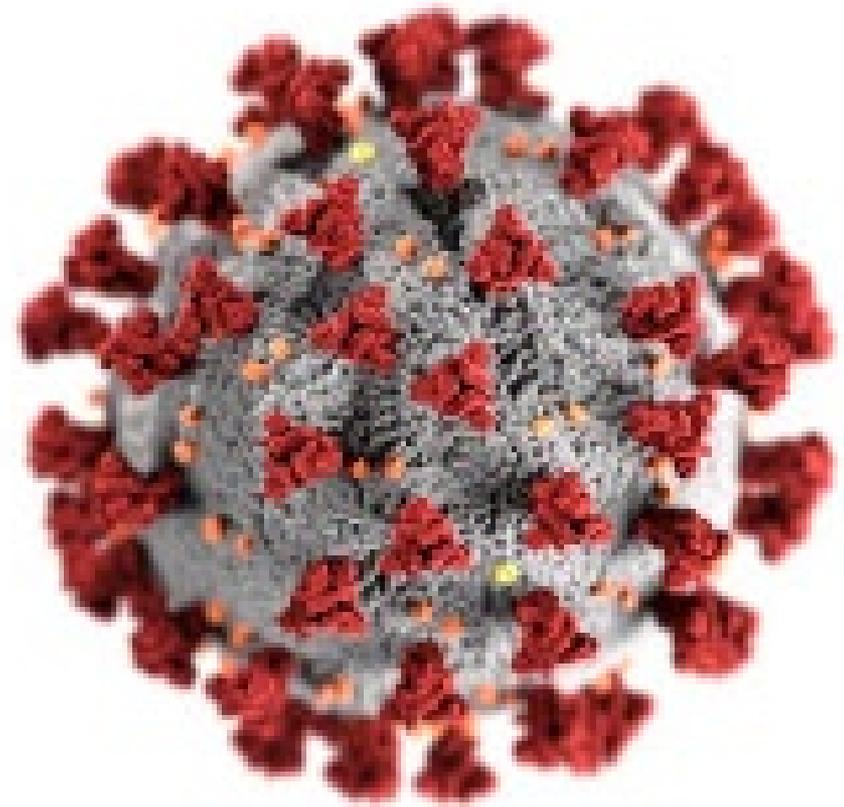
Layout and Organization (Molecular Lab, Core Lab, and Histo Techs)

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COVID-19 Testing

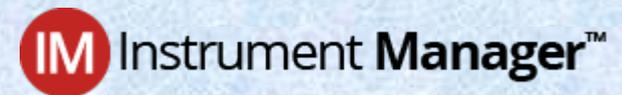
- **Testing sent out to LabCorp initially**
- **First in-house testing limited to 30 tests/day**
- **Up to 5,500 – 6,000 PCR tests/week**
- **Currently over 40,000 in-house tests performed**



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Sentara's Future with DI

- Retire the SMJH Chemistry
 - **Merge into Enterprise Chemistry DI Server**
- Upgrade the Hemo/Coag Server
 - **Upgrade OS and DI Version**
- Cloud Based Servers
- Immulink
 - **Immucor Echo Instruments in Blood Bank**



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THANK YOU!!! QUESTIONS???

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