JOHNS HOPKINS MEDICINE

Point of Care Connectivity: Untangling the Web

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Disclosures

- I do not have any disclosures to report

Objectives

- To understand basic IT terms and definitions for successfully setting up Point of Care instruments
- To understand connectivity models including wired and wireless connections
- To learn how to resolve connection issues including errors involving the instruments, middleware and/or facilities' network problems

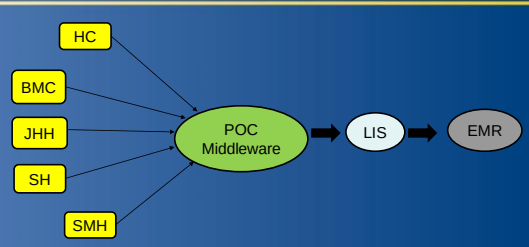
Connectivity advantages

- Helps ensure that all care teams have access to patient results in a timely manner
- Monitor POC program from a centralized location
- Operator certifications are more manageable
- More control over large number of instruments
- QC and calibration documentation
- QA monitoring/ troubleshooting in real time
- Multiple facilities work together to troubleshoot and support each other – breaking silos
- Makes it all easier!

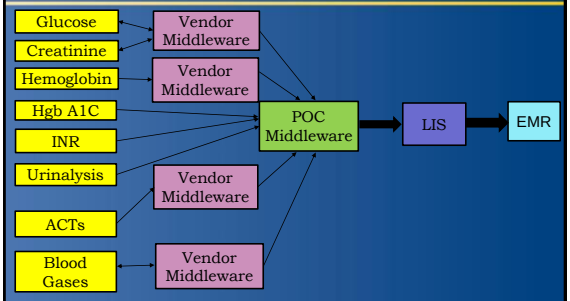
Today, your POCT program efficiency will depend on the instrument's rapid TAT combined with the fast access of the accurately integrated results.

Futrell, K. (2016, September). ***Point of Care Testing. The Great Boom Ahead.***

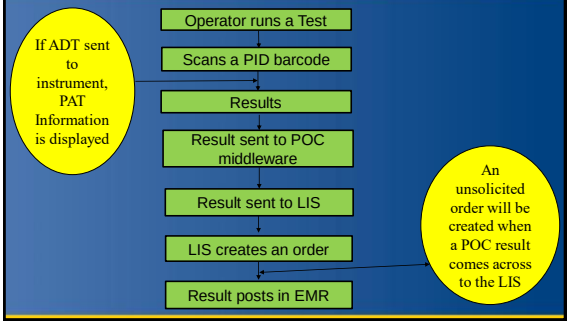
Enterprise Interface Infrastructure



Interface infrastructure



Pathway: Instrument to EMR



So how do we get there?

IT terminology

Servers

- A server is a computer, a device or a program that has the ability and is dedicated to managing network tasks and resources
- Servers respond to requests made by another program (Client)
- **Dedicated**: they perform no other task besides the server task, and are used for communicating with a specific set of instruments
- **Virtual**: usually located offsite and resources are shared by multiple users. One physical server is converted into multiple virtual machines that can run their own operating systems

IT terminology

- Server redundancy: implemented to ensure server availability when the primary fails
- Test server: in POCT it is important to have a server where new instrument connections can be tested before moving into the Live environment

IT terminology

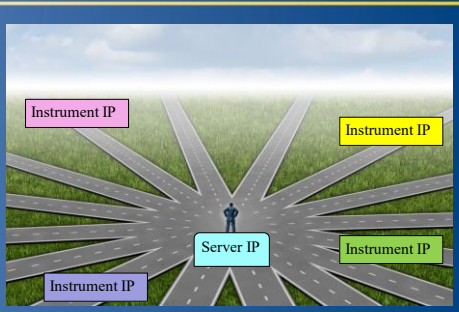
IP address:

- Short for Internet Protocol
- Allows a device to communicate with other devices, or a server
- It gives identity to the instrument being connected
- Ex: 10.123.456.78

MAC address:

- Short for Media Access Control
- Assigned to a device or docking station at the moment of manufacturing
- Does not contain specific information about which network a device is connected to
- Ex: 12:3A:45:6B:78:9C

IP addresses



IT terminology

Middleware

- Technology that helps integrate data from different sources (devices) and provide ways to manipulate it
- In POCT, middleware serves as the platform where Technologists can perform QA activities to ensure operator compliance, ADT and location set up, and keep track of instruments

IT terminology

- A middleware is able to obtain information from instruments and process it and may or may not be able to do instrument configurations
- Some vendors offer their own middleware to assist with configurations and are also able to perform quality assurance functions
- When selecting a middleware, it is important to consider the system's ability to connect to multiple devices, regardless of the vendor

Admission, discharge, transfer (ADT)

- These are Patient Administration messages that are used to communicate patient's states while in the Hospital
- Different messages are generated when a patient is admitted, transferred, merged or discharged, among other transactions
- POC middleware does not manipulate ADT information, they only receive and pass it through to the instruments
- Some POC instruments do receive ADT information and will display it for Patient Identification purposes

ADT Message

```
MSH|^~\&|ADT|MPAC|BOR||20160726070825||ADT^A01|277815287|P|2.3|||||8859/1
PID|1|9999999|999999|999999|SAMPLE^ERIN^J||19870501|B||Caucasian/White|345
SUNNY STREET^APT 36^ANN ARBOR^MI^48105^UNITED STATES||(734)567-
8910||English|Single|No Preference|99999|||Non-Hispanic
PD1||||1234EXAMPLE^EXAMPLE^JANE|||||||N
PV1|1|E|P-ER^^^BORGESS-PIPP HOS^^^PIPP Health
Ctr|Emergency|||7777777777^LLOYD^CARLI|||Pipp Emergency Room|||Not
Available|||6666666666^SOLO^HOPE|Emergency|99999999|HMO
Medicaid|||||||||||||||||||BORGESS-PIPP HOS|||||20160726075400
PV2||Semi Private|^LOWER BACK PAIN WITH NAUSEA AND VOMTING
DG1|1|FT|39003^Back pain^IMO|Unknown||A
GT1|1||SAMPLE^RYAN^J||456 CLOVER LANE^UNIT 7^GRAND RAPIDS^MI^49301|616)567-
8910||||FATHER|||||UNEMPLOYED||0000000000
IN1|1||9999999|MEDICAID|||||||||||||MED|||||||||||||||||||999999999
```

https://www.ihe.net/uploadedFiles/Documents/PCD/IHE_PCD_Suppl_ADT_Interoperability_Rev1-1_TI_2016-08-19.pdf

Wired vs Wireless

Wired	Wireless
Needs evaluation of infrastructure - are there enough network jacks or does it require new installation/ activation	Needs network evaluation – get the IT team involved
Might require IT registration	Might require IT registration
Might require a designated IP from IT	Requires a certificate loaded on instrument

Wired connection

- Most of these instruments include a docking station
- The MAC address from the docking station and/or meter must be registered with IT
- A static IP will be assigned from IT, and the docking station must be configured with it → This allows the communication from the instrument to the POC middleware
- The network jack where the instrument will be connected must be identified – if it is not active, your Facilities' IT department would need to activate it

Wired connection

Set up Tips:

- Communicate with vendors to understand their requirements for loading and updating information on docking stations. Ex: is there a password, or a specific set of instructions you must follow
- Always keep a document with the instrument location, Serial Number, MAC address, and Network Jack

Wired connection

Wireless connection

For instruments that are able to connect wirelessly, and depending on your IT department's regulations, some of the following guidelines will be helpful:

- Find out if the wireless card is included within the instrument or if it is an additional component
- Find out with IT, what are the necessary steps to configure this wireless card as well as any security set up required
- In most cases, you will need a Certificate issued by IT to be loaded on the instrument so that they will connect

Wireless connection

DHCP

- Stands for Dynamic Host Configuration Protocol
- Protocol for assigning dynamic IP addresses to devices on the same network
- A device has the opportunity to connect to any IP address that is available

STATIC

- Permanent number assigned to a device on a network
- Also known as Fixed
- Indicates that the device will only connect via this IP and not search for available ones

Wireless connection

Certificates

- "Document" created by IT to allow devices to connect wirelessly to a network.
- Created after IT has approved the instrument is able to connect safely to the Hospital's network
- They are assigned a file name and password
- IT is usually involved in loading them on instruments
- They are created to last 3-5 years, depending on Facilities' protocols
- Must be reloaded with new expiration date

POCT1A

- Universal standard created by the CIC (Connectivity Industry Consortium)
- Connectivity guideline for how to build a Point of Care instrument
- Framework for engineers to design devices
- First in defining a common protocol for communicating POC date from devices to computer systems
- Idea was so that any vendor should be able to connect to LIS

POCT1A

https://clsi.org/standards/products/point-of-caretesting/documents/poct01/

So how do we get there….

Know your team

- Point of Care Coordinators
- Hospital IT representative – multiple groups depending on connection types
- Vendor- including an IT expert
- LIS representative
- EMR representative
- Operator/nursing
- Billings representative

Selecting a Middleware

- Does it allow connection to all your current instruments/ potential new ones?
- Are there any growth limitations? – additional Facilities, Physician offices, etc
- What are the QA functions available or those that you would like to see?
- Is there an E-Learning platform?
- Does it have a limited access option for Clinicians?
- What are your institutions' requirements to allow vendors to remote in?

Selecting new Instruments

- Understand the connection options: wired vs wireless
- Does the instrument connection frequency meet IT requirements?
- What are the steps for the user to send results – would it discourage operators?

Interface: Step by Step

Questions to get started:

- How are you connecting the instrument?
- Do you need data jacks installed/ activated?
- What steps are involved to send results? Extra steps for operators?

Interface validation

Besides instrument validation, the interface set up needs to be tested, including:

- Reporting units
- Reference ranges
- Critical action values
- Instrument comments
- Any calculated values
- EMR result posting
- Billing validation

*Check specific accreditation agency requirements when it comes to validation.

Interface: Challenges

- To meet expectations (i.e., transmission timing, location of results)
- Instrument date/time must be accurate
- Human factor, for instruments not automatically uploading
- Wireless dead spots
- Depending on institution's size, IP addresses availability: wireless traffic
- Different IT regulations per site

Connectivity Troubleshooting Activity

Troubleshooting

Problem: My results are not in the patient's EMR

- Check if the instrument is connecting
- Check if there is a cable missing
- Check if the operator needs to push the results from the meter
- Determine if it is a hardware or software issue
- Check if the operator needs to Accept results for them to be sent
- Was the result run under the correct ID?
- Is there an exception/issue with the account number or result received?
- Is the operator authorized to run the test?
- Is there a configuration exception?

Troubleshooting

Problem: I have no connectivity bars (wireless connection)

- Make sure the Wi-Fi button is enabled
- Check for the instrument location; is there a dead spot zone
- If this is a new instrument, make sure it has been registered to connect on the network
- Does this meter need a certificate to connect?

Troubleshooting

Problem: My meter uploaded yesterday but it is not uploading today (wired connection)

- Check for connection cables
- Is the network cable connected to the right network jack?
- Check with IT to make sure the assigned IP to the meter has not been reassigned to another instrument

Troubleshooting

Problem: My instrument receives patient ADT. Today I have been seeing too many patient overrides but the results are going to the EMR

- Ask if the meter has fully connected recently – reset
- Clarify the problem – it is helpful to get examples of the patients that are showing up as invalid to make sure they are being registered under the right location
- Double check the location the meter is assigned to along with the ADT locations being sent to that meter
- If you have access, look at the server status; is there anything not connecting in the background?

Summary

- Having an understanding of basic IT terminology will help in setting up a successful program
- Involve all team members from the beginning
- Understand IT's requirements and procedures for allowing new instruments on the network
- When evaluating new instruments, ask IT questions to the vendor and understand their ability to troubleshoot
- Before implementing a new instrument, make sure it has been fully tested for connectivity from the instrument to the EMR

QUESTIONS?

Thank you!

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