Valley Children’s Laboratory:
An Auto-verification Journey

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Valley Children’s Hospital

- 330 beds at main hospital
- Multiple Outpatient Clinics on campus
- Laboratory
  - ~250-350 Chemistry specimens/day
  - ~200-250 Hematology specimens/day
  - ~50 Coagulation specimens/day
  - ~80-120 Urinalysis specimens/day
Core Laboratory Instruments

- **Chemistry**
  - Abbott Architect c4000
  - Abbott Architect ci4100

- **Hematology**
  - Beckman Coulter DxH 1601 (2 analyzers plus SMS)
  - Cellavision DM96
  - iQ200 Select (Body Fluids)

- **Coagulation**
  - Stago Compact (2 analyzers)
  - Rotem Delta

- **Urinalysis**
  - Arkray Aution Hybrid 4050
  - Siemens Clinitek Status+
Laboratory Software

- LIS: Meditech Client Server 5.67
- Instrument Manager v8.16 (upgraded from v8.13 on 8/2018)
  - IM LIVE
    - 17 Connections
    - 8 Thin Client Licenses
    - Specimen Management
  - IM TEST
    - 5 Connections
    - 3 Thin Client Licenses
  - IM MIRROR
- Bio-Rad Unity Real Time
Initiating Steps

• LEAN project
  – TAT monitoring
  – Auto Cell / Manual Cell
  – Establish procedures for new workflow
  – Identified need for Auto-verification to improve efficiency
• Coordinated purchase of new Chemistry analyzers with IM as the interface
  – Had the option to purchase middleware through Abbott
  – Would have been more difficult to apply AV to the rest of the lab because they are not all on the Abbott platform without purchasing additional software had we went this route
  – IM provided the most versatile solution
2015-2016
Implementation Milestones

2012 – EP Evaluator

1/2015 – Began Weekly IT Meetings

2/2015 – Installed IM

3-4/2015 – DI Training in VT

7/2015 – Chemistry Pass-Through

1/2016 – Chemistry Soft Go-Live

2/2016 – Chemistry Auto-verification

6/2016 – Coagulation Auto-verification

9/2016 – Clinitek Pass-through

12/2016 – Bio-Rad Unity Real Time for Chemistry and Interval Rule
2017-2018 Implementation Milestones

- **2/2017** – UA Auto-verification (including Clinitek)
- **6/2017** – Rotem Pass-through
- **7/2017** – iQ200 Pass-through
- **7/2018** – Bio-Rad Unity for Hematology
- **8/2018** – Upgraded IM from v8.13 to v8.16
- **9/2018** – Bio-Rad Unity for Coagulation
- **TBD/2018** – Laboratory Intelligence
- **11/2017** – Hematology Pass-through
- **2/2018** – Hematology Auto-verification
Average Turn-Around-Times (in minutes) Received in Lab to Verify

<table>
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<tr>
<th>Department</th>
<th>2015</th>
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Areas for future improvement of TAT and Auto-verification rates:

- Delta Checks for Hematology
- Re-evaluate Instrument errors for relevance
- Re-evaluate current hold rules for efficiency and effectiveness
Factors in Successful Implementation of IM

1. Dedicated Resource (Middleware Coordinator)
2. Dedicated DI Consultant (Brandon Robison)
3. Implementation team - consisted of a good working relationship with IT and Laboratory Technical Specialists
4. Weekly project update meetings held with Medical Director, Lab Administrative Director, Lab Operations Manager
5. Constant communication and collaboration with core lab CLS
Future Goals

- On-going modification and validation of Rules
- Regular driver and software upgrades
- Implement Laboratory Intelligence
- Transition to EPIC
- Possibly implement CAP and EP Evaluator interfacing
- Evaluation for possible movement into other areas of the Laboratory (Molecular Pathology and Microbiology)
Connections, Workspaces, and Rules examples

- Note that some analyzers/LIS may require 2 IM Connections
- Printer requires a connection

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Chemistry Workspace

- Utilize rules that work in conjunction with Bio-Rad Unity to hold QC failures
- Utilize rules that hold if an acceptable QC specimen was not run in the specified time interval from the last QC run
- Reruns can be ordered from the workspace
- TSH reflex to FT4 testing
Coagulation Workspace

- Use of color coding for Critical Results and Specimen Department
- Rules are utilized to format results that fall outside of linear range.
- Factor rules to select correct result to report based on dilution factor
• 2 separate connections for 1 analyzer plus a 3rd analyzer for this area; Created rules to make them all work together
• Culture if Indicated rules assess if a culture is required
Hematology Workspace

- Rules in Hematology configuration order Cellavision tests and automatically reject auto-differential
- Hematology analyzer working in conjunction with Cellavision
All Analyzers Workspace

- Color Formatting and Layout
- Creative Rule Writing: Methotrexate Screen test (9 Rules)
[11] 8.10 Format Methotrexate Results 20170601

- If:
  - [11] Then:
    - [0] 8.10.1 Order MTX Screen 20170601
    - [3] 8.10.2 Manual Dilution for MTX 20170601
      - If:
        - [3] Then:
          - [0] 8.10.2.1 Result is >
          - [0] 8.10.2.2 Result is <
          - [0] 8.10.2.3 Result is numeric
        - [0] Else:
          - [3] 8.10.3 Format MTX1000 Test 20170601
            - If:
              - [3] Then:
                - [0] 8.10.3.1 Multiply by Dil Factor 20170601
                - [0] 8.10.3.2 Format Upper Limit 20170601
                - [0] 8.10.3.3 Set Test Name 20170601
              - [0] Else:
                - [0] 8.10.4 Format MTX Lower Limit 20170601
                - [0] 8.10.5 Hold All Methotrexate Results 20170601
  - [0] Else:
Articles of interest

- AUTO10-A Autoverification of Clinical Laboratory Test Results; Approved Guideline; CLSI, October 2006
- Marquardt, Bill; A Step-by-step Process to 95% Autoverification; CAP Today, Dec 2015
- Paxton, Anne; Beyond Connectivity: Middleware’s Shifting Shape; CAP Today, Apr 2016
Questions?