

IMPROVING COMPLIANCE AND DOCUMENTATION OF CT QUALITY CONTROL USING AN ELECTRONIC QUALITY ASSURANCE PRACTICE MANAGEMENT TOOL

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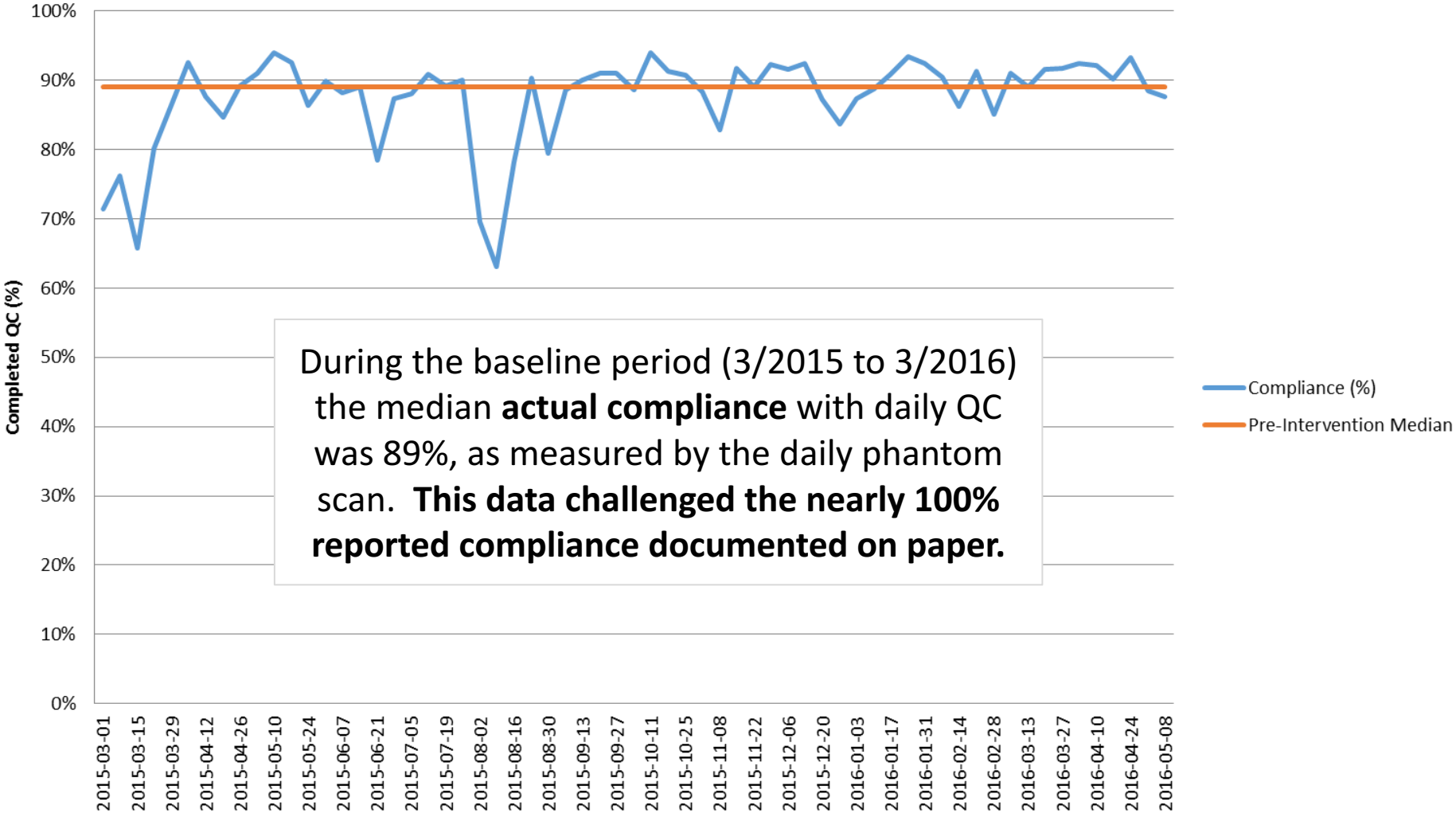
BACKGROUND

- Periodic quality control (QC) tests are required for computed tomography (CT) and other modalities
- Tracking compliance across larger healthcare systems can be challenging
 - Time-constrained technologists may forget to perform QC tests
 - Results historically were recorded on paper
 - Oversight and monitoring of results infrequent
 - Corrective actions are often delayed

CURRENT (BASELINE) CONDITIONS

- Daily QC maintained on paper record from 3/2015 to 3/2016
- Paper logs audited by CT physicist quarterly
- Actual QC performance was tracked using software (Radimetrics, Bayer) to detect the presence of a daily phantom scan
- CT physicist forwarded actual performance data on a monthly basis to site QC lead to encourage daily compliance

QC Compliance Run Chart



During the baseline period (3/2015 to 3/2016) the median **actual compliance** with daily QC was 89%, as measured by the daily phantom scan. **This data challenged the nearly 100% reported compliance documented on paper.**

— Compliance (%)
— Pre-Intervention Median

GOAL: AIM STATEMENT

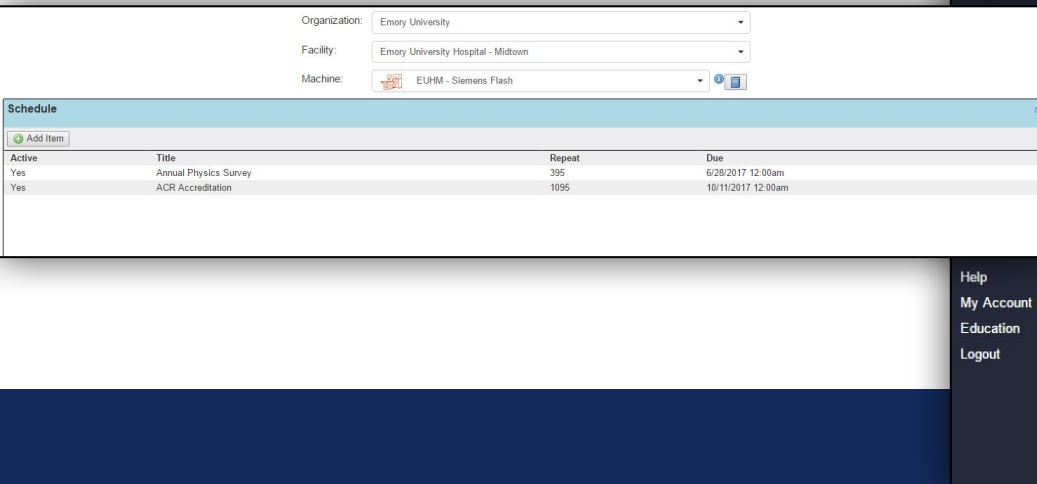
- Implement a QC management system that allows online documentation, reminders for late results, and notification of aberrant results
- Improve compliance and documentation of daily CT QC tests to 100% by 4/2017 using an online management system

ONLINE QA PLATFORM

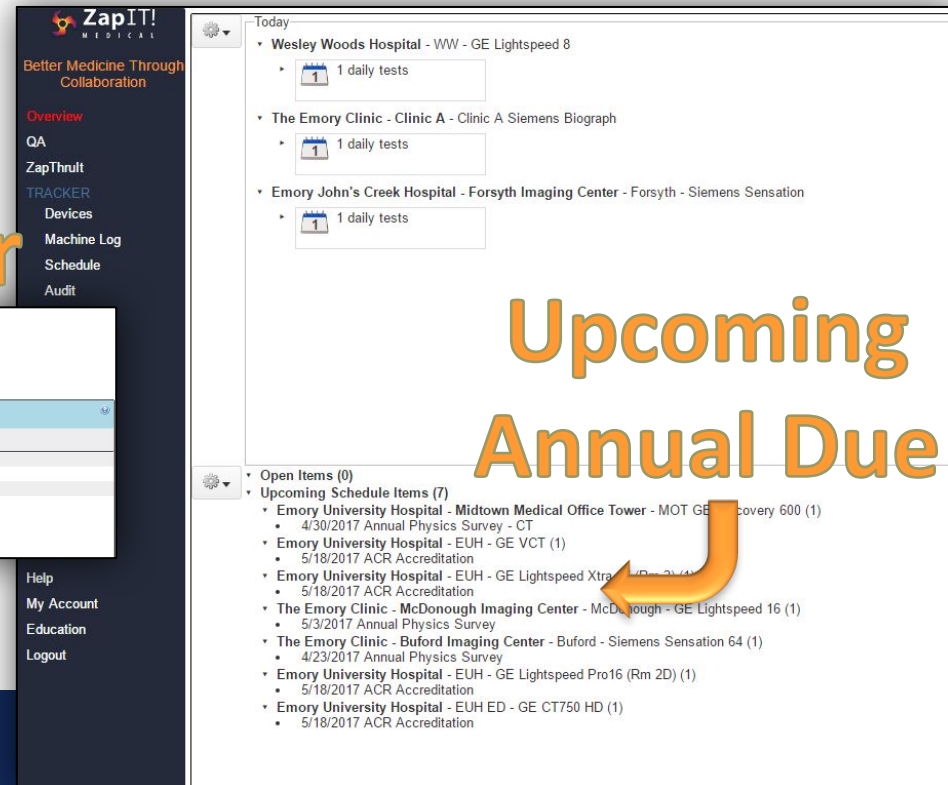
A commercially available quality assurance management software (ZapIT! Medical) was implemented to track daily, monthly, and annual QC for 25 CT scanners.

 **Technologist
QC Due**

Annual QC Scheduler



Active	Title	Repeat	Due
Yes	Annual Physics Survey	395	6/28/2017 12:00am
Yes	ACR Accreditation	1095	10/11/2017 12:00am



Upcoming Annual Due

- Wesley Woods Hospital - WW - GE Lightspeed 8
 - 1 daily tests
- The Emory Clinic - Clinic A - Clinic A Siemens Biograph
 - 1 daily tests
- Emory John's Creek Hospital - Forsyth Imaging Center - Forsyth - Siemens Sensation
 - 1 daily tests

Upcoming Schedule Items (7)

- Emory University Hospital - Midtown Medical Office Tower - MOT GE Discovery 600 (1)
 - 4/30/2017 Annual Physics Survey - CT
- Emory University Hospital - EUH - GE VCT (1)
 - 5/18/2017 ACR Accreditation
- Emory University Hospital - EUH - GE Lightspeed Xtra (Rm 2D) (1)
 - 5/18/2017 ACR Accreditation
- The Emory Clinic - McDonough Imaging Center - McDonough - GE Lightspeed 16 (1)
 - 5/3/2017 Annual Physics Survey
- The Emory Clinic - Buford Imaging Center - Buford - Siemens Sensation 64 (1)
 - 4/23/2017 Annual Physics Survey
- Emory University Hospital - EUH - GE Lightspeed Pro16 (Rm 2D) (1)
 - 5/18/2017 ACR Accreditation
- Emory University Hospital - EUH ED - GE CT750 HD (1)
 - 5/18/2017 ACR Accreditation

DOCUMENTATION

ZapIT!
MEDICAL
Better Medicine Through Collaboration

Organization: Emory University
Facility: Emory University Hospital - Midtown
Machine: EUHM - Siemens Flash

Machine Logs - Total down-time: 0 hours

+ Add Search

Date	Status	Category	Title	Created By
6/10/2014 8:00pm	Closed	Physics (routine)	Annual Report	@emory.edu
6/1/2015 8:00pm	Closed	Physics (routine)	Annual Report	@emory.edu
2/5/2014 7:00pm	Closed	Physics (non-routine)	ACR Accreditation	@emory.edu
4/27/2016 8:00pm	Closed	Physics (non-routine)	Physicist Qualifications - MT	@emory.edu
6/28/2016 3:54pm	Closed	Physics (routine)	Annual Physics Survey	@emory.edu
3/17/2017 1:54pm	Closed	Manufacturer Bulletin	XR-29 Compliance	@emory.edu

Overview
QA
ZapThruIt
TRACKER
Devices
Machine Log
Schedule
Audit
RSC
Aprons
Cassettes
Reporting
RAM
MANAGE
Groups
Users

File
Attachments



DATA ENTRY

Starting 3/2016, technologists were trained to perform daily and monthly QC per ACR recommendations and required to log results in the system.

EJCH - GE VCT1

Daily QC Formula
Incomplete ⚠

Test	Status
Daily QC	⚠

User data entry

Axial Mean HU (center):

Axial Mean SD (center):

Axial Artifacts Visible?: Yes No

Helical Mean HU (center):

Helical Mean SD (center):

Helical Artifacts Visible?: Yes No

Baseline

CT Number/Uniformity pass/fail_criteria:5

Noise (SD) Upper Limit: 7

NoNoise (SD) Baseline: 5

Noise (SD) Lower Limit: 3

Show warning after how many consecutive failures?:3

NoShow warning after how many failures within a period?:3

Failure period (days): 7

Notes

Mark All Not Performed Submit Tests Cancel

Test Not Performed

QA HISTORY & APPROVAL

Did QC
Pass?

Organization: Emory University
Facility: Emory John's Creek Hospital
Machine: EJCH - GE VCT1

[Graph](#) [Run Test](#) [Return to test list](#) [Show setup](#)

Results

Sign-Off Approve Reject Date range: [calendar icon] [calendar icon] Reset

Viewing 1 - Infinity of 402 total records 6 excluded [Show](#)

P/F	S	A	Info	
✓	⚠	⚠	4/25/2017 6:18am	emoryhealthcare.org
✓	✓	✓	4/24/2017 6:37am	emoryhealthcare.org
✓	✓	✓	4/23/2017 7:01am	yhealthcare.org
✓	✓	✓	4/22/2017 7:15am	yhealthcare.org
✓	✓	✓	4/21/2017 6:43am	yhealthcare.org
✓	✓	✓	4/20/2017 6:16am	emoryhealthcare.org
✓	✓	✓	4/19/2017 5:56am	emoryhealthcare.org
✓	✓	✓	4/18/2017 6:19am	emoryhealthcare.org
✓	✓	✓	4/17/2017 6:19am	emoryhealthcare.org
✓	✓	✓	4/15/2017 6:22am	emoryhealthcare.org

Reviewed &
Approved?

Details

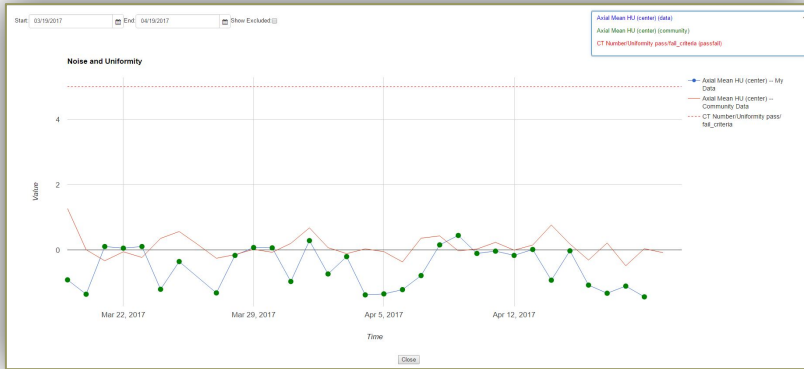
Test: Noise and Uniformity

Status: Pass ✓

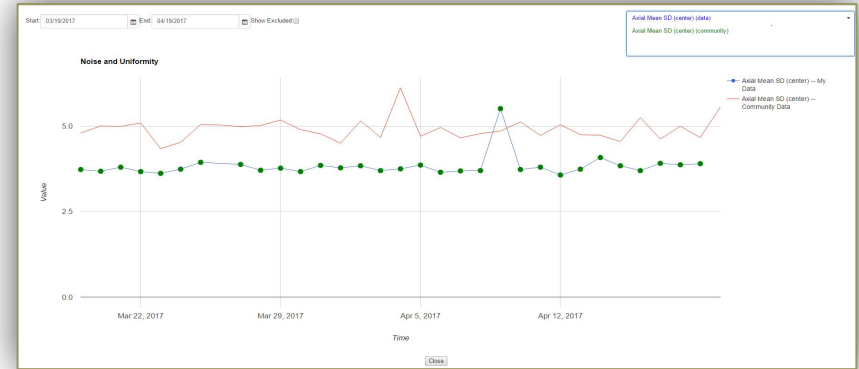
Inputs

Axial Mean HU (center) :	-1.15
Axial Mean SD (center) :	3.82
Axial Artifacts Visible? :	no
Helical Mean HU (center) :	2.01
Helical Mean SD (center) :	4.06
Helical Artifacts Visible? :	no

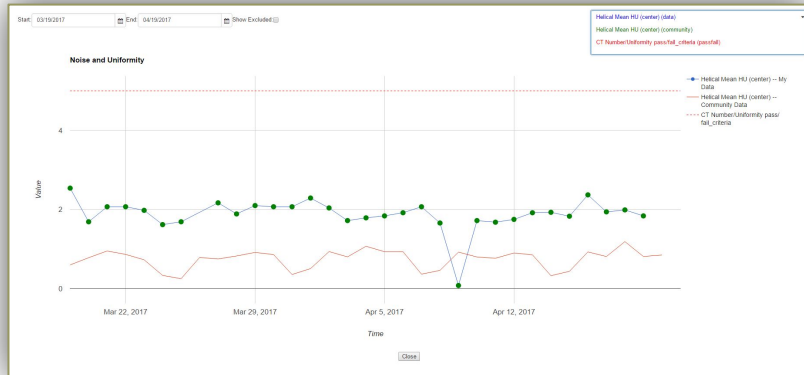
GRAPHICAL VIEWS



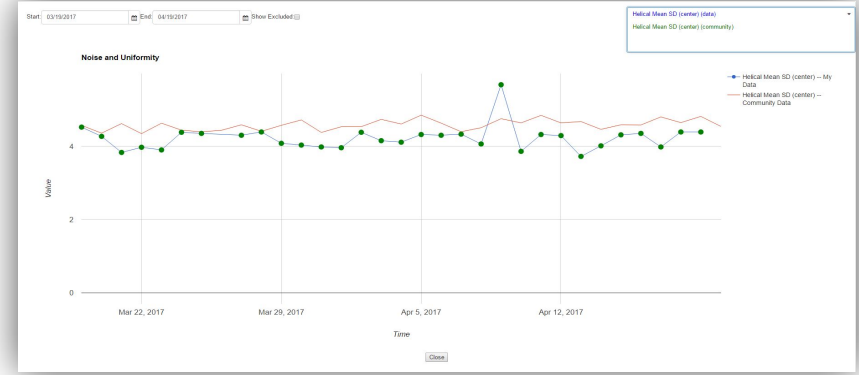
Axial Mean HU



Axial Noise

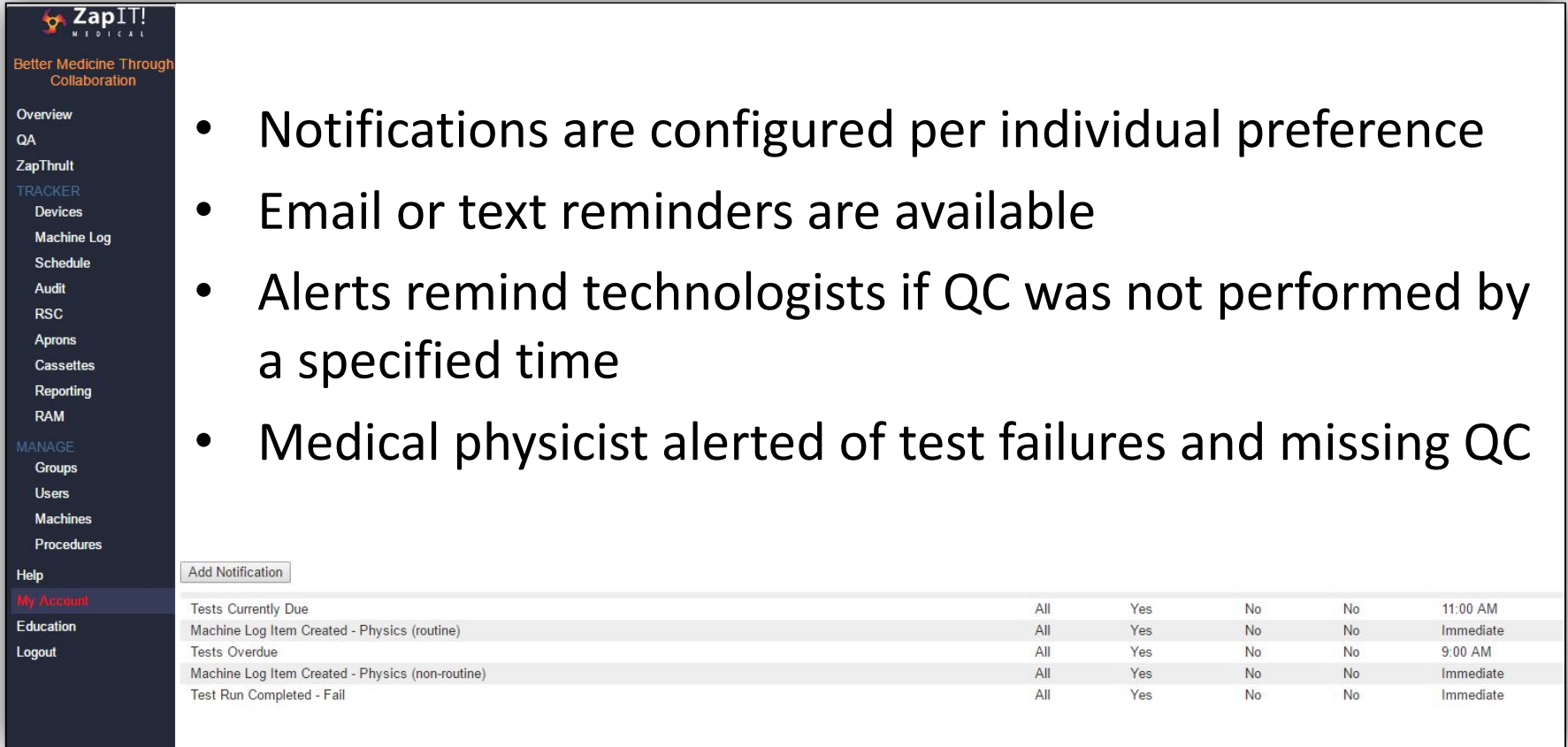


Helical Mean HU



Helical Noise

NOTIFICATIONS



ZapIT!
MEDICAL

Better Medicine Through Collaboration

- Overview
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 - RAM
- MANAGE
 - Groups
 - Users
 - Machines
 - Procedures
- Help
- My Account**
- Education
- Logout

Add Notification

Tests Currently Due	All	Yes	No	No	11:00 AM
Machine Log Item Created - Physics (routine)	All	Yes	No	No	Immediate
Tests Overdue	All	Yes	No	No	9:00 AM
Machine Log Item Created - Physics (non-routine)	All	Yes	No	No	Immediate
Test Run Completed - Fail	All	Yes	No	No	Immediate

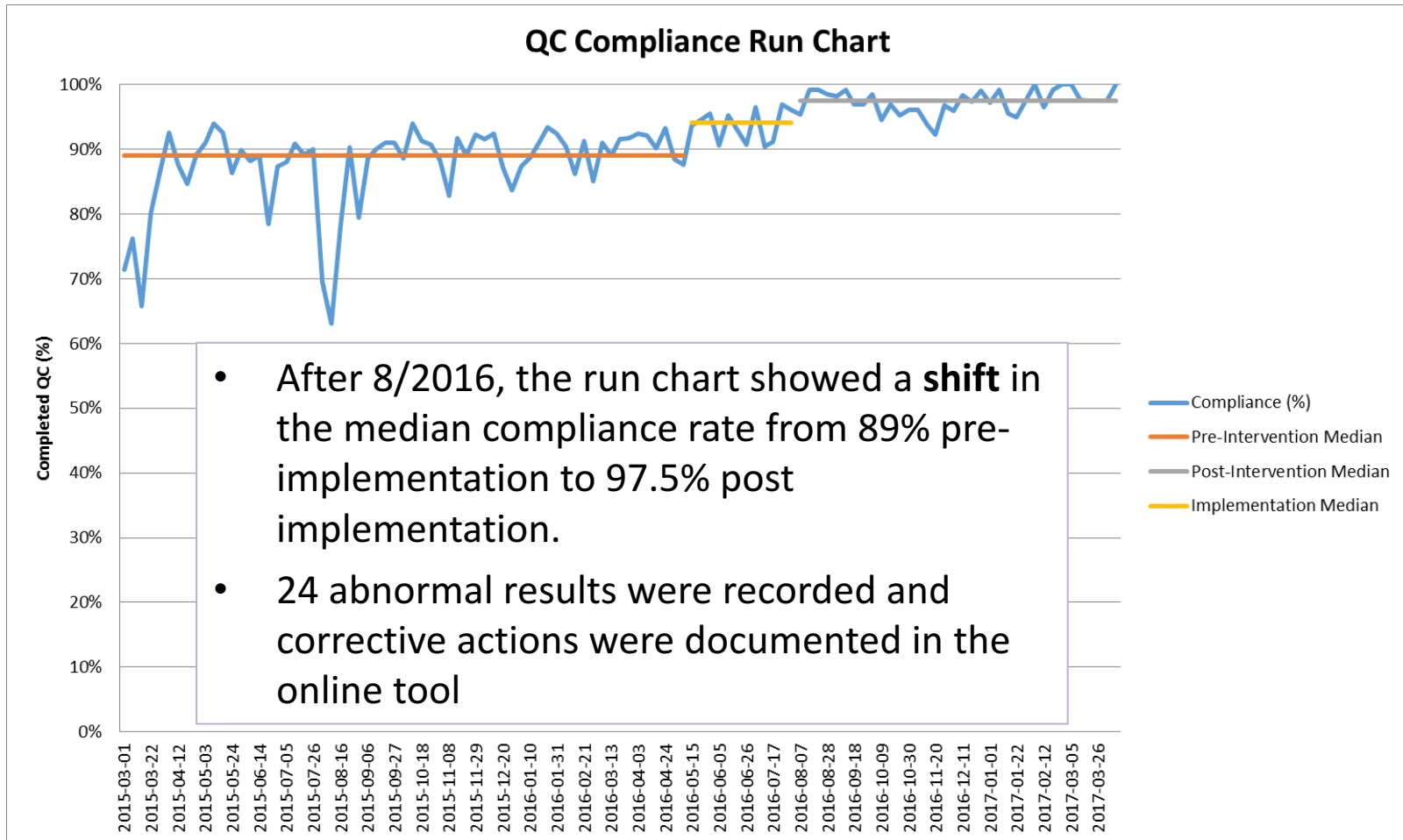
QC NOTIFICATIONS IN-PATIENT SETTING

If by 7AM, QC not performed and documented, responsible Shift 1 Technologist emailed QC reminder.

If by 8AM, QC not performed in Shift 1, Shift 2 supervisor receives reminder.
Assigns QC to Shift 2 Technologist.

If by 11AM, QC not performed, Medical Physicist receives notification.
Medical Physicist escalates to supervisor and manager.
Supervisor or manager assigns QC to Shift 2 Technologist.

METRICS/RESULTS



24 ABERRANT RESULTS ADDRESSED

Result	No. of Occurrences	Action
QC Value Incorrectly Recorded	8	<ul style="list-style-type: none">• Retraining• Exclude result and repeat QC measurement
Ring Artifact Identified	4	<ul style="list-style-type: none">• Air Calibration performed and/or service contacted
QC Value out of tolerance	4	<ul style="list-style-type: none">• Repeat Test• Contact Service
QC Protocol requires adjustment – baseline noise level lower than selected range	6	<ul style="list-style-type: none">• Physicist corrected QC protocol
Broken Phantom	2	<ul style="list-style-type: none">• Site ordered new phantom

CONCLUSIONS

- The online QC management tool improved compliance with daily QC from 89% to 97.5%.
- Abnormal results and remediation steps are easily documented for auditor review.
- The software tool enabled a single physicist to effectively track QC from 25 CT scanners across multiple sites.