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Disclosures

• Phantom Image Reviewer for the ACR Mammography Accreditation Program

Learning Objectives

Upon completion of the talk, the attendee will be able to:
1. Identify if the 2018 QC Manual is appropriate for your facility by assessing its pros and cons.
2. Identify the challenges and solutions of the Consulting physicists.

Outline

• Advising the site on adoption of the manual
• Communication with the Radiologist
• Establishing Technologist QC program
• Implementing physics testing
• MP involvement post adjustments, changes or repairs

Advising the Site on Adoption of the Manual

Pros
• Unifies QC programs of multiple vendors
• Physician testing is more efficient
• Technologist QC is more efficient
• Clarifies some gray areas of Physician onsite vs. oversight
• New Phantom has tighter manufacturing tolerances and less artifact due to attenuation differences

Considerations
• Must purchase new Phantoms
• Must have physics evaluation prior to implementation of the new QC program
• Everyone must learn new program and adapt it to your site’s equipment
• Uncertainty in interpretation for regulators and physicists

Advising the Site on Adoption of the Manual

• The 2016 Digital Mammography QC manual—only covered FFDM and CR
  – Most sites were adding DBT at this time. Since you could not use this manual for DBT, very few switched.
• The 2018 Mammography QC manual—covered FFDM, CR and DBT
  – This now can be applied to most sites
• Prerequisites
  – Must have ACR FFDM Phantom
  – Must have Annual Physics evaluation prior to starting
Advising the Site on Adoption of the Manual

Types of Facilities
- Single Manufacturer Same Units
  - Not many benefits with new manual
- Single Manufacturer Multiple Generations
  - Some benefits with new manual
- Multiple Manufacturers
  - Great benefits with new manual
- Additional Functionality – Contrast Enhanced Spectral Mammography
  - Not a deal breaker with new manual. The FAQs specify that the manufacturer’s QC program can be used for CEM and ACR manual for DBT and FFDM portions.

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Communication with the Radiologist
- According to the ACR 2018 QC manual the Lead Interpreting Physician (LIP) is responsible for the ensuring all MQSA required activities are met. *
- Follow up after MEE and Annual Surveys
  - Onsite if available verbally
  - Facility QC Letter for Radiologist - Summarizes findings for Radiologist and can be left onsite
  - E-mail follow up is recommended

Communication with the Radiologist
- Quality Assurance Committee (QAC)
  - QAC can provide oversight to the QC program, set goals and direction, determine policy, and assess effectiveness of the QC program
  - Committee should include:
    - Lead Radiologist, additional Radiologist
    - Medical Physicist
    - Facility Manager
    - QC Technologist
    - Supervising Technologist
    - Additional Radiology Personnel involved in mammography patient care
  - This QC manual requires quarterly review of the facility QC by LIP and Facility Manager. More frequent if problems are noted. They must fill out the “Facility QC Review” Form
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Establishing Technologist QC Program

Considerations for Training the Technologist:
– The Physicist is Applications
  • Must instruct the QC Technologist(s) on all new QC procedures specific to the site’s equipment
  • Need to allot time on-site
  • The QC Technologist(s) must be present
  • Review the new instructions for Medical Physicist Involvement in equipment adjustments, changes, or repairs
  • Explain Mobile QC if applicable

Establishing Technologist QC Program

Training the Technologist: (cont.)
– ACR Technique and Procedures forms

Note: During the MEL, the medical physicist should complete the Technologist's ACR Technique and Procedure Summaries form included in the Technologist Section. To help the QC technologist use the appropriate techniques during the QC tests, the form should be reviewed and updated as necessary during annual surveys.

Establishing Technologist QC Program

• ACR Phantoms for Scoring
  – Review scoring the new ACR phantom
    • No deductions
    • Different Pass/Fail Criteria
    • Artifacts Fail - train technologist on what is a "clinically significant" artifact
  – Discuss ACR phantom submissions
    • Isolating a phantom image
    • Approved file formats
    • Review online instructions
• Responding to Questions
  – Expect to follow up and provide ongoing support
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Implementing Physics Testing

- Initial annual survey
  - Must set baselines
  - Must determine applicable tests for facility
  - Must document the setup well for consistency
    - Fill out “Procedure” blocks on ACR forms
  - Manufacturer specific tests and action limits may still be useful for acceptance testing or troubleshooting.

Implementing Physics Testing

- Initial Annual Survey (Cont.)
  - “If Applicable” Tests
    - Computed Radiography
    - Film Printer
    - Manufacturer Calibrations
  - Optional Tests (MEE and Troubleshooting)
    - Collimation (Except for DBT)
    - Ghosting
    - Beam Quality (HVLs)
    - kVp accuracy and reproducibility
    - Viewbox illuminance

Implementing Physics Testing

- Remember:
  - “Applicable 2D tests must be performed whether or not the system is used for 2D imaging since they test system components which may impact DBT performance.”
  - “If the DBT system employs an “add-on” device, applicable 2D tests must be repeated with the “add-on” device in place.”

Implementing Physics Testing

- Hologic- Selenia and Dimensions 2D/DBT
  - Manufacturer calibrations
  - Required for Physicist during MEE, Annually and after relevant service
  - These can be used to calibrate out artifacts during testing.
  - Required Calibrations for Technologist
    - Weekly Gain Calibrations all Hologic Units
    - Semi-Annual Geometry Calibrations for Dimensions DBT

Implementing Physics Testing

- Hologic- Selenia and Dimensions 2D/DBT (cont.)
  - SmartCurve Paddle must be tested using manufacturer’s method. Paddle edge to chest wall can’t be tested conventionally.
  - Z Res Test and AEC Test
    - Cannot use ROI feature on machine to measure on DBT slices
    - Can use the distance measurement tool
    - Either use a RWS or download and use a DICOM viewer

Note: If the exposure resolution does not have DBT capability, the external physicist should use one of the following alternatives for complete test:

- Manually measure the HVL measurement on the radiographic image.
- Utilize the image processing software, make the HVL measurement on an external computer system.
- If any of the above alternatives are available, use the manufacturer’s AEC evaluation procedure, equipment, and forms.
Implementing Physics Testing

- GE- 2000D, DS, Essential, SenoClaire, Pristina
  - SenoClaire and Pristina
    - Cannot view DBT images on the Acquisition Workstation (AWS)
    - Measurements for the DBT portion of the testing will have to be made on a RWS, technologist review workstation, or external computer with features to measure distance and ROIs.
    - Produces Planes and Slabs – Planes should be used for DBT Volume Coverage Test and Z-resolution test.
    - SenoClaire has the “add-on” MTD bucky.
    - All GE systems have QAP testing which may be useful for acceptance testing and troubleshooting.
    - Pro: Can omit the subsystem MTF test.

Implementing Physics Testing

- Siemens-Novation, Inspiration 2D/DBT, Revelation
  - Gain Calibrations
    - Novation – Weekly
    - Inspiration 2D and 3D – Quarterly
    - Revelation 2D and 3D – Quarterly
  - No problem with ROI and distance measurements on DBT.

Implementing Physics Testing

- CR-Fuji, Konica, Carestream, AGFA
  - Most CR systems have manufacturer tests that are specific to the system which may be useful for acceptance testing and troubleshooting.
    - S-Value (EI) Test
    - Erasure Tests
    - PSP Plate Replacement
      - ≤ 2 – Physicist Oversight
      - > 2 – Requires Physicist MEE

New Units and New Displays

- Review Workstations (RWS)
  - Onsite Radiologist
    - RWS must be tested to the ACR 2018 QC manual standards within 14 months of the previous survey.
  - Teleradiology
    - Reading solely for sites that have adopted the new QC manual
      - RWS survey meets the RWS requirements for the new manual.
    - Reading for sites that have both
      - RWS survey meets the RWS manufacturer’s requirements and requirements for the new manual.
    - If the RWS is off-site and is used to read for a site that has adopted the new manual, it must be tested to the new manual’s standards by the next annual due date or earlier. ★

New Units and New Displays

- The new manual requires the pathway from the Mammography unit to the display device be evaluated. This is done by reviewing a FFDM phantom on each display device. This complex system is diagramed in the manual in 5 figures.
Implementing Physics Testing

- You must be aware of the State Requirements where you implement this new manual
  - Several States have regulations that require some of the optional/troubleshooting tests
  - You may not be able to omit some tests

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MP Involvement Post Adjustments, Changes and Repairs

- **AEC Calibration that Affects Dose**
  - Previously this could be done by scaling the dose respectively to the mAs of a phantom taken by the technologist and could be done remotely, now it requires an onsite visit.
  - Engineers tend to adjust this during the PMs, so training them to notify us is important.
- **Manufacturer’s Software Upgrade or Modifications**
  - Previously there was an alternative standard that let the manufacturer determine if this modification was extensive enough to require an onsite survey. Now it requires an onsite survey. This manual does not specify if the alternative would still apply. Open to interpretation.
- **Videocard or Software Upgrade for RWS**
  - PACS administrators tend to make these adjustments without notifying anyone.

**Conclusion**

- This manual is an option that may be a correct choice for a facility after careful consideration and planning.
- Most benefit for multi-manufacturer facilities.

**References**