IHE Mammography Acquisition Workflow (MAWF)

SIIM 2009 - D. Clunie
Mammo Acquisition Workflow

• Problems to solve
  – handling procedure & protocol changes
  – rejecting images for quality reasons
  – correcting wrong view information

• Consistency between
  – FFDM (Acquisition Modality)
  – RIS (DSS/OF)
  – PACS (Image Manager/Archive)
  – workstation (Image Display)
Mammo Acquisition Workflow

- Procedure and protocol changes
  - screening -> diagnostic
  - supplemental views acquired or requested
  - completion in same or different room
  - reject images for quality and repeat (recall)
  - recall patient for supplemental views
- Specific focus is on FFDM
  - generic mechanisms but codes are for FFDM
  - future work to include breast US, MR
Mammo Acquisition Workflow

• Builds on existing profiles
  – Scheduled Workflow (SWF)
  – Mammography Image (MAMMO)

• Does NOT address
  – CAD workflow
  – Reporting workflow
  – Radiologist <-> Technologist communication
Supplemental Views

Acquire implant images and select appropriate protocol

MPPS Completed [RAD-7] (Screening images)

Modality Images Stored [RAD-8] (Screening images)

MPPS Completed [RAD-7]

MPPS Completed [RAD-7] (Implant images)

Modality Images Stored [RAD-8] (Implant images)

Detect unscheduled acquisition of supplemental images
Supplemental Views

Acquire implant images and select appropriate protocol

- MPPS Completed [RAD-7] (Screening images)
- Modality Images Stored [RAD-8] (Screening images)

DSS/OF

- MPPS Completed [RAD-7]

Image Manager/ Image Archive

- MPPS Completed [RAD-7]
  - Detect unscheduled acquisition of supplemental images
- Modality Images Stored [RAD-8] (Implant images)
Convert Unilateral to Bilateral

Acquire images of left breast

Acquire images of right breast and select new procedure/protocol information

Acquisition Modality

MPPS Completed [RAD-7] (Unilateral Dx Mammogram)

Modality Images Stored [RAD-8]

DSS/OF

MPPS Completed [RAD-7] (Unilateral Dx Mammogram)

MPPS Completed [RAD-7] (Bilateral Dx Mammogram)

Detect / confirm procedure conversion

Procedure Update [RAD-13] (unilateral to bilateral)

Modality Images Stored [RAD-8]

Image Manager/ Image Archive

Change Procedure Codes in instances
Convert Unilateral to Bilateral

- **Acquire images of left breast**
  - Acquisition Modality
  - MPPS Completed [RAD-7] (Unilateral Dx Mammogram)
  - Modality Images Stored [RAD-8]

- **Acquire images of right breast and select new procedure/protocol information**
  - MPPS Completed [RAD-7] (Bilateral Dx Mammogram)
  - Detect / confirm procedure conversion
  - Procedure Update [RAD-13] (unilateral to bilateral)
  - Modality Images Stored [RAD-8]

- **DSS/OF**
  - MPPS Completed [RAD-7] (Unilateral Dx Mammogram)

- **Image Manager/Image Archive**
  - Change Procedure Codes in instances
Finish in Another Room

Room 1
- Acquire images of one breast
  - Acquisition Modality 1
  - MPPS In Progress [RAD-6]
  - MPPS Completed [RAD-7]
  - Modality Images Stored [RAD-8]
  - DSS/OF
  - MPPS In Progress [RAD-6]
  - MPPS Completed [RAD-7]
  - Image Manager/Imaging Archive

Room 2
- Acquire images of other breast
  - Acquisition Modality 2
  - Query Modality Worklist [RAD-5] (Patient-based)
  - MPPS In Progress [RAD-6]
  - MPPS Completed [RAD-7]
  - Modality Images Stored [RAD-8]
  - MPPS In Progress [RAD-6]
  - MPPS Completed [RAD-7]
  - Image Manager/Imaging Archive
Finish in Another Room

Room 1
- Acquire images of one breast
  - Acquisition Modality 1
  - MPPS In Progress [RAD-6]
  - MPPS Completed [RAD-7]
  - Modality Images Stored [RAD-8]
  - DSS/OF
  - MPPS In Progress [RAD-6]
  - MPPS Completed [RAD-7]

Room 2
- Acquire images of other breast
  - Acquisition Modality 2
  - Query Modality Worklist [RAD-5] (Patient-based)
  - MPPS In Progress [RAD-6]
  - MPPS Completed [RAD-7]
  - Modality Images Stored [RAD-8]
  - MPPS In Progress [RAD-6]
  - MPPS Completed [RAD-7]
Reject for Quality Reasons

Select images to be rejected

Image Display/ Evidence Creator

Creator PS In Progress [RAD-20] (step: reject images)
Creator PS Completed [RAD-21] (step: reject images)

DSS/ OF

Creator PS In Progress [RAD-20] (step: reject images)
Creator PS Completed [RAD-21] (step: reject images)

Image Rejection Note Stored [RAD-66]
Storage Commitment [RAD-10]

Image Manager/ Image Archive

Provide or hide rejected images as configured
Reject for Quality Reasons

Select images to be rejected

Image Display/ Evidence Creator

Creator PS In Progress [RAD-20]
(step: reject images)

Creator PS Completed [RAD-21]
(step: reject images)

DSS/ OF

Creator PS In Progress [RAD-20]
(step: reject images)

Creator PS Completed [RAD-21]
(step: reject images)

Image Rejection Note Stored [RAD-66]

Storage Commitment [RAD-10]

Image Manager/ Image Archive

Provide or hide rejected images as configured
Correction of View

1. Acquire images of LCC view
2. Correct LCC to RCC view/image
3. Acquisition Modality
4. DSS/OF
5. Image Manager/Image Archive

- **Acquire images of LCC view**
  - Modality Images Stored [RAD-8]
  - MPPS Completed [RAD-7]

- **Correct LCC to RCC view/image**
  - MPPS In Progress [RAD-6] (step: correct image)
  - Modality Images Stored [RAD-8] (correct RCC image)
  - Image Rejection Note Stored [RAD-66] (marks incorrect For Processing/Presentation images)
  - MPPS Completed [RAD-7] (step: correct image)

- **Update list of managed images**

- **Detect correction and hide the LCC image**
  - MPPS Completed [RAD-7] (step: correct image)
  - Instance Availability Notification [RAD-49] (list incorrect images)
Key Object Selection
  – Reject for Patient Safety Reasons

Requested Procedure
  – Screening Mammography, bilateral
  – Diagnostic Mammography, left
  – Additional Mammography Views
  – ...

Reason for Requested Procedure (multiple)
  – Screening
  – Recall for Technical Reasons
  – Personal history of breast cancer
  – Lymphadenopathy
  – ...

MAWF – New Standard Codes
MAWF – DSS/OF Requirements

• Required codes in specific transactions
  – “The DSS/OF shall be able to fill one or more codes from Table 4.5-6 into the Reason for Requested Procedure Code Sequence (0040,100A) of the Modality Worklist Response”
  – “In case of a recall Scheduled Procedure Step, the DSS/OF shall fill into the Modality Worklist Response … one appropriate recall code …”

• Also requires reference to related priors
  – “Referenced Study Sequence (0008,1110) with … the Study Instance UID (0008,1155) from the Study for which the recall is being done”

• Shall detect updates in codes from MPPS
Assisted Acquisition Protocol Setting required

Required to populate performed attributes in images and MPPS, which may have different values than what was requested/scheduled:

- Procedure Code Sequence
- Performed Protocol Code Sequence, Protocol Name, Performed Procedure Step Description
- Reason for Performed Procedure Code Sequence (new)

If changed during study, sent in next MPPS

Shall allow view correction and shall send a rejection KOS and a new image
MAWF – Display Requirements

- Specific presentation layouts
  - shall be able to display different procedures or additional views
- Shall use specific attributes for this
  - Procedure Code Sequence
  - Performed Protocol Code Sequence
  - Reason for Performed Procedure Code Sequence
- Shall be able to detect the recall-related codes
MAWF – Display Requirements

- Requires support of KOS
- Images rejected for *quality* reasons - shall be *configurable* to either
  - suppress images and KOS from presentation
  - present the rejected images and the KOS
  - ignore this KOS and present the rejected images
- Images rejected for *patient safety* reasons
  - shall suppress images and KOS from presentation