iSite PACS 3.6: Hanging Protocols
Learning Objectives

• Understand the concept of Hanging Protocols

• Understand how to create User and System Hanging Protocols

• Understand Hanging Protocol Hierarchy and Presentation States
Introduction

• iSite Radiology Hanging Protocols are an important part of an efficient reading workflow

• iSite Radiology has User and System Level Hanging Protocols

• All iSite Radiology users will be able to select and utilize any User Level Hanging Protocol that they (the individual user) have created

• All iSite Radiology users will be able to select and utilize any System Level Hanging Protocols that have been created

• Hanging Protocols may be configured according to User Preferences for viewing exams on the Diagnostic Monitors based upon Modality Type, Modality Type and Body Part, and Hanging Protocol Groups
Hanging Protocols Introduction

- User Hanging Protocols are created by and assigned to an individual user log-in, and are *only* available to the user log-in for which the Hanging Protocol was created.
Hanging Protocols Introduction

- System Hanging Protocols are created by the iSite PACS Administration team and are available to all users
Hanging Protocols Introduction

• Multiple Hanging Protocols for the same Exam Type may exist

• Default or Alternate Hanging Protocols may be created

• One default Hanging Protocol can be made for each Identifier Key on the User and System level

• 20 alternates for each Identifier Key (both user and system)

• For example: A Radiologist who primarily reads CR EXAM exams may want to define a few alternate Hanging Protocols to switch to instead of re-hanging the entire exam
Hanging Protocol Hierarchy
Hanging Protocol Hierarchy

• Hanging Protocols may be created with varying levels of specificity

<table>
<thead>
<tr>
<th>Hanging Protocol Identifier Keys</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modality Type</td>
<td>Very Generic</td>
</tr>
<tr>
<td>Modality Type + Body Part</td>
<td>Specific</td>
</tr>
<tr>
<td>Hanging Protocol Group</td>
<td>Very Specific</td>
</tr>
</tbody>
</table>
Hanging Protocol Hierarchy

- Identifier Key is selected in the Hanging Protocol Wizard
Hanging Protocol Hierarchy

- User and System Default Hanging Protocols are identified in the popup menu as ‘default’
Hanging Protocol Hierarchy

- Alternate Hanging Protocols are never automatically applied to the Main Exam
- Alternate User and System Hanging Protocols can be selected from the popup menu and are applied to an exam on the fly
Hanging Protocol Hierarchy

- iSite Radiology will automatically select the most specific Hanging Protocol to load the Main Exam
- User Default will take precedence over the System Default (for same exam type and Identifier Key)
  
  *If the System Hanging Protocol is more specific than the User Hanging Protocol it will have higher precedent*

- If no Default is defined for either User or System, the Main Exam will be loaded with the Default hard-coded Hanging Protocol (1st series on left monitor, the next series on the right monitor)
Hanging Protocol Hierarchy

Automatic application of Hanging Protocol is applied in the following hierarchy of *DEFAULT* protocols:

1. User ‘Hanging Protocol Group’
2. System ‘Hanging Protocol Group’
3. User ‘Modality and Body Part’
4. System ‘Modality and Body Part’
5. User ‘Modality’
6. System ‘Modality’
7. Default Hard-Coded Hanging Protocol

Most specific to least specific
Presentation States
Presentation States

• Presentation States over-ride Hanging Protocols

• When the user opens an exam, the Presentation State with the highest priority will be presented

• The most recent Presentation State for the highest priority Presentation State will be applied to the exam
Presentation States Hierarchy

1. “Mark Read” Presentation State *(radiologist uses the “Mark Read” button)*

2. “Conference” Presentation State *(use the “Conference” presentation state for activities such training, tumor board, etc.)*

3. “Pre-Read” Presentation State *(radiologist to save image presentation modifications so that it can be read later)*

4. “Technologist” Presentation State *(prior to the radiologist viewing and interpreting the exam)*

5. “Original DICOM” Image Presentation *(no Presentation States have been defined for this exam)*

6. “User” Presentation State *(does not take precedence over other users or the original DICOM presentation unless the preference is set)*
Presentation States Hierarchy

- A User preference allows you to open your most recently saved Presentation State, regardless of the type.
Presentation States

- Presentation States preserve the following changes to the exam:
  - Window Width and Window Level
  - Measurements, excluding Point Value
  - Annotations
  - Invert Image
  - Clone
  - Key Images
  - Flip
  - Rotate
  - Sort
  - Split
Hanging Protocol Configuration
Hanging Protocol Configuration

- Hanging Protocol configuration is specified in the Hanging Protocol Wizard found in the pop up menu in the Shelf Bar of the Exam Rack
Create User Hanging Protocol

- If the user has rearranged the images and made modifications to them, then the ‘Use Current Exam Layout’ may be enabled so that these “changes” will be remembered in the wizard

- **Only available if Series Matching Rules have been defined**
Create User Hanging Protocol

- Hanging Protocols may be created without series matching rules for some simple cases
Hanging Protocols Configuration

Page Two allows the user to automatically configure:

- Multi-Image Mode
- Window/Level Preset
- Scout Lines
- Show Localizer
- Invert Image
- Clones
- Don’t Auto Hang on Monitors
Hanging Protocols Configuration

Page Two (continued):

- Flip Horizontal
- Flip Vertical
- Rotate90 CW
- Rotate90 CCW

- Flip and Rotate functions apply to current series only

- Image Processing
- Zoom Presets
If there are no Series Matching Rules defined, those series will be generically defined as a Single or Stack window.

- **Single Image Window(s)** are series such as SCOUT or CR or Secondary capture.

- **Stack Window(s)** are series such as axials or US (multiple images that may be scrolled or cined).

- Select each clone for each type of window and make your selections.

- Up to 6 clones can be created for each series type.
Hanging Protocols Configuration

- **Multi Image Mode** allows you to display stack image windows in Multi-Image modes in the diagnostic monitor.

- Not available for single images.
Hanging Protocols Configuration

- **Default Window/Level:** Default Window Width/Window Level is applied to the Stack or Single Image Window

- **Window/Level Preset:** A specific Window Width/Level may be applied (bone, lung, soft tissue)

- Presets may be configured for all modality images (not just CT)

- **Don’t Auto Hang on Monitors** designates any particular series matching rule for not automatically hanging on diagnostic monitors
Localizer, Scout Lines, and Invert Image

- **Show Localizer**: Display of Localizer cursor on images
  - Same frame of reference with the image selected
  - Displayed only on MR, CT and PT series

- **Show Scout Lines**: Single images or stack series
  - Displayed only on MR, CT and PT series

- **Invert Image**: Grayscale images
  - Single or Stack Series will be displayed in ‘Invert’ (black on white)
Monitor Control

Page Three

- Each monitor may be configured to display different configurations of the series
Monitor Control

- Preview display on a one, two or four diagnostic monitor configuration

- Each monitor may be configured to display different configurations of the series
Monitor Control

- Hanging Protocol Monitor 1 Mode and Monitor 2 Mode layouts are:
  M1, M2H, M2V, M3H, M3V, M4, M6P, M6L, M1_2, M2_1, M1_3, M3_1

- **Important Note:** the monitor configuration loading differs on one-monitor systems, two-monitor systems and four-monitor systems
Monitor Control

- Ability to designate the location of the prior images relative to the main exam images

- Prior Exam Hanging designations: Top, Below, Left, Right, Don’t Hang Prior Images on Monitors, Separate Monitors

- When the current exam does not have a prior exam for comparison, iSite Radiology utilizes all available diagnostic monitors for hanging of the current exam
Monitor Control

- **Note:** Display of Prior Images option requires series matching rules

- Prior studies that do not have series matching rules will be displayed as blanks (black-out) on the monitors
Monitor Control

Move Down and Move Up Buttons

- Users can move the series up or down in the series list to display the series on the monitor where they want it

- Users can also click & drag Series Matching Rules to monitor preview area to display the series on the monitor where they want it
Monitor Control

- **>> and << buttons are only enabled if the Use Series Matching Rules check box is selected with the Hanging Protocol**

- These buttons allow you to preview on which rack exam Series will display when paging the Main Exam
Monitor Control

- Series Linking
- Mirror Linking
Monitor Control

Series Linking

- Link series with the same orientation in one or multiple exams with the same modality type.
- Link series, such as CT or MR, with the same orientation in one or multiple exams with different modality types.
Monitor Control

Creating Mirror Links

- Mirrored links are primarily used for mammography studies

- Based on how these images are acquired, mammography studies typically capture bilateral breasts and display images which are positioned sidelong either to the left or right side of image windows

- The linking functionality allows you to link images at opposite coordinates

- When Mirrored Linking is engaged, when you zoom into an image that is positioned along the right side of an image window, iSite Radiology automatically zooms into the other image positioned along the left side of the linked image window
Main Exam Options

Page four

- Main Exam configuration:
  - Linking
  - Load Relevant Prior based on Matching
  - Number of Priors to Load
  - Cache Entire Study
  - Spine Label Tool
  - Vertical Rack
Linking Options

- Link Axials
- Link Sagittals
- Link Coronals
- Link Obliques
- Linking allows simultaneous zooming, panning and scrolling
Relevant Prior Loading

- ‘Load Relevant Prior’
  - ‘Body Part Only’
  - ‘Modality and Body Part’

- ‘Body Part Only’
  - loads the relevant priors in the Relevant Exam Timeline based on Body Part

- **For example**: Body Part CHEST
Relevant Prior Loading

- ‘Modality and Body Part’
  - loads the relevant priors in the Relevant Exam Timeline based on matching of the same Modality and Body Part

- **For example**: Modality CR and Body Part CHEST
Hanging Protocols Configuration

- 10 Relevant Priors may be loaded automatically

- ‘Cache Entire Study’ allows caching of the entire Main Exam into iSite Radiology workstation memory

- ‘Show Spine Label Tool’ displays the tool on all Sagittal windows

- ‘Vertical Rack’ option to hang exams in a vertical mode
Hanging Protocol Sequence

Hanging Protocol Sequence Groups

• Users can create a sequence of hanging protocols with different layouts with different series that users can quickly toggle through

• For example, screening Mammography: at the push of a button Radiologists may move through various layouts of the same study

• Users may create a Hanging Protocol Sequence for Conference Presentations and Teaching Cases
Hanging Protocol Sequence

- Right-click in the Exam Margin (on the shelf bar) and select Create User HP Sequence or Create User HP Sequence
- The Create Hanging Protocol Sequence dialog box opens
Hanging Protocol Sequence

1. **Name:** Unique name of the sequence

2. **Number of Monitors:** Choose between a Two and Four monitor set-up for the Hanging Protocol Sequence

3. **Type:** Select Default or Alternate hanging protocol type

4. **Matching Hanging Protocols:** Displays matching Hanging Protocols for the chosen exam
Hanging Protocol Sequence

5. **Selected Hanging Protocols:**
   Hanging Protocols Added from Matching Hanging Protocols list that make up the Hanging Protocol Sequence

6. **Move Up/Down:** Move Hanging Protocols Up or Down to configure order of Hanging Protocol Sequence within Selected Hanging Protocols list

7. **Monitors:** Check Monitors box to view Hanging Protocol on Monitors below

8. **OK:** Click OK when finished to create Hanging Protocol Sequence
Additional Information
Monitor Layout

- iSite Radiology supports one, two or four diagnostic monitor displays
Keyboard Shortcuts

- **Scrolling Current and Prior Exams Simultaneously**

- **F9**: Simultaneously load the previous current and prior series (if available) in the rack onto the diagnostic monitors

- **Shift + F9**: Display the previously opened prior exam (if the main exam has more than one prior exam) onto the diagnostic monitor(s) for comparison while keeping the main exam loaded on the diagnostic monitors

- **F10**: Simultaneously load the next current and prior series (if available) in the rack onto the diagnostic monitors

- **F10** continue synchronized paging of the current series on the designated panes and leaves the panes for prior hanging blank when the prior exam has less series than the current exam
Keyboard Shortcuts

• **Shift + F10**: Display the next opened prior **exam** (if the main exam has more than one prior exam) onto the diagnostic monitor(s) for comparison while keeping the main exam loaded on the diagnostic monitors

• *For example:*
  1. Current, Prior1, Prior2, Prior3 are opened on the Canvas Page
  2. Current & Prior1 are hung
  3. Shift + F10 hangs Current & Prior2
  4. Another Shift + F10 hangs Current & Prior3
  5. Another Shift + F10 hangs Current & blank prior panes on diagnostic monitors
Import and Export Hanging Protocols

- User and System Hanging Protocols may be imported and exported
- Each hanging protocol is saved in a xml file and may be exported to the local drive
Import and Export Hanging Protocols

- Maximum 10 User or System Hanging Protocols may be imported for the same Hanging Protocol Identifier Key and exam.

- Imported Hanging Protocols will be set as 'Alternate' Hanging Protocols.
Hanging Protocols and Presentation States in Order of Priority

1. Marked Read Presentation *(Highest priority)*
2. Conference Presentation State
3. Prelim Presentation
4. Technologist Presentation
5. User Hanging Protocol Sequence Matching Group
6. System Hanging Protocol Sequence Matching Group
7. User Hanging Protocol Group (e.g. group of exam codes: CTABPLV, CTABD)
8. System Hanging Protocol Group
9. User Hanging Protocol Sequence Matching Modality and Body Part
Hanging Protocols and Presentation States in Order of Priority

1. Marked Read Presentation *(Highest priority)*
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9. User Hanging Protocol Sequence Matching Modality and Body Part
Hanging Protocols and Presentation States in Order of Priority (continued)

10. System Hanging Protocol Sequence Matching Modality and Body Part
11. User Modality and Body Part Hanging Protocol (e.g. CR CHEST)
12. System Modality and Body Part Hanging Protocol
13. User Hanging Protocol Sequence Matching Modality
14. System Hanging Protocol Sequence Matching Modality
15. User Modality Hanging Protocol (e.g. US or RF)
16. System Modality Hanging Protocol
17. *Hard-coded Hanging Protocol (Original DICOM Presentation)*
18. User Presentation (unless preference is set to high priority)