Clinical Experience
Accountability through an
In-House Database

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Overview
• Background of our Program
• Accountability Process
• Database Walkthrough
• Development of the System
• Caveats
University of Iowa Residency

- 2 year program
  - 1 resident per year
  - 12 rotations + optional 13th (protons)

- Mentors
  - Rotation mentor
  - Weekly clinical mentor

- Clinical Training
  - Special Procedures
  - Routine Tasks: QA, Plan/chart checks, Troubleshooting

Overall Progress Tracking
Competency Tables

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Required Observe</th>
<th>Required Guided</th>
<th>Required Solo</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDR Tandem &amp; Ovoid 3D</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>HDR Tandem &amp; Ovoid Planar Imaging</td>
<td>2</td>
<td>1</td>
<td>X</td>
</tr>
<tr>
<td>HDR Vaginal Cylinder</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>QA – HDR Daily</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>QA - HDR Source Calibration</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Some Competency Policies

- Resident has option to participate in clinical mentor’s activities
- Residents in a rotation have priority for participating in clinical activities related to the rotation
- GOAL: Increase awareness of, and participation in, clinical activities
Accountability Process

Resident
- Perform and Record Activities
- Track Competency Progress
- Maintain Competency

Mentor
- Review, Comment, Approve Activities
- Discuss Progress
- Monitoring

Program Director
- Aggregate, Analyze
- Approve Competency
- Inform all staff

Definitions

- Procedure - Sequence of Steps to be followed by Resident
- Activity – a performed procedure
- Activity Part – performed step in procedure
Model Goal Components

Clinical Goal

Competency 1

Procedure 11

Step 111
Step 112

Procedure 12

Step 121
Step 122
Step 123

Procedure 21

Step 211
Step 212
Step 213

Procedure 22

Step 221

Competency 2

…

Performed Task Components

Clinical Training

Competency 1 Metric

Activity 11
Part 111
Part 112

Activity 12
Part 121
Part 122
Part 123

Competency 2 Metric

Activity 21
Part 211
Part 212
Part 213

Activity 22
Part 221
Part 222
Part 223

…
V1 Software

- Activities entered by Resident into DB
  - Hard to enter partial activities
- Mentors Review and Communicate Through DB
- Lots of Manual Work:
  - Secretary compiled activities for a given competency
  - DB structure did not account for our changing definitions of competency
  - Secretary reminded mentors to approve activities (based on a report)

V2 Software

- Web-based
- Simplified GUI
- Edit activity with various parts
- Automated Competency Analysis
- Activity and Completion Metrics
- New DB structure to support variable competency requirements
Login - FERPA

Resident views only his records
Faculty can see all records
Admin can configure DB

Resident Home Screen

Access only to blue buttons
Access only to his own records
Enter Activity

Why track Anatomy?
Pick up where you left off

Review/Search Activities
### Activity Summary

![Image of Activity Summary](image1.png)

### Review/Search Competency

![Image of Review/Search Competency](image2.png)
Not visible to resident; Mentor – mentor communication

Mentor Activity View

Where do these come from?

Mentor Home Screen

Mentor – resident communication

Mentor – resident communication

Mentor – mentor communication

Where do these come from?
Define Procedures as Models for activities

- Activities are created based on the procedure ("Template")
- Defines the parameters/constraints/parts
- Some examples…

Do all

<table>
<thead>
<tr>
<th>Procedure Part</th>
<th>DESCRIPTION</th>
<th>DIVIDE TYPE</th>
<th>REQUIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determine Reconstructed Heads</td>
<td>Assess inlet and exhale imaging/patient com</td>
<td>CT</td>
<td>YES</td>
</tr>
<tr>
<td>Image Reconstruction</td>
<td>Reconstruct needed phases</td>
<td>CT</td>
<td>YES</td>
</tr>
<tr>
<td>Patient Set-Up</td>
<td>Belt placement, gantry offset</td>
<td>CT</td>
<td>YES</td>
</tr>
<tr>
<td>Treat Clean-up</td>
<td>Clean-up: inhale and exhale syno</td>
<td>CT</td>
<td>YES</td>
</tr>
</tbody>
</table>
Do some and pick some from the remaining

Pick one of these

Do this 1

Do 1 from many options
### Competency Tracking

From our competency requirements document:

**From our competency requirements document**

![Competency Tracking](image)

### Competency Target Score

**Competency Target Score**

![Competency Target Score](image)
Percent Complete

- $T = \sum_i m_i c_i$
  - $m_i =$ minimum number of times $i$th activity should be performed
- $c_i =$ credits for $i$th activity
- $P = \frac{\sum_i a_i c_i}{T}$,
- $a_i =$ Lesser of \{number of times the $i$th activity was performed, required number\}

Activity metric

- $T = \sum_i m_i c_i$
- $A = \frac{\sum_i a_i c_i}{T}$,
- $a_i =$ number of times the $i$th activity was performed
Metrics aren’t perfect

- Must also examine the summary table
- Solo performances are worth more than guided ones
- Percent Complete – flag at 80%
- Grant Competency based on discussion with mentors and resident
  - “Any staff physicist can recommend a resident for competency discussion before reaching the target goals if the resident has shown significant progress in a procedure and is deemed competent.”

Example Quarterly Report

Conference participation
Didactic Course work
Teaching
Clinical Participation (Qtr)
Clin. Part (cumulative)
Competency
Rotation Status
Director Comments
Resident Comments

Inclusive Dates From 1/1/2014 to 3/31/2014

Clinical Participation:

<table>
<thead>
<tr>
<th>Procedure</th>
<th>N/A</th>
<th>Observe</th>
<th>Guided</th>
<th>Solo</th>
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</thead>
<tbody>
<tr>
<td>QA - HDR Daily</td>
<td>0</td>
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<td>0</td>
<td>10</td>
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<tr>
<td>QA - HDR Source Calibration</td>
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<tr>
<td>Plan Check - HDR</td>
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<tr>
<td>Plan Check - Non-HDR</td>
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<td>SRS Daily Floor Stand QA</td>
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<tr>
<td>SRS Source Localization and Registration</td>
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<td>0</td>
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</tr>
<tr>
<td>SRS - Single I &amp; P</td>
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<tr>
<td>SRS - Multi I &amp; P</td>
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<tr>
<td>SRS - Frameless Delivery</td>
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<td>Usual Care Procedures</td>
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<tr>
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<tr>
<td>Conference - Journal Cases</td>
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<tr>
<td>RSF - Stereotactic Radiosurgery</td>
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<tr>
<td>QA - Linear Annual</td>
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<td>0</td>
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Competency
Brachytherapy approved 7/31/13
Eye plaque approved 7/31/13
Treatment Planning approved 7/31/13
Next closest - SRS, 70%, and Stereotactic Radiosurgery - 70% complete.
Development

- Visual Studio – Lightswitch
  - Rapid Application Development Tool
  - M-V-VM; silverlight
- SQL Server
- IIS (Web) Server
- C#.net
- More info – ask me later!

Caveat 1 - a lot of work, Why bother?

- Personal Progress Record
- Helps address Gaps in training
- Provides confidence to other clinical staff
  - you know the looks the therapists give the residents….
- Increase Resident Clinical Contribution
  - …return on investment of training…
Caveat 2 - modifying procedures

- Hard to do mid-stream
- E.g. IORT steps were re-defined.
- What happens to records with the old steps? How do you track competency?
- Work-arounds:
  - retire the old one, and redefine the competency that contains it
  - Modify the old one, defining required steps and optional steps (where changes occurred)
  - Convert old activities to use redefined steps

Caveat 3 - moving target

- Who knows what numbers really should go in this table?
- The table structure and numbers have been revised many times.
- Process or Concepts or Both?

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What if the data were available nationally?

- Mine the DB
  - “Average” resident learning rate
  - How well are we doing relative to the average?
  - More realistic competency tables?
- Standardize procedures, nomenclature, evaluation methods, etc.

Other systems for tracking resident progress...

- Typhon: student tracking for nursing & allied health programs (example in MBPCC)
Summary

• The DB was written to support our clinical experience accountability process
• Helps us spot gaps in training with ample time to find opportunities to fill the gaps
• Caveats – needs a well-defined program, hard to modify on the fly. Would be easier with national standards.

Thank You!