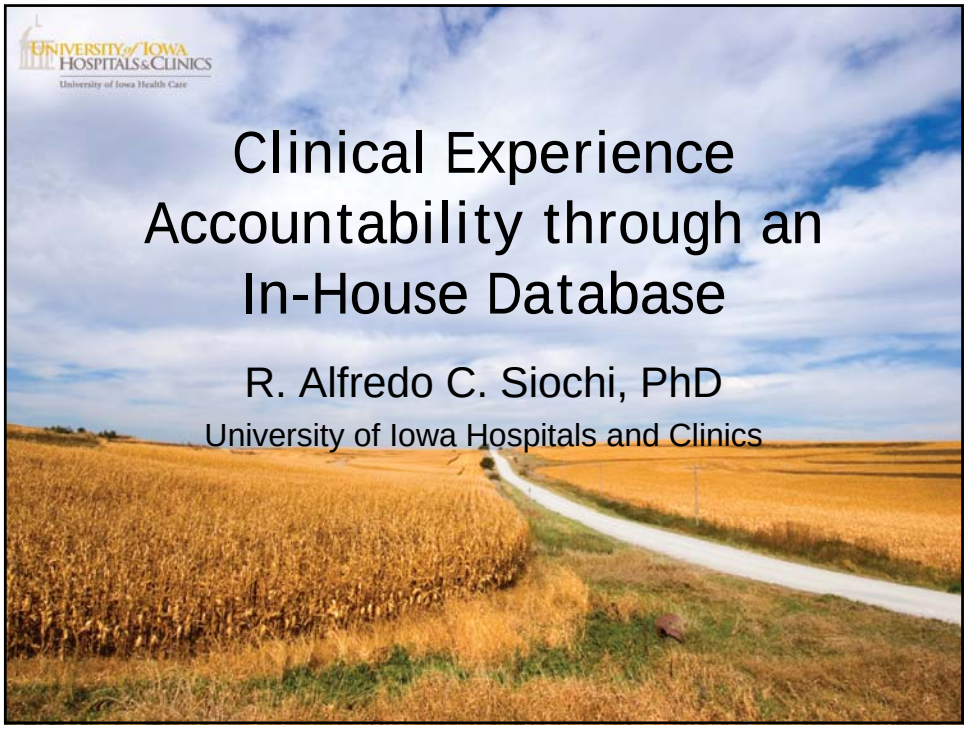
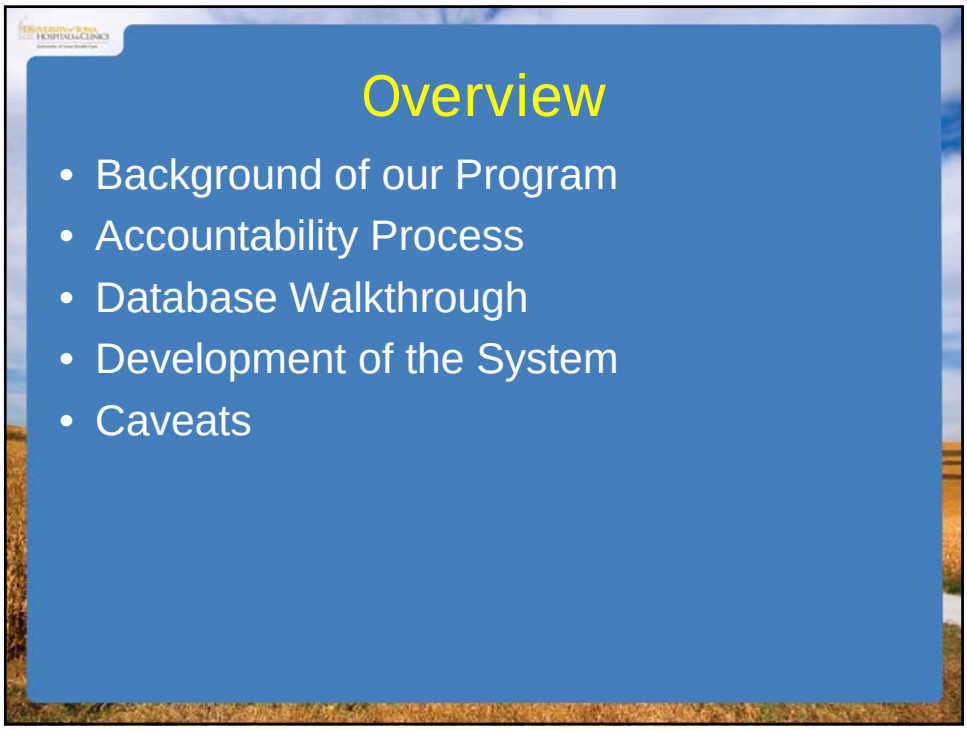

University of Iowa Hospitals & Clinics
University of Iowa Health Care
Clinical Experience Accountability through an In-House Database
R. Alfredo C. Siochi, PhD
University of Iowa Hospitals and Clinics


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

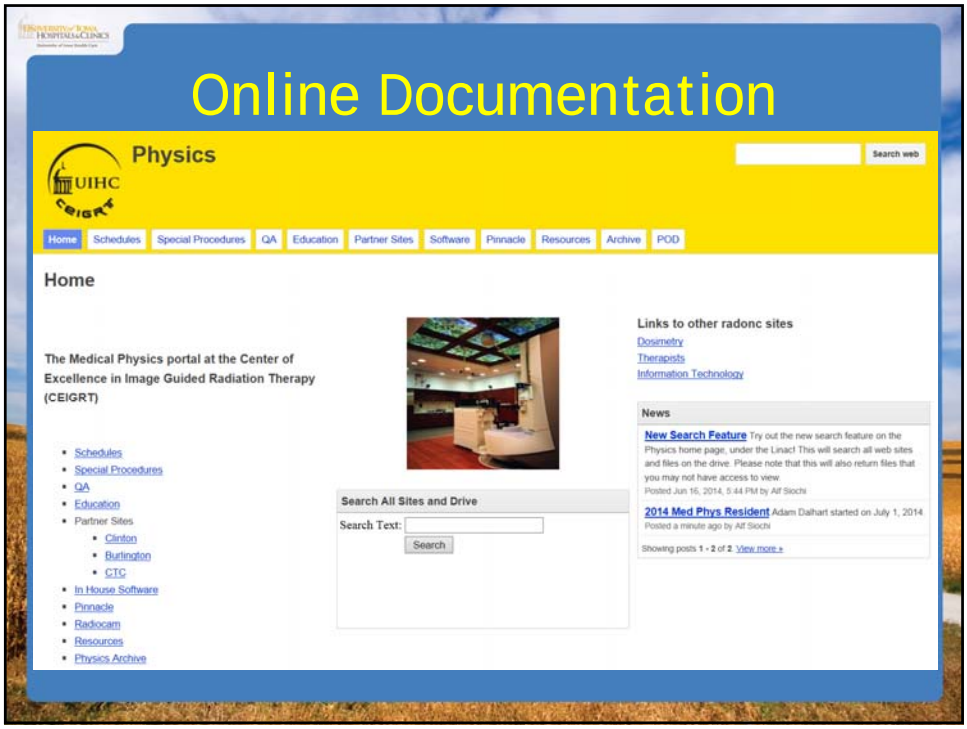
Overall Progress Tracking

	Start Date	7/1/2013	Resident	Test	
Primary Rotation	**Mentor**	**time, mos.**	Approx Due Date	Pass Date	Comments
Orientation	AS	0.5	7/16/2013		
Dosimetric system acceptance testing/Commissioning/QA	DH	2	9/15/2013		
Brachytherapy	JM/YK	2	11/15/2013		
Linear Accelerator Acceptance Testing / Commissioning / Annual QA	JM/TW	2	1/15/2014		
Treatment machine calibration (TG51) & Monitor Unit Calculations	EP/AS	2	3/17/2014		
TPS Modeling / Acceptance / Commissioning	DW	1.5	5/2/2014		
Treatment Planning A&B	JX/DP	2	7/2/2014		
Vacation / Sick Leave / Family Leave / Conferences		1	8/1/2014		
Intensity Modulated Radiation Therapy (IMRT)	AS	2	10/1/2014		
Imaging for treatment simulation & verification	EN/RF/TW	2	12/1/2014		
Image Guided Radiation Therapy (IGRT)	SM	1	12/31/2014		
Stereotactic radiosurgery	EP/DH	2	3/2/2015		
Special Procedures: Total Body Irradiation, Total skin electrons (TSE) & Intraoperative radiation therapy (IORT)	TW	2	5/2/2015		
Shielding/Room Design/Radiation Protection Survey / Radiation Safety	EP/SM	1	6/1/2015		
Vacation / Sick Leave / Family Leave / Conferences		1	7/1/2015		
	STATUS		ON TIME		

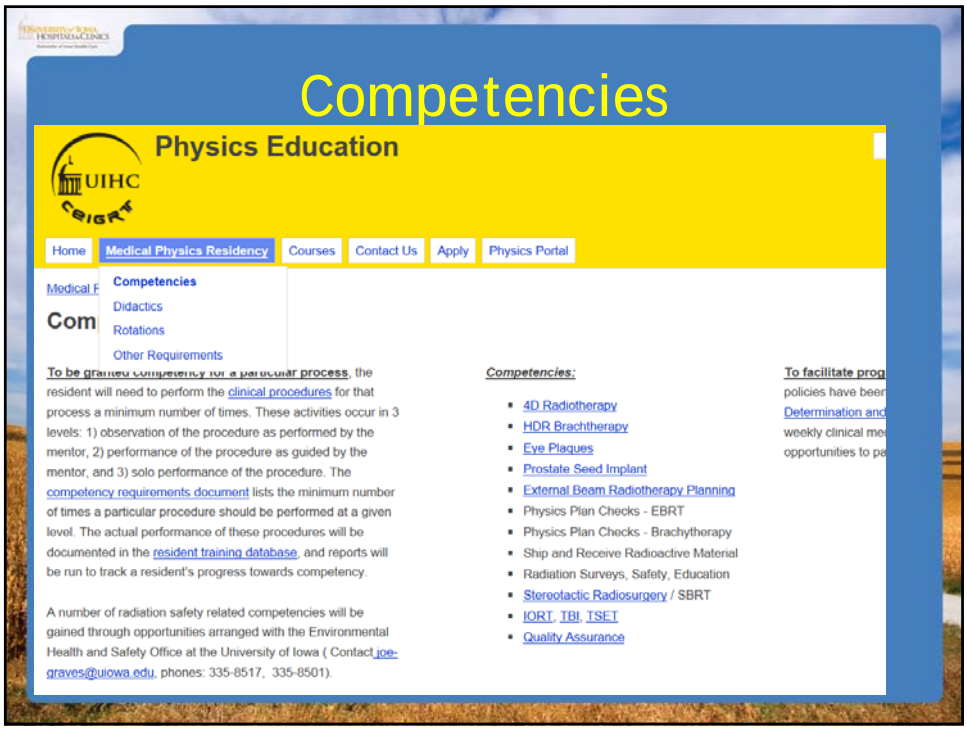
Approx Due Date	Pass Date
7/16/2013	7/1/2013
8/31/2013	8/15/2013
10/15/2013	
12/15/2013	
2/14/2014	
4/1/2014	
6/1/2014	
7/1/2014	
8/31/2014	
10/31/2014	
11/30/2014	
1/30/2015	
4/1/2015	
5/1/2015	
5/31/2015	
ON TIME	

Approx Due Date	Pass Date
7/16/2013	7/16/2013
9/15/2013	9/30/2013
11/30/2013	
1/30/2014	
4/1/2014	
5/17/2014	
7/17/2014	
8/16/2014	
10/16/2014	
12/16/2014	
1/15/2015	
3/17/2015	
5/17/2015	
6/16/2015	
7/16/2015	
BEHIND SCHEDULE	

Online Documentation



Competencies

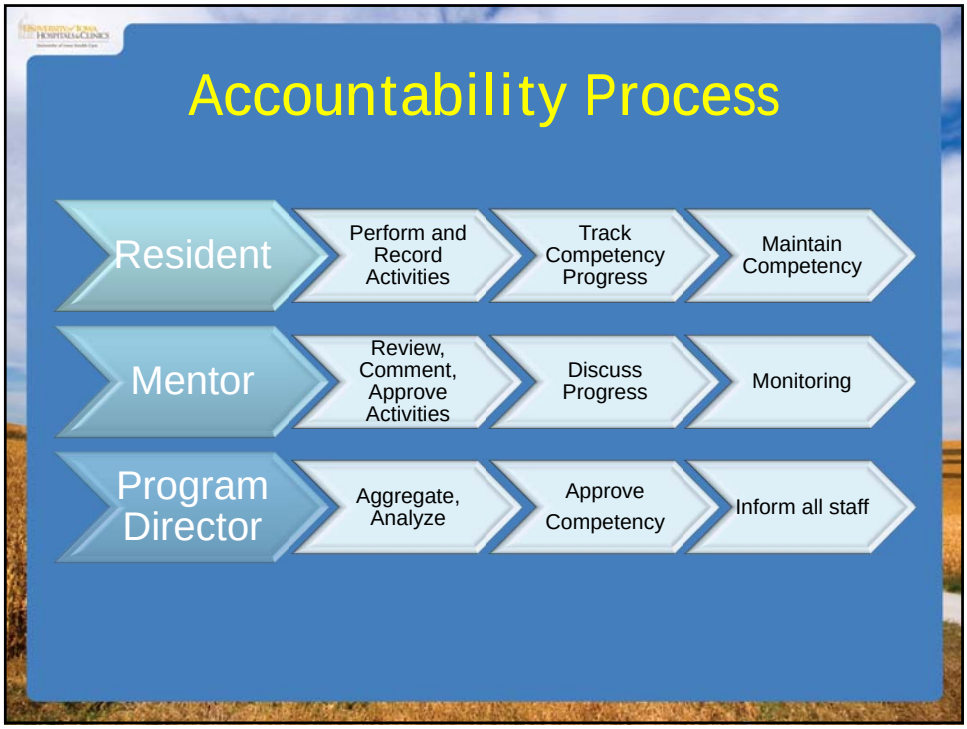


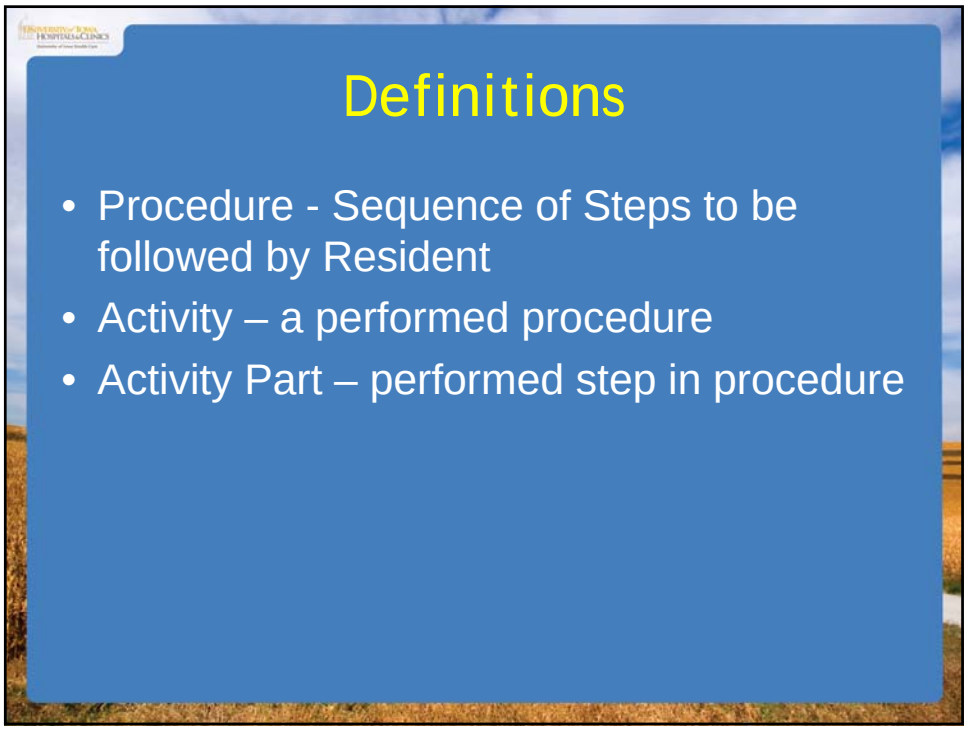
Competency Tables

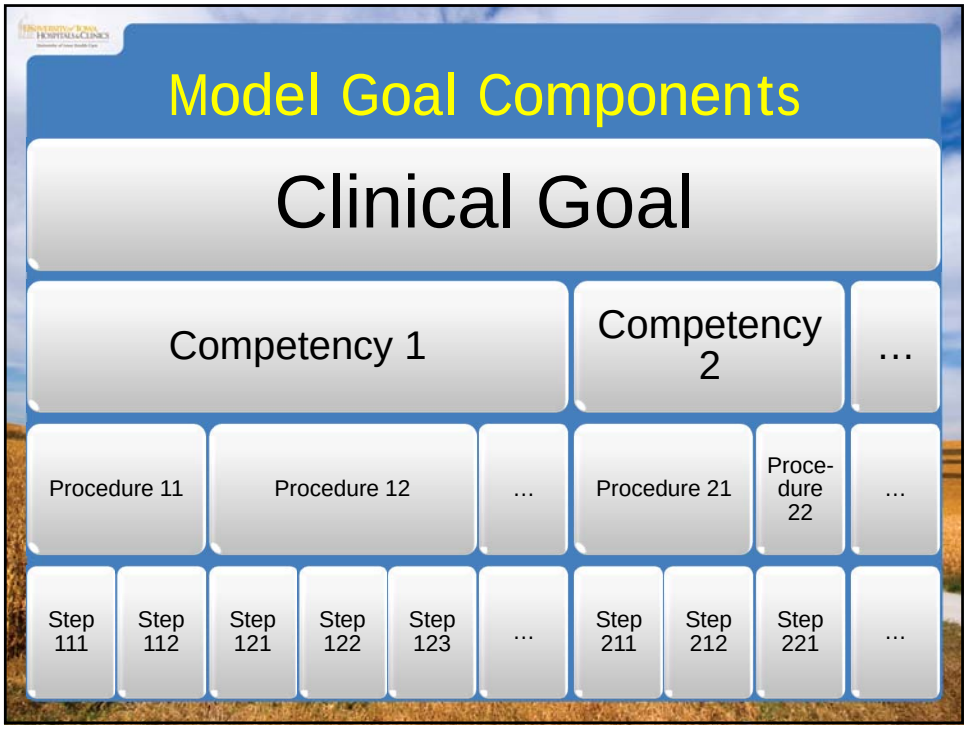
Procedure	Required Observe	Required Guided	Required Solo
HDR Tandem & Ovoid 3D	2	2	2
HDR Tandem & Ovoid Planar Imaging	2	1	X
HDR Vaginal Cylinder	2	2	2
QA – HDR Daily	3	2	3
QA - HDR Source Calibration	1	1	1

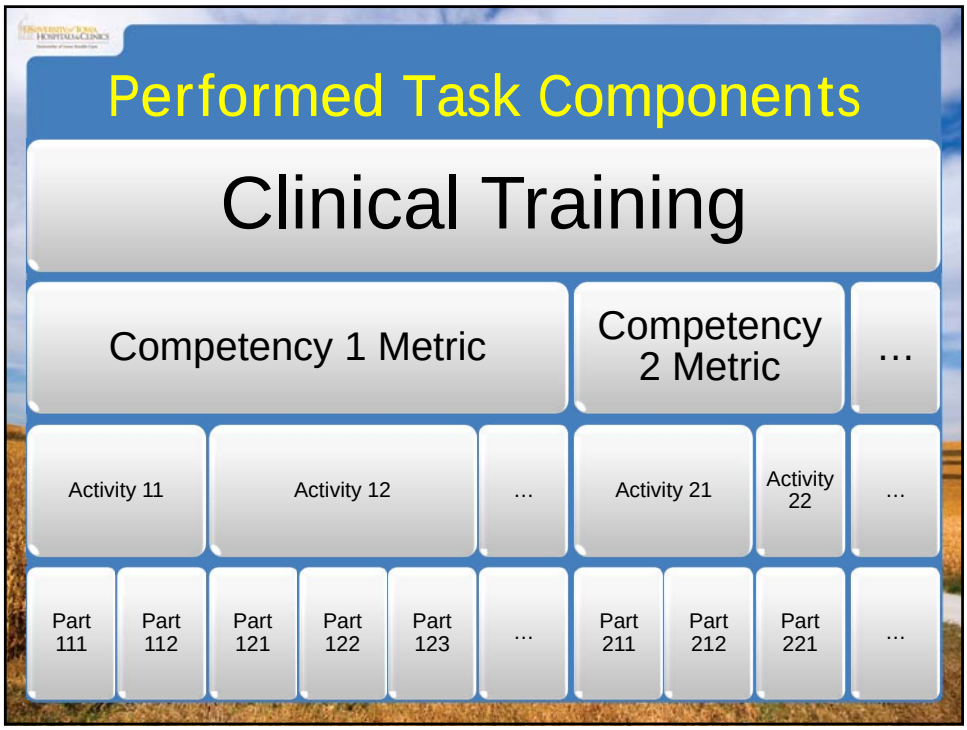
Some Competency Policies

- 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
Competency 2
…
Procedure 11
Procedure 12
…
Procedure 21
Proce-dure 22
…
Step 111
Step 112
Step 121
Step 122
Step 123
…
Step 211
Step 212
Step 221
…


Performed Task Components
Clinical Training
Competency 1 Metric
Competency 2 Metric
…
Activity 11
Activity 12
…
Activity 21
Activity 22
…
Part 111
Part 112
Part 121
Part 122
Part 123
…
Part 211
Part 212
Part 221
…

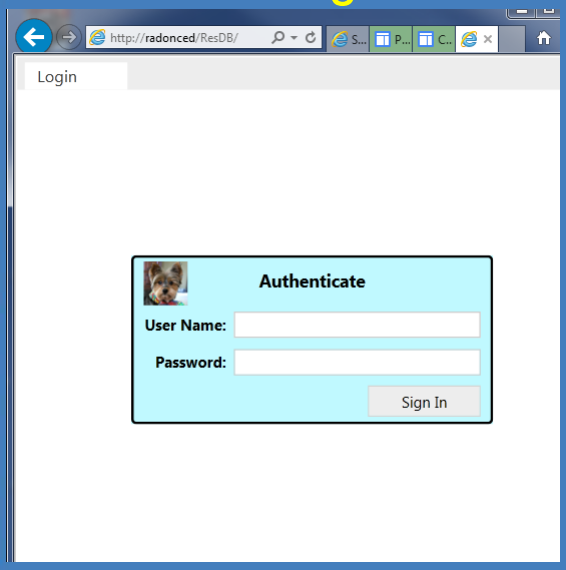
V1 software

- 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

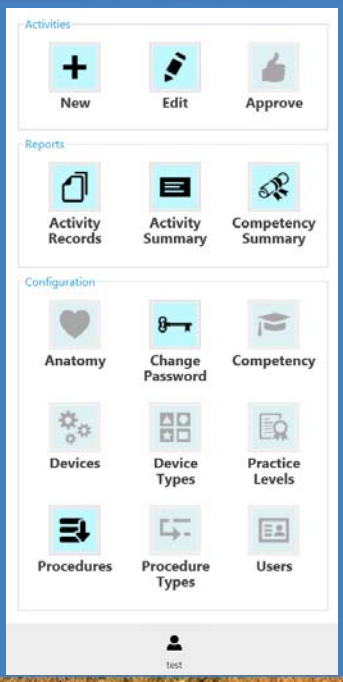


Resident views only his records

Faculty can see all records

Admin can configure DB

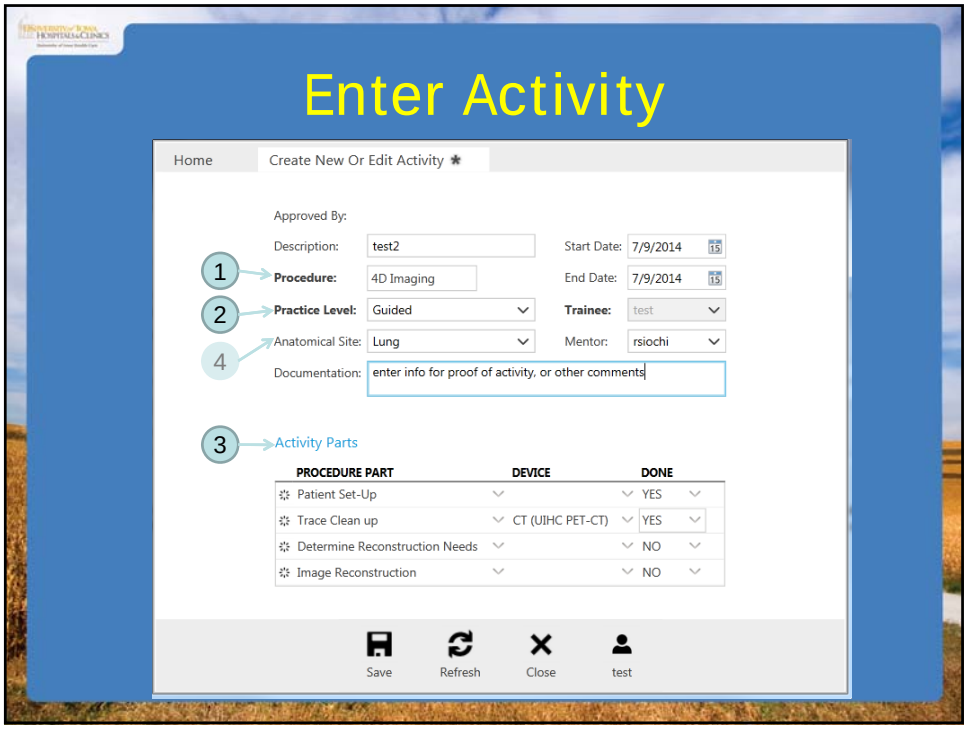
Resident Home Screen



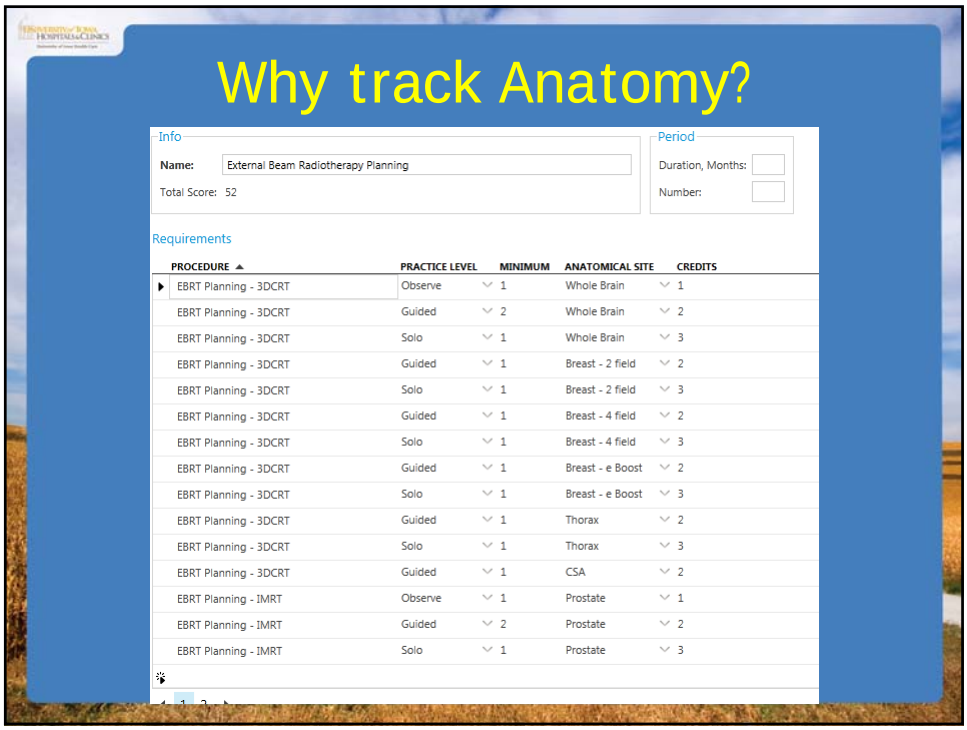
Access only to blue buttons

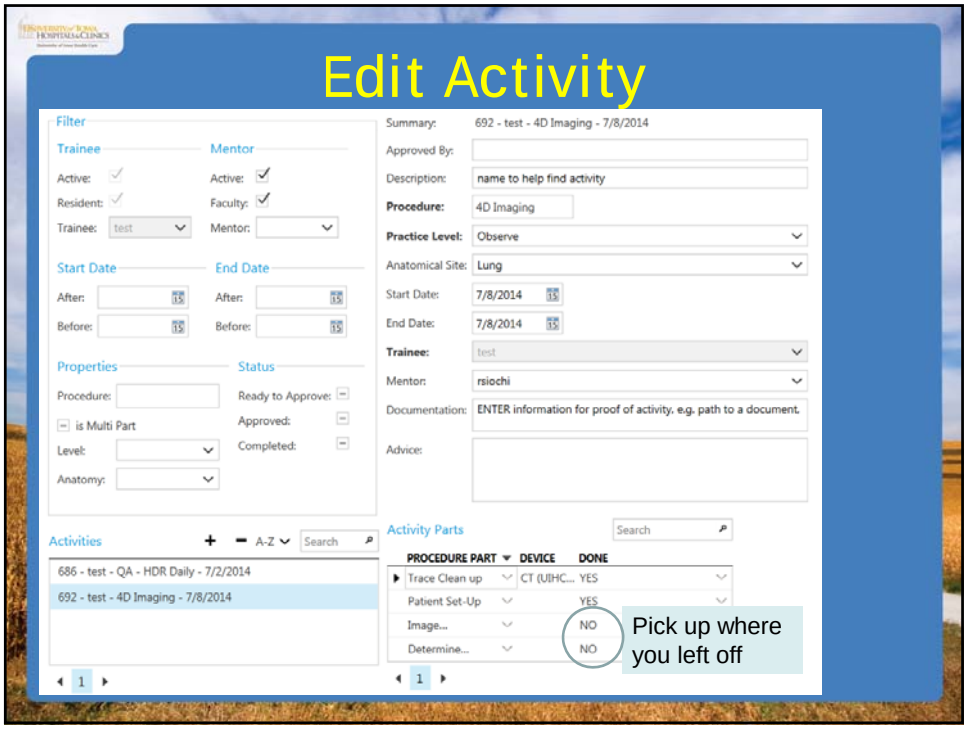
Access only to his own records

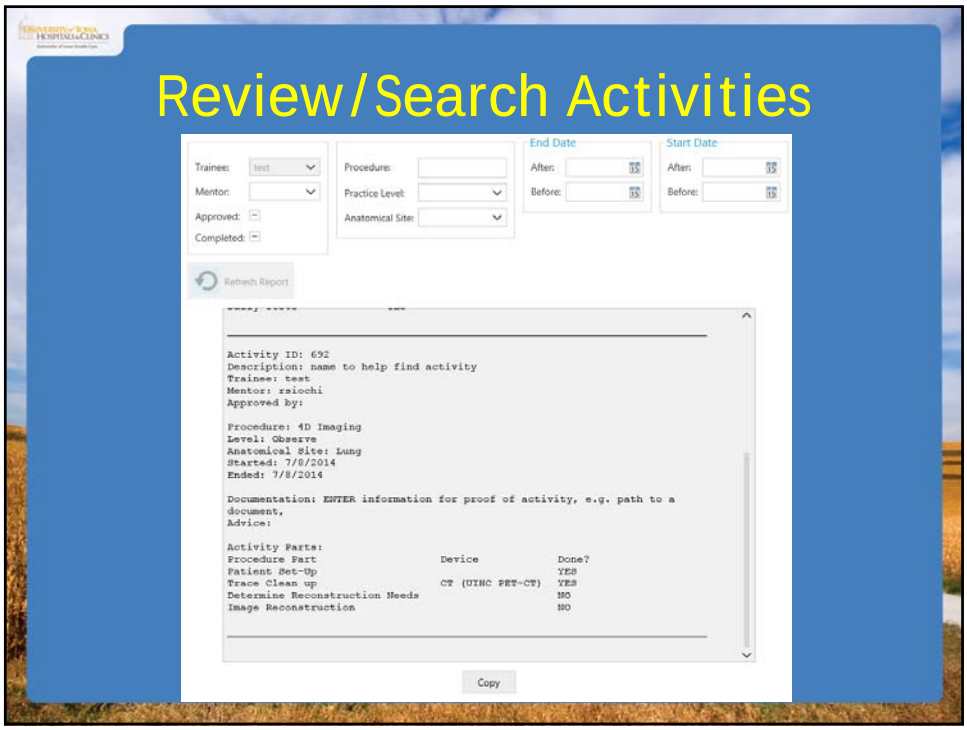
Enter Activity



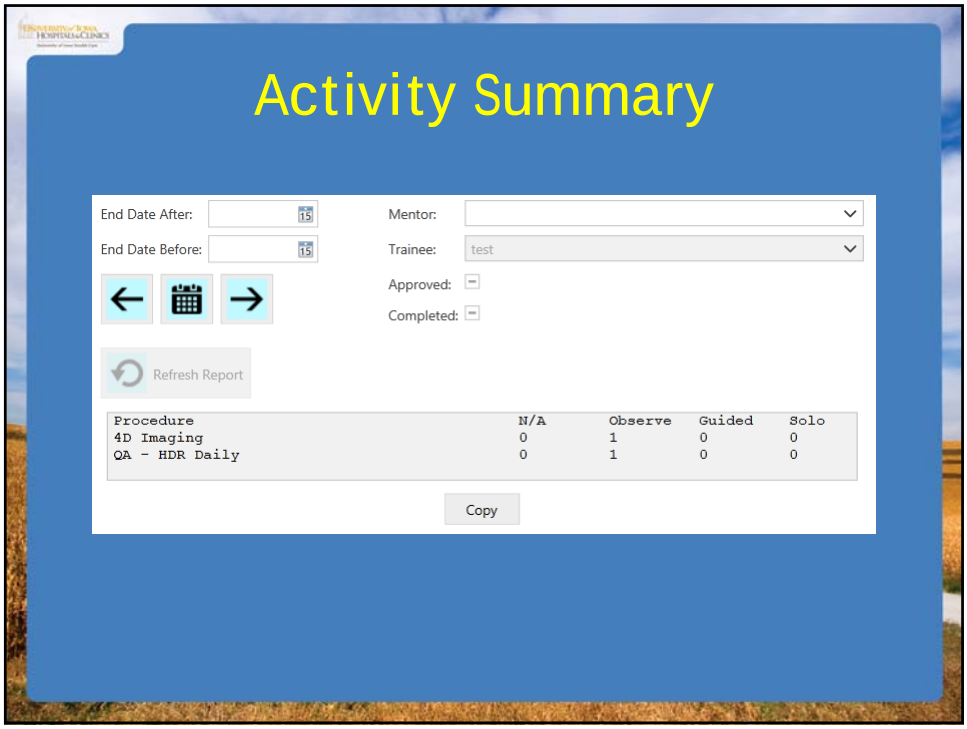
Why track Anatomy?



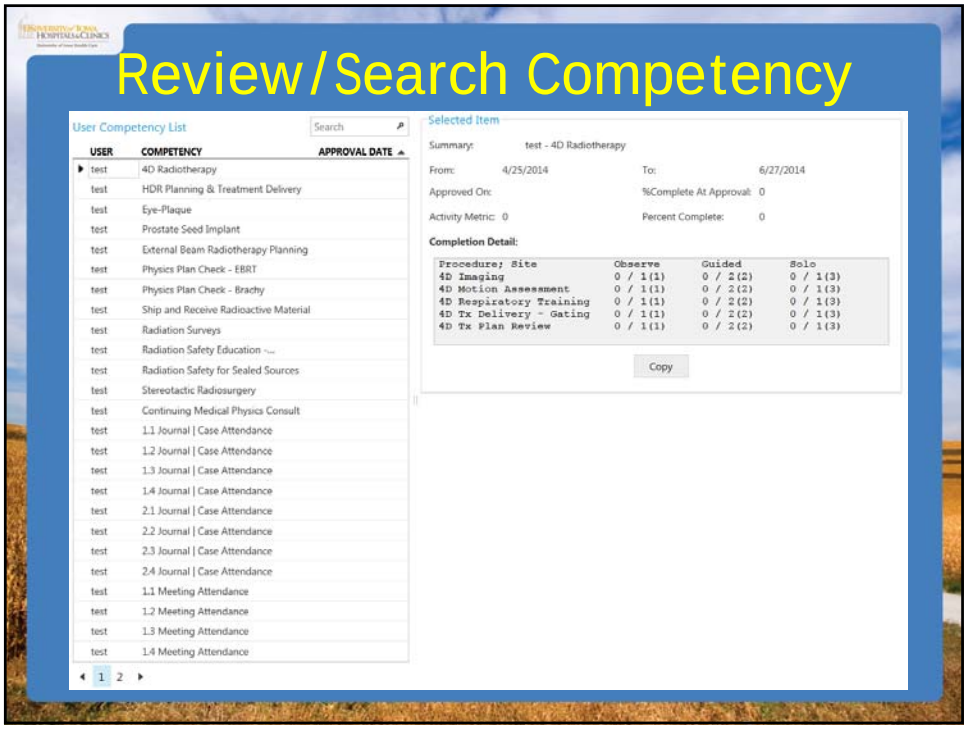

Edit Activity
Filter
Trainee
Active:
Resident:
Trainee: test
Mentor
Active:
Faculty:
Mentor:
Start Date
After:
Before:
End Date
After:
Before:
Properties
Procedure:
is Multi Part
Level:
Anatomy:
Status
Ready to Approve:
Approved:
Completed:
Summary: 692 - test - 4D Imaging - 7/8/2014
Approved By:
Description: name to help find activity
Procedure: 4D Imaging
Practice Level: Observe
Anatomical Site: Lung
Start Date: 7/8/2014
End Date: 7/8/2014
Trainee: test
Mentor: rsiochi
Documentation: ENTER information for proof of activity, e.g. path to a document.
Advice:
Activities
A-Z
Search
686 - test - QA - HDR Daily - 7/2/2014
692 - test - 4D Imaging - 7/8/2014
Activity Parts
Search
PROCEDURE PART
DEVICE
DONE
Trace Clean up
CT (UIHC...
YES
Patient Set-Up
YES
Image...
NO
Determine...
NO
Pick up where you left off

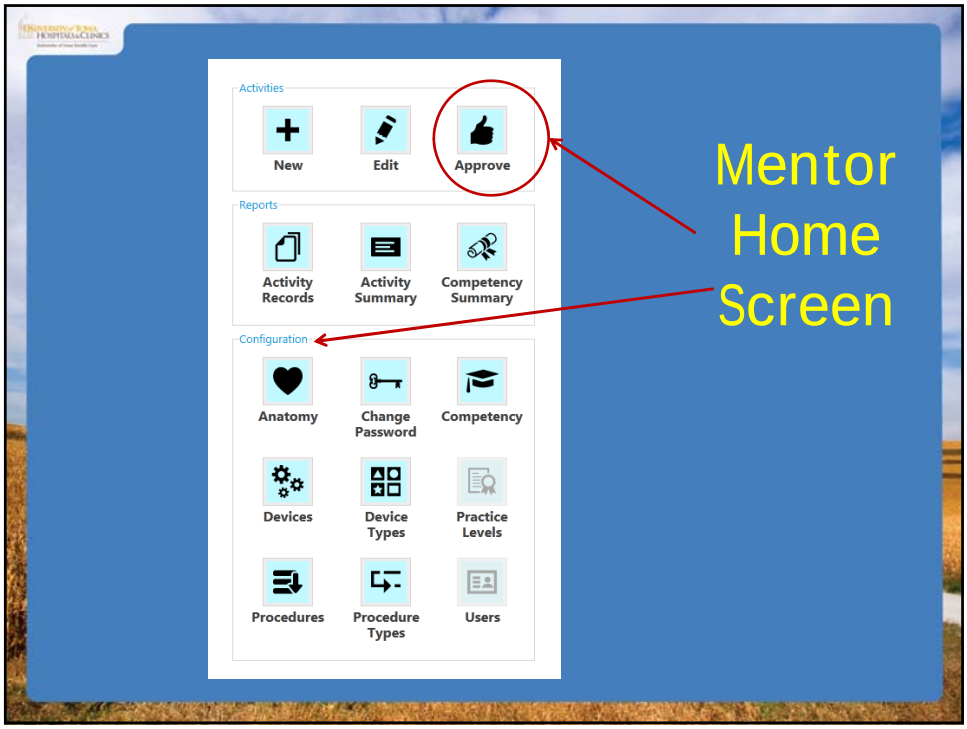

Review/Search Activities
Trainee: test
Mentor:
Approved:
Completed:
Procedure:
Practice Level:
Anatomical Site:
End Date
After:
Before:
Start Date
After:
Before:
Refresh Report
Activity ID: 692
Description: name to help find activity
Trainee: test
Mentor: rsiochi
Approved by:
Procedure: 4D Imaging
Level: Observe
Anatomical Site: Lung
Started: 7/8/2014
Ended: 7/8/2014
Documentation: ENTER information for proof of activity, e.g. path to a document,
Advice:
Activity Parts:
Procedure Part
Device
Done?
Patient Set-Up
YES
Trace Clean up
CT (UIHC PET-CT)
YES
Determine Reconstruction Needs
NO
Image Reconstruction
NO
Copy

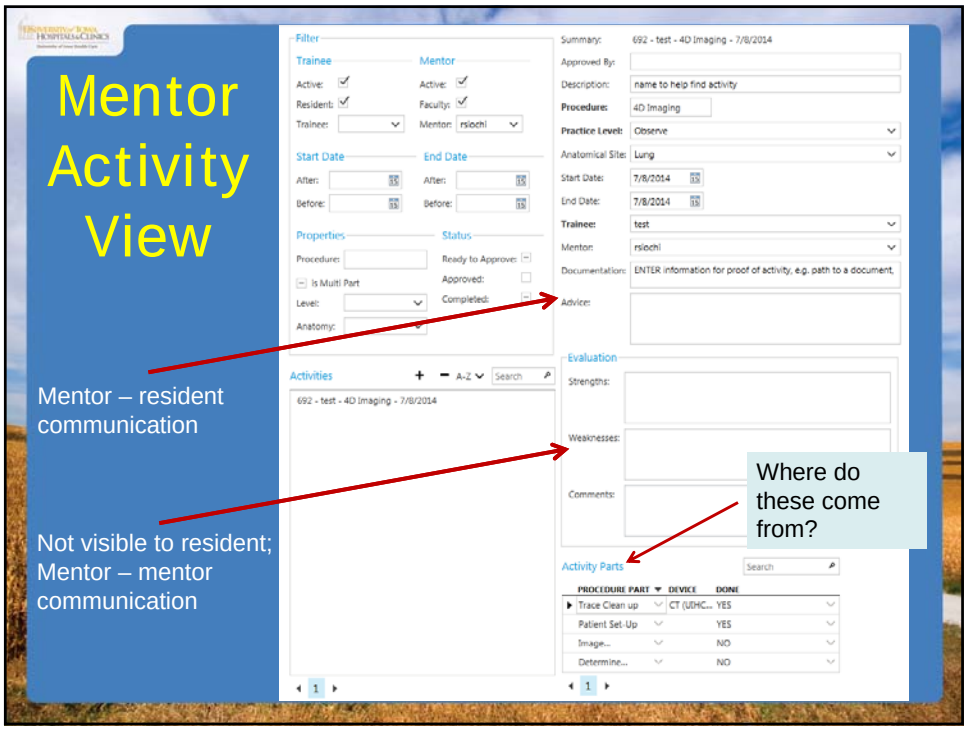
Activity Summary



Review/Search Competency



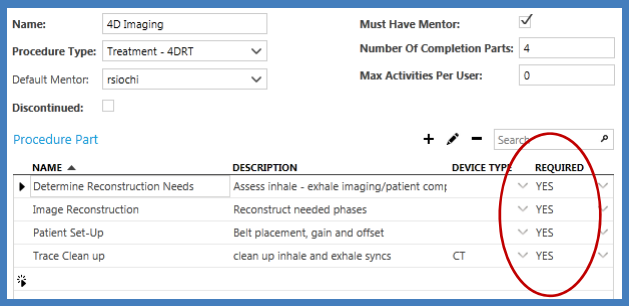

Activities
New
Edit
Approve
Reports
Activity Records
Activity Summary
Competency Summary
Configuration
Anatomy
Change Password
Competency
Devices
Device Types
Practice Levels
Procedures
Procedure Types
Users
Mentor Home Screen


Mentor Activity View
Mentor – resident communication
Not visible to resident; Mentor – mentor communication
Where do these come from?

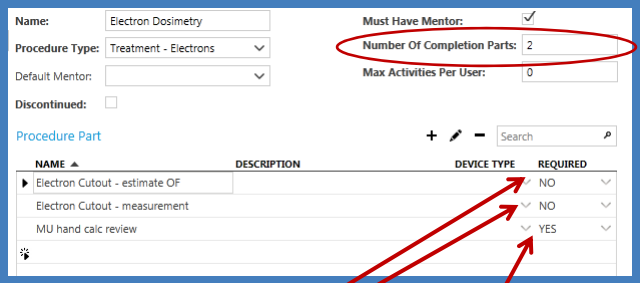
Define Procedures as Models for activities

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

Do all



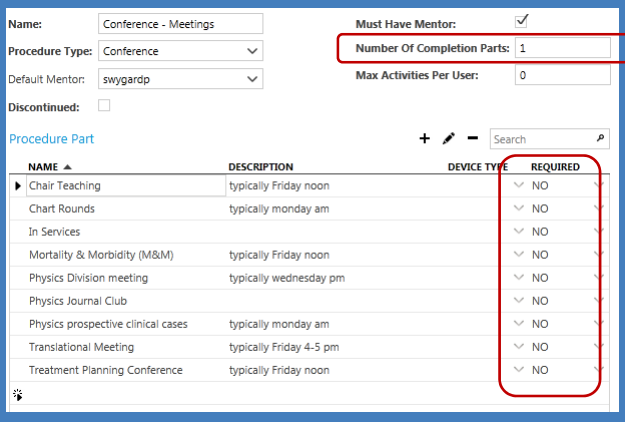
Do some and pick some from the remaining



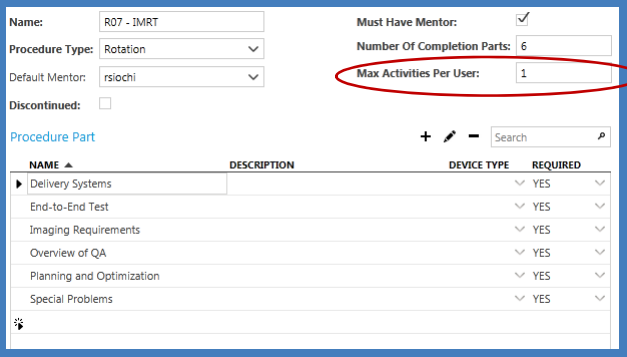
Pick one of these

Do this 1

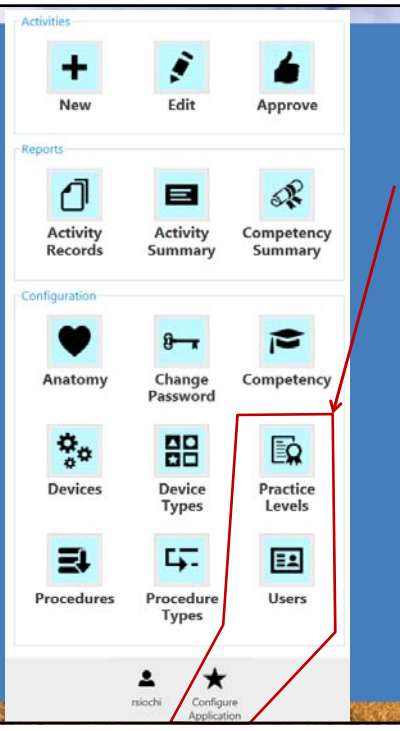
Do 1 from many options



Track Rotation Progress



Program Director Home Screen



Competency Tracking

Selected Item

Summary: resident HDR Planning & Treatment Delivery

From: 7/1/2013 To: 7/1/2015

Approved On: %Complete At Approval: 0

Activity Metric: 340 Percent Complete: 80

Completion Detail:

Procedure; Site	Observe	Guided	Solo
HDR Tandem & Ovoid 3D	5 / 2(1)	4 / 2(2)	3 / 2(3)
HDR Tandem & Ovoid Planar Imaging	0 / 2(1)	0 / 1(2)	1 / 0(3)
HDR Vaginal Cylinder	2 / 2(1)	1 / 2(2)	4 / 2(3)
QA - HDR Daily	3 / 3(1)	2 / 2(2)	40 / 3(3)
QA - HDR Source Calibration	0 / 1(1)	1 / 1(2)	0 / 1(3)

Copy

From our competency requirements document

Procedure	Required Observe	Required Guided	Required Solo
HDR Tandem & Ovoid 3D	2	2	2
HDR Tandem & Ovoid Planar Imaging	2	1	X
HDR Vaginal Cylinder	2	2	2
QA – HDR Daily	3	2	3
QA - HDR Source Calibration	1	1	1

Competency Target Score

Info

Name: HDR Planning & Treatment Delivery

Total Score: 50

$\sum mc$ = 2*1 + 2*2 +….

Period

Duration, Months:

Number:

Requirements

Apply Default Credits Search

PROCEDURE	PRACTICE LEVEL	MINIMUM	ANATOMICAL SITE	CREDITS
HDR Tandem & Ovoid 3D	Observe	2		1
HDR Tandem & Ovoid 3D	Guided	2		2
HDR Tandem & Ovoid 3D	Solo	2		3
HDR Tandem & Ovoid Planar Imaging	Observe	2		1
HDR Tandem & Ovoid Planar Imaging	Guided	1		2
HDR Tandem & Ovoid Planar Imaging	Solo	0		3
HDR Vaginal Cylinder	Observe	2		1
HDR Vaginal Cylinder	Guided	2		2
HDR Vaginal Cylinder	Solo	2		3
QA - HDR Daily	Observe	3		1
QA - HDR Daily	Guided	2		2
QA - HDR Daily	Solo	3		3
QA - HDR Source Calibration	Observe	1		1
QA - HDR Source Calibration	Guided	1		2
QA - HDR Source Calibration	Solo	1		3

1

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
- $\mathrm{P} = \frac{\sum_i a_i c_i}{T}$,
- 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:

Procedure	N/A	Observe	Guided	Solo
QA - HDR Daily	0	0	0	10
QA - HDR Source Calibration	0	0	0	1
Plan Check - IMRT	0	0	1	2
Plan Check - Non-IMRT	0	0	2	0
SRS Daily Floor Stand QA	0	0	0	2
SRS Image Localization and Registration	0	0	0	2
SRS - Single Iso Plan	0	1	1	0
SRS - Multi Iso Plan	0	2	0	3
SRS - Frameless Delivery	0	0	1	1
SRS - Frame Delivery	0	0	1	2
Weekly Physics Check	0	0	4	3
Uncommon Procedures	0	0	0	1
Conference - Meetings	40	0	0	0
Conference - Journal | Case	12	0	0	0
R10 - Stereotactic Radiosurgery	1	0	0	0
IORT - electronic brachy	0	0	1	1
QA - Linac Annual	0	0	0	1
QA - Linac Monthly	0	0	0	2

Competency
Brachytherapy approved 7 /31 /13
Eye plaques approved 7 /31/13
Treatment Planning approved 7 /31 /13
Next closest –IORT, 75%, and Stereotactic Radiosurgery, 71% 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?

Procedure	Required Observe	Required Guided	Required Solo
HDR Tandem & Ovoid 3D	2	2	2
HDR Tandem & Ovoid Planar Imaging	2	1	X
HDR Vaginal Cylinder	2	2	2
QA – HDR Daily	3	2	3
QA - HDR Source Calibration	1	1	1

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!