Working Cohesively with RO-ILS in A Multi-Centered Institution

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44th AAMD Annual Meeting
June 18, 2019

Outline

• Introducing ROILS into the department
• Implementation
• Results
• Discussion
EVOLUTION IN TREATMENT PLANNING

RAPID ADVANCES IN TECHNOLOGY
Patient example
- 84 yo male
- Prior L Posterior fossa in 2014
- Palliative bone met
- KPS 70
- Dose fractionation 20Gy in 5fx
- Port films needed (MV/KV)
- Nandots requested
- Fusion C1/C2
- APPA
- Modality: 6-23MV (6MV preference)
- Has a pacemaker
• Simple urgent right?
  • Opposed fields
  • Quick turnover
  • Rather take this than SIB HN plan

• Simple math
  • 9-3=?
  • 6=Genius
  • So easy

It’s a simple APPA case, there should be no errors....

\[
9 - 3 \div \frac{1}{3} + 1 = ?
\]

The Correct Way

\[
\begin{align*}
9 - 3 \div \frac{1}{3} + 1 & \quad 9 - 3 \div \frac{1}{3} + 1 \\
9 - 3/(1/3) + 1 & \quad 9 - 9 + 1 \\
& \quad 1
\end{align*}
\]
Where's the error?

- Re-enter Calypso coordinates
- Whole brain urgent at 4 PM
- MD needs assistance on treatment fields
- 0 kV/270 kV
- FUSE TO C1/C2
- Come to CT SIM to check setup
- Ax T1 post fusion needed
- PACemaker noted & entered
- Resident needs help with contouring tools
- Avoid overlapping from prior tx fields
- Optimise to 70Gy but keep PTV cool around brainstem
- Outside studies from prior treatment plan needed to be sent out
- Bolus placement needed
- 400x5

DISREGARDING ERRORS/WARNINGS
Prostate Total Dose to 4500cGy

No issues for a quick rescan?

- Who was notified?
- Are we evaluating or replanning?
- Do you think you will meet constraints?
Ripple effect

- Dosimetrist
- Physicist
- Therapist
- Billing
- Social Workers
- Transporters
- MDs

PATIENT
PATIENT SAFETY ERRORS

- IL-2010
  - Trigeminal neuralgia
  - Jaws open
  - Treated 4x Rx dose
- MO-2010
  - 76 patients overdosed
  - Beam not calibrated correctly
- NY-2007
  - Radiation Overdose to brainstem
- NY
  - Overtreatment of breast CA
  - No wedge inserted
- Scotland-2005
  - Pt treated 1.67x for 2 fx incorrectly
  - entered incorrectly from TPS
- NJ 2006
  - 36 over radiated patients
  - 20 subjected to “errors in technique”
- Tampa Bay- 2005
  - 77 brain over radiated
- WA-2005
  - Over radiated optic nerve to tonsil patient
- OH-2006
  - Entered an incorrect magnification factor into the treatment planning computer

BACKGROUND

Patient Safety and Quality Improvement Act of 2005 (PSQIA)

- Signed into law July 2005
- Authorized the creation of patient safety organizations (PSOs)
- Licensing health care providers to:
  - Report
  - Investigate
  - Analyze
- Goals was to reduce risks
- Improve quality and safety
- Non-punitive
BACKGROUND

• Launched in 2014 from a partnership between ASTRO & AAPM
• Global shared learning
• A system to improve the quality and safety within radiation oncology departments
• ~500 facilities using

NORTHWELL RADIATION ONCOLOGY DEPT

• 7 sites
• 9 machines
  • TRUIBEAM
  • TOMO
  • GAMMA KNIFE
  • CYBER KNIFE
  • TRILOGY
  • C-LINAC
• 2 Record and Verifiers
  • Mosaiq
  • ARIA
• 250-300-daily patients
• In house whiteboard

**TRANSITION FROM OUR IN HOUSE ASPECTS OF CARE DATABASE**

MONTHLY QA INCIDENT DATABASE

Log New Incident
- Login Incident
- Log Retrospective Incident
- Log Retrospective Incident
- Log Monthly Incidents
- Log Monthly Reports

Log QA Monitoring Item
- Select Item
- Enter Item
- Select Item
- Log Item

Northwell Health

American Association of Medical Dosimetrists
IMPLEMENTING ROILS

- Recruitment
  - Strong Leadership-supportive and engaged
  - On site training
  - Apprehension of using new system
  - Do it right vs Do it “on time”
- Taking a month for launch
  - Discontinued Aspects of Care link
  - Implementing Standards for logging in events
  - How were we to review incidents?
- Quantifying and examining our metrics
  - Were there any trends?
- Implement and execute changes
  - Motivation
- Team Building and Support
  - Encouragement
  - Language
  - Non punitive!!!

ROILS disciplinary team
- Physicist
- MD
- Therapist
- Nursing
- Dosimetrist

IMPLEMENTING ROILS

- Added ROILS link throughout the health system on every desktop
- Create a universal password/login
- Email blasts
- Job aides
- Meetings/in-service at each site
- Incentive for best catch/near miss
- Onsite training
ENTRIES SUBMITTED

- Rx Mismatches
- Patient consents not completed
- Setup-issues/errors
- Missing patient information
- Treatment Planning issues
- 1st day checks
- Resims
- OTVs
- Film Reviews
- Billing/scheduling issues
- Treatment machines/software issues

NON PUNATIVE-COLLABORATIVE APPROACH

- Encouraging emails
  - Following up-adding to the narrative
  - Reaching the people directly involved with the event
- Requesting feedback
  - Asking for more details
  - Providing the feedback after review
- Catching the worst mistake

*Working to solve the how not the who*
*Teamwork*
*Accountability*
*Independence*
*Rewarding the best catch*
WHO IS AT FAULT?

- A systems approach, not a person approach
- How can we learn from other facilities?
- Not who?
  - See why?
  - What exactly happened?
  - How do we prevent it in the future?
  - Become PRO-ACTIVE not REACTIVE

GOAL for Dosimetry

- Improving work life balance
  - Limiting replans/rushed cases
- Better relationship with therapist/physicist/MDs
- Learn from past and potential future mistakes
- Any trends going on?
  - Have data to back it up
  - Improving workflow

Ever Happen to You?

- Contour change just before Vsim
- Rx change during review
  - Change in total dose?
  - Change in technique?
  - Change in Energy?
  - Breast reviewed?
  - Machine assignments
- Late fusion request
- Found that pt had prior tx, need fusion
- Change in patient start date
PROCESS

- Therapeutic Radiation Incident
- Other Safety Incident
- Near-miss
- Unsafe Condition
- Operational/Process Improvement
ENTRY INTO ROILS
Categorizing Events

- Therapeutic Radiation Incident
- Other Safety Incident
- Near-miss
- Unsafe Condition
- Operational/ Process Improvement

Initial Screening by ROILS Leader
Submit to PSO

Bi-Weekly Analysis with ROILS committee
Root Cause Analysis

Internal Sub Categories Investigation

Proposals for operational Process improvement
MONTHLY QA COMMITTEE

Directives Committee
Push out proposals to the staff

CLOSE THE LOOP
Aug 2017- Dec 2017 Initial kick off of RO-ILS into Departments.

Incorporating Other Institutions

- Center for Advanced Medicine (CFAM) 51%
- Imbert Cancer Center (ICC) 2%
- Lenox Hill Hospital (LHH) 32%
- Long Island Jewish Medical Center (LIJ) 2%
- North Shore Medical Accelerator- Greenlawn (NSMA-G) 2%
2018 Entries

- Radiation Therapist: 454
- Physicist: 31
- Physician: 10
- Nurse, NP, PA: 107
- Dosimetrist: 95
- Administrator: 74
RO-ILS 2018 DATA

Aggregate Sum:
Workflow Step Where Event Occurred

Before Simulation
- 8%
- Pre-Planning Imaging and Simulation
  - 12%
- Treatment Planning
  - 30%
- Pre-Treatment QA Review
  - 14%
- Treatment Delivery
  - 25%
- On-Treatment QA - 6%
- After Treatment Course is Finished
  - 2%

Aggregate Sum:
Workflow Step Where Event Discovered

Before Simulation
- 4%
- Pre-Planning Imaging and Simulation
  - 5%
- Treatment Planning
  - 8%
- Pre-Treatment QA Review
  - 25%
- Treatment Delivery
  - 29%
- On-Treatment QA - 11%
- After Treatment Course is Finished
  - 3%

#231. Contributing Factors (Categories) for Treatment Planning Events

- Human Behavior, 21%
- Organizational management, 27%
- Technical, 8%
- Communication, 20%
- Procedural Issues, 24%

#208. Occurred 'Workflow = "Treatment Planning"
Q3 2016 to Q2 2018
Select all that apply
n=413

*RO-ILS Data Elements were updated August 2016

Northwell Health
Examining Trends

Event#1- Rx & Directive Mismatch (MD to change dose level to 6600/5940/5445 in directive to match Rx)

Event#2- Wrong DRRs associated, unable to match 2d images
Directive Variance - Rx & Directive Mismatch (Add dose painting PTV vol in the planning section in the directive)
(Planner might mistake for what is in the directive and their constraints and what the rx is written for)

Event#3- Anatomical location incorrect in the treatment directive. The site was for bladder, but the directive stated otherwise.

Event#4- After plan is done, physics reviewed, MD added trachea constrain which is not in the treatment directive, planner has to replan.

Event#5- QA Incident logged: Directive Variance - Rx & Directive Mismatch (take out 0.5cm bolus in the directive under boost Rx)

Event#6- Re-plan because of : 1. Request OAR (temporal lobe) contour when plan reviewed. 2. Ask 100% dose coverage on PTV-parotid overlap area although plan meeting directive.

PHYSICS-sub categories

- Physics Element
- Physics Mislabeled
- Physics No Check
- Physics Efficiency

Missing a functional aspect of the plan
Discrepancy from the plan to the patient chart
Why are you late?
Not wrong but inefficient on the floor
Results & Discussion

1. COMMUNICATION

**INCIDENT**
- Verbal handoffs

**CHANGE IMPLEMENTED**
- Increase in notations and alerts in the system (ex. Pacemaker, prior RT, bolus)
2. RESIM

**INCIDENT**

- Patients start delayed after Resim

**CHANGE IMPLEMENTED**

- Need new Rx to trigger workflow
- Must be entered and approved prior to CT sim is completed

3. Chart Checks

**INCIDENT**

- Correcting primary reference points in the tx plan
- Graticules attached
- Apertures created
- Checks before 3 tx cutoff

**CHANGE IMPLEMENTED**

- 17% drop

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**RO-ILS REPORTING & CHANGES IMPLEMENTED Q2 2018**
4. Nano-dots

INCIDENT

- NANO-DOTS Frequency: 1st day of each treatment prescription and 1st day of change in treatment plan.
- NANO-DOTS Placement: See assessment

CHANGE IMPLEMENTED

- NANO-DOTS
  - Frequency: 1st day of each treatment prescription and 1st day of change in treatment plan.
  - Weekly
  - Daily
  - Placement: See assessment

5. Film Review

INCIDENT

- Not being reviewed on time

CHANGE IMPLEMENTED

- Implementing peer-to-peer feedback.
  Reviewing events, collecting data. Number of events have decreased

Film Review 2018
6. Bolus

**INCIDENT**

ON TREATMENT
Comments: bolus 0.5cm daily (OPTIONAL)

**CHANGE IMPLEMENTED**

Updates
Departmental emails sent

Radiation Medicine Directives Committee
February 2019 Update

- GU Directives will be updated this week in MOSAIC

The main differences include:
- There will be 3 directives for EBT alone: Standard fractionation, hypofractionation and SBRT. Separate directives for EBT-IGRT, SBRT and CALYPSO—will be retired.

PROSTATE EBT STNDfx
PROSTATE EBT HYPFx
PROSTATE SBRT

There will also be a menu of specific markers and spacers, to select from when using, for all the directives using EBT, located under the PRESCRIPTION:

- _X_ SpaceOAR
  - CALYPSO beacons
  - Gold fiducials
Case Presentations

Learning from incidents

Example 1- Quick fix

Common APPA
- KPS bad
- 300x10
- Scan head first
- Planned for feet first accommodating for clearance issues
- Documentation was set up for feet first
- Pt was set up head first
- Scheduling issues
- Expectation Bias

Solution:
- Notify chief therapist- communication
- Pre-flight checks-policy
- Re-educate
Learning from incidents

Example 2- What I meant

- SBRT Multiple sites
  - T1-T2, T6, L5-sacrum
  - Had multiple scans
    - One HN mask
    - One Prolock (with compression belt)
  - Contours for T1 was on the arms completed on Prolock scan
    - But was intended for T1-T2 HN scan (arms down)
  - During VSim T1 was unable to reproduce
    - Caught during filming
  - Who is responsible?
    - Planner making a bad plan?
    - Physicist not catching mistake?
    - Therapist not setting up properly?
    - MD not notifying?

Don’t blame. Learn

Learning from incidents

- SBRT Multiple sites-investigation:
  - MD had stated they wanted to see if they can fit all the sights on the Prolock scan. They MIGHT want to have 2 separate scans
  - Only one scan was sent
  - Importer didn’t carefully look at the sim instructions
  - Physicist missed of 2 scans during 2nd check
  - Remove-expectation bias. Who’s job to catch it?
  - Would a non-experienced therapist no fly treatment?
    - Fear of delaying on time?
    - Reprimanded?

Don’t blame. Learn
Learning from incidents

• SBRT Multiple sites-Conclusion:
  • Proper communication was needed at time of sim
  • Written Clarification on MD intention
  • Double checking the sim instructions match the scans sent
  • Investigate-Don’t immediately judge
  • PTV contours were transferred to proper scan and represented during Smart Rounds prior to new plan

Don’t blame. Learn

• How urgent?
  • They have cancer.
    • 200x33 HN by tomorrow?
  • Can you put it at the top of your list?
    • What’s for lunch...Did I eat today?
    • If they need it now, treat palliative and reassess
  • We can’t rush jobs
Adaptive Planning

- Patient lost weight
- Not setting up properly
- Tumor change
- Increase in workload

- Set up policies to reflect when needed
- Account for the time
  - Has the new total dose significantly impacted the patient?
- Are the contours similar?
  - Large bowel/bowel bag?

Example 3- Human to Human Interaction

- Covering MD signs off new Rx after peer review
- Directive mismatch was caught during the planning process
- Email was sent to the Primary MD to adjust what was approved in Smart Rounds

- Primary MD wanted simultaneous integrated boost (SIB) vs concomitant boost
- REPLAN NEEDED

- ANY CHANGE IN RX, MUST BE REPRESENTED
Moving forward...

Common Mistakes

- Rushed urgent
- Decrease in daily fractions
  - 600cGy x 5fx Or 500cGy x 6fx?
- Prior radiation treatment
- Multiple Rx
- More handoffs
- Incorrect beams and energy are chosen
Solutions/OUTCOMES

• Rushed urgent  NO FLY RULES POLICY
  • Is it really emergent?
• Decrease in daily fractions  Templates in tx planning system
• Prior radiation treatment  Add tx notes for fusion needed.
• Multiple Rx-  New entries must be created
• More handoffs- Constant communication; enforce policies
• Incorrect beams and energy are chosen  Changed energy to ‘per plan’
• OTVS (pending)

Opportunity for improvement

From prior FMEA analysis directives were created
• Standardize RX
  1. TX SITE;
  2. DELIVERY METHOD;
  3. DOSE/FX (cGy);
  4. # of fractions
  5. TOTAL DOSE
Templating Constraints

• Filming rules-Creating templates
  • KV/MV/CBCT

Templating Constraints

• “Can you re-do this plan but make it cooler?...Can you re-do this plan but make it in the middle”

• Incorporating more physicians to the group
  • Can’t just have verbal requests
  • Consensus
    • Creating and updating treatment directives
    • Prioritizing what is a hard constraint
**PRE-planning**

- Understanding margins
- Addressing concerns prior to treatment planning
- Peer review is key

- Can you achieve 50% Total Dose at rectum?
  - Limit replans, rushing cases

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**Investigating Inefficiencies**

- Patient not setting up properly
- Coordinates match, films don’t
- Who’s responsible?
- Who’s at fault?

- Trust the process
  - Assess the situation
  - Attempt setting up the patient again
  - Work together
  - Manage the workflow

- **Findings:** Pt remove their braids prior to verification sim without notification

Don’t blame. Learn
THE NO INTERRUPTION ZONES

- Removing distractions
- Allowing full concentration
- Interruptions = compromise patient safety

Roadblocks

- Reporting bias
- Emotionally involved — example next slide
- Solving the problem there and not reporting to prevent future mistakes
- Recorder mental fatigue
- OLD CULTURE MENTALITY - **FEAR**
  - The value of speaking up
Roadblocks-example of emotionally involved

Ex airing out

- With limited to zero access to the whiteboard, while following a workflow that was not designed for Aria, as well as an electronic system that does not work well with manually entry, presents a danger to patient care. Every single patient added to the whiteboard is done manually. We physically write down (on paper) their entire name, MR number, treatment intent; palliative or curative, IMRT 3d or 2d, and a directive description that the doctor has to copy and paste from a master file that may or may not be updated (because again, our NSMA network is not connected to Northwell, so we do not have access to your S drive). We then take all of this written information from multiple patients, walk it down the hallway (but only at our Greenlawn site, as Smithtown still has no access) find a Northwell PC that is both not occupied AND logged onto by a limited number of users, then manually enter this info onto a spreadsheet that hides the header, and takes way too long to load. As of this writing, the directives drop-down log on the whiteboard still does not match the master file, which causes rejection from presentation due to this "mismatch". This entire process raises the potential for human error. We went from paperless, back to paper. None of the Directives contain information specifically written for our equipment, which often leads to mismatches between our electronic prescription and this directives document (which also leads to rejection at presentation). Oftentimes our plans are presented and ridiculed during smart rounds because staff Northwell dosimetrists are completely unaware of our machine limitations and the methods we use to create plans for our equipment. These suggestions are not presented to us collegiately, rather arrogantly and with disdain for our planning processes. This is not a culture of care. There is a palatable unnecessary level of stress due to these miscommunications, and delays which leads to redundant work for all staff involved, under conditions not ideal for this high level of care we provide, that ultimately trickles down to extended patient Vsim dates, and upset patients and staff. The Aria equivalent for the whiteboard process is a simple Carepath, which is as seamless for Aria users as the whiteboard is for MQ. This is written with respect to your staff, and respect with understanding the processes for your workflow.

“Oftentimes our plans are presented and ridiculed...

... rather arrogantly and with disdain for our planning processes”

COMMUNICATION

Dosimetry & Physics-“AAA”

- Assumptions & Expectations-NO!
- Accountability, designating who gets it done
  - Emails > verbal
- Any concerns (technique, clearance, constraints)
- Changing culture
  - Educating the newer generations of non-finger pointing

- Less things falling through the cracks
Why Bother

• You’re frustrated + I’m frustrated= frustrated together? → NOPE
  • Decide what you want to focus
    • Which reached the patient
    • Monitor why patient was delayed

• In house system- no problem
  • Using ROILS to see what other center common mistakes might be
  • Any common trends?

• Using ROILS
  • Automatically can make spreadsheets and graphs
  • They sent quarterly reports and tips

Conclusions

• Improves Teamwork & Communication

• Continuous Learning and Adapting

• Bottom line: Exceptional Patient Care
Acknowledgements

- Katrina Aronoff, RTT
- Adam Riegel, PhD
- May Lim, MD
- Gayle Somerstein, RN

I always learn from mistake...
of others...
...who take my advice.
References


Thank you