

RO•ILS[®]

Leveraging Incident Learning for Newer Techniques and Process Improvement

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Disclosures:

- Member of the Radiation Oncology Healthcare Advisory Council (RO-HAC) for RO-ILS.



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Disclosures:

- ASTRO employee

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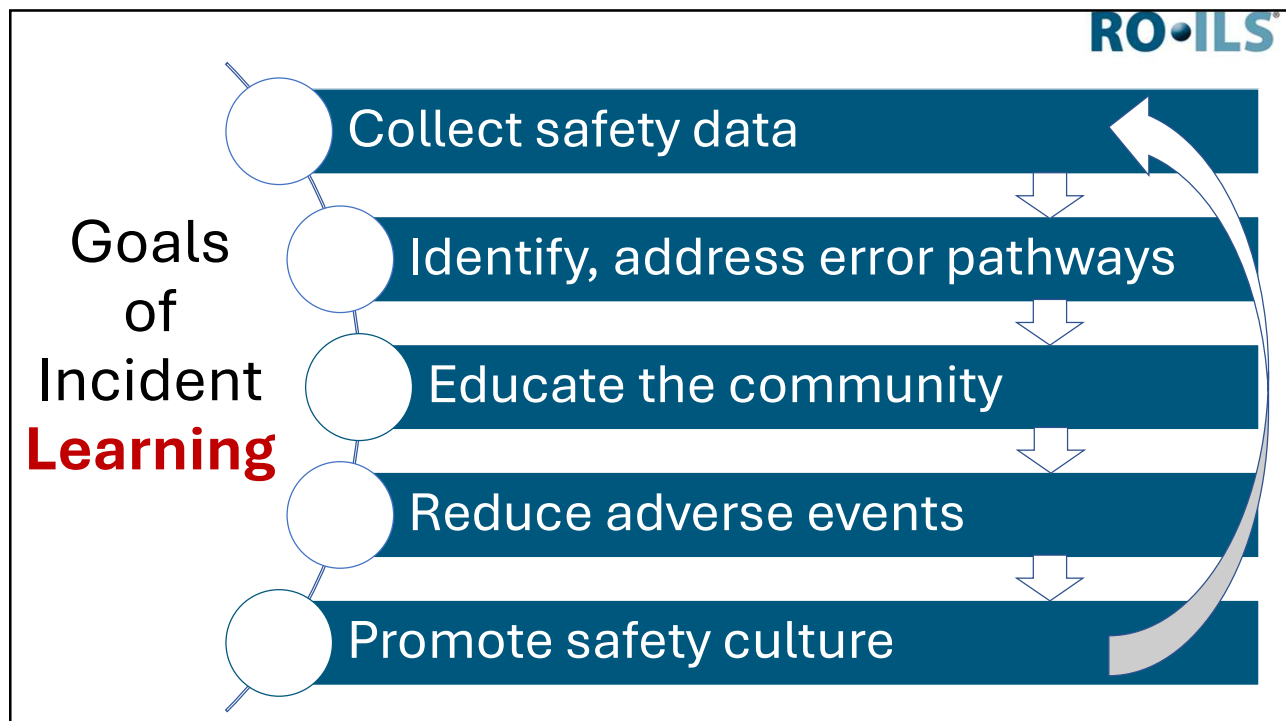
Outline

- RO-ILS Basics
 - Program Overview
 - Event Process
 - Analysis Tools
- RO-ILS Case Examples
 - SGRT
 - Online Adaptive
- Newer Technology Mitigation Strategies

Learner Objectives

1. Understand the nature and benefits of the RO-ILS system and how to leverage incident learning for practical improvements.
2. Appreciate new and unique error pathways that may be associated with newer technologies.
3. Identify error mitigation strategies with the use of new technologies.

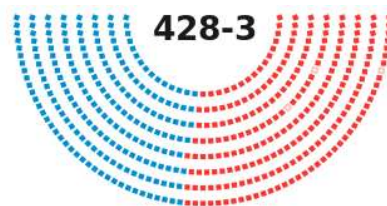
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Patient Safety Organization

- 2005 federal law created PSOs
- Data is confidential and privileged
- RO-ILS PSO vendor provides the associated services



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RADIATION ONCOLOGY
INCIDENT LEARNING SYSTEM

Sponsored by ASTRO and AAPM



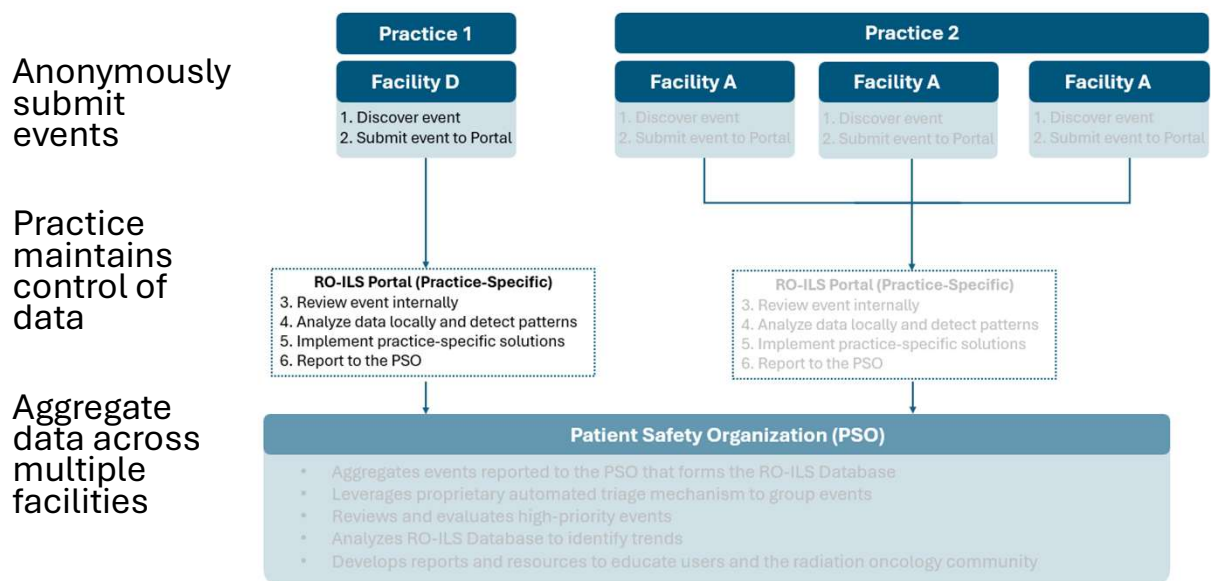
The mission of RO-ILS is to facilitate safer and higher quality care in radiation oncology by providing a mechanism for shared learning in a secure and non-punitive environment.

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Enrollment Process




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All events are worth submitting




Submission Optional Submission Recommended


Any deviation, discrepancy, or error is a learning opportunity

Increase in total submission 


Decrease in severity 


9


Review



Analysis



SUBMIT EVENT






Dashboard



Tasks


Messages


Admin


Library


Ask
question


Guides

RO-ILS Overview

- [Incident Learning Cycle](#)
- [General Event Workflow](#)
- [Submitting an Event](#)
- [Submitter Video](#)

RO-ILS Announcements

September 17th Patient Safety Conversation Hour –
[Register](#) now to attend this free, virtual meeting on 9/17 at noon Eastern Time to discuss curated RO-ILS events in small groups and debrief with safety experts. All radiation oncology staff are encouraged to attend so please join us. It will be a great way to spend World Patient Safety Day!

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Submit Events

RADIATION ONCOLOGY
INCIDENT LEARNING CYCLE
Powered by RO-ILS and APM

HEALTHCARE SAFETYZONE
powered by CLARITY

[Mujumdaric Mujumdaric](#) [Logout](#)

Review

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EVENT

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- [Reviewer Video](#)

RO-ILS Program Information

[NEW](#) PSO Training Videos (101a and 101b)

- [Reviewer Request Form](#)
- ["Great Catch!" Program](#)
- [Reviewer Dashboard](#)

RO-ILS Announcements

RO-ILS In-person User Meeting at the AAPM Annual Meeting will be held on Tuesday, July 21 from 10:30-11:30 am. Save the date. Registration Information coming soon.

2026 Educational Topics – Provide [input](#) for future RO-ILS education and user events.

RO-ILS Subscription Model is now in effect for 2026. If you have any questions about invoices or need more information, please email roaqa@ro-ils.com.

RO-ILS Reports and Education

- [NEW](#) Case Study 22: Multiple Lesions, One Dilemma
- [Case Study 21: Confounding Complexity](#)
- [Themed Report: Specialized Treatment Techniques](#)

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Portal tools: Dashboard

Mujumdaric Mujumdaric

Logout

Submit Event

Home

My Review

Tasks

Dashboard

Messages

Analysis

Administration

Refresh Data

The most recent 1 Years by Month

Dashboard 1: Events Entered Per Practice based on Submitted Date

The most recent 3 Months by Week

Dashboard 2: Events Entered Per Facility based on Submitted Date

The most recent 1 Years

Dashboard 3: Event Classification of All Entered Events

The most recent 1 Years

Dashboard 4: PSO Submission of All Entered Events

The most recent 1 Years

Dashboard 5: Significance Scale of All Reviewed Events

The most recent 1 Years

Dashboard 6: Dose Deviation of Therapeutic Incidents

Print
Export To Excel

7 Record(s) Found

EventNumber	102 Location_Sub	104 Classification	105 Narrative
41459	General 1	Therapeutic Radiation Incident	Test
42105	General 2	Therapeutic Radiation Incident	Test
42426	General 2	Near-miss	Test
42429	General 1	Operational/Process Improvement	Task
42472	General 1	Therapeutic Radiation Incident	Test
47446	General 1	Operational/Process Improvement	Test
48531	General 2	Other Safety Incident	Test

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Portal tools: Analysis wizard

Run reports and trend events

Create convenient templates

Schedule and export reports

Built-in graphing capacities

Form Name: Event Form Reset Search Criteria

40 Record(s) Found Page Size: 100

Event Number	10X Date_Time_Submitted	104 Classification	102 Location_Sub	233 Problem_Type	225 Significance_Scale
34172	5/26/2020 11:19:59 AM	Near-miss	General 1		
34147	5/22/2020 3:20:01 PM	Therapeutic Radiation Incident	General 1	Wrong side (laterality)	Mild
34146	5/22/2020 3:19:39 PM	Unsafe condition	General 2	Wrong anatomical site (excluding laterality)	Mild
34145	5/22/2020 3:19:14 PM	Unsafe condition	General 1	Treatment not delivered; personnel/hardware/software failure	Moderate
34144	5/22/2020 3:18:54 PM	Operational/Process Improvement	General 1	Treatment not delivered; personnel/hardware/software failure	Moderate
34143	5/22/2020 3:17:49 PM	Near-miss	General 2	Systematic hardware/software (including dose-volume) error	Mild
34142	5/22/2020 3:17:25 PM	Unsafe condition	General 1	Treatment not delivered; personnel/hardware/software failure	Mild
34141	5/22/2020 3:17:04 PM	Near-miss	General 1	Inappropriate or poorly informed decision to treat or plan	Moderate
34140	5/22/2020 3:16:32 PM	Other Safety Incident	General 2	Excess imaging	Mild
34139	5/22/2020 3:15:45 PM	Other Safety Incident	General 2	Radiation therapy scheduling error	Severe

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Analyze Events

Kujundzic Kujundzic Logout

Review

Analysis

SUBMIT EVENT

Dashboard

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Call for applications coming this fall

RO-HAC: Radiation Oncology Healthcare Advisory Council






Patient Safety Organization (PSO)

- Aggregates events reported to the PSO that forms the RO-ILS Database
- Leverages proprietary automated triage mechanism to group events
- Reviews and evaluates high-priority events
- Analyzes RO-ILS Database to identify trends
- Develops reports and resources to educate users and the radiation oncology community


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RO-ILS Education

- Conversation Hours
- Case Studies
- Themed Reports
- Great Catches
- Aggregate Data Reports
- Safety Notice
- More!



Access RO-ILS public education!
www.astro.org/roilsreports



RADIATION ONCOLOGY INCIDENT LEARNING SYSTEM
Sponsored by ASTRO and AAPM A Patient Safety Organization

RO-ILS 2025 Dosimetry Great Catch

At the heart of incident learning is improving the safety and quality of patient care. While much time is put into dissecting and analyzing the most severe errors, those rarely occur. The most frequent events entered into most incident learning systems, including RO-ILS, are caught before reaching the patient. Practices which thoughtfully report and use events of lower severity for learning opportunities demonstrate a strong safety culture while leveraging incident learning to its full potential.

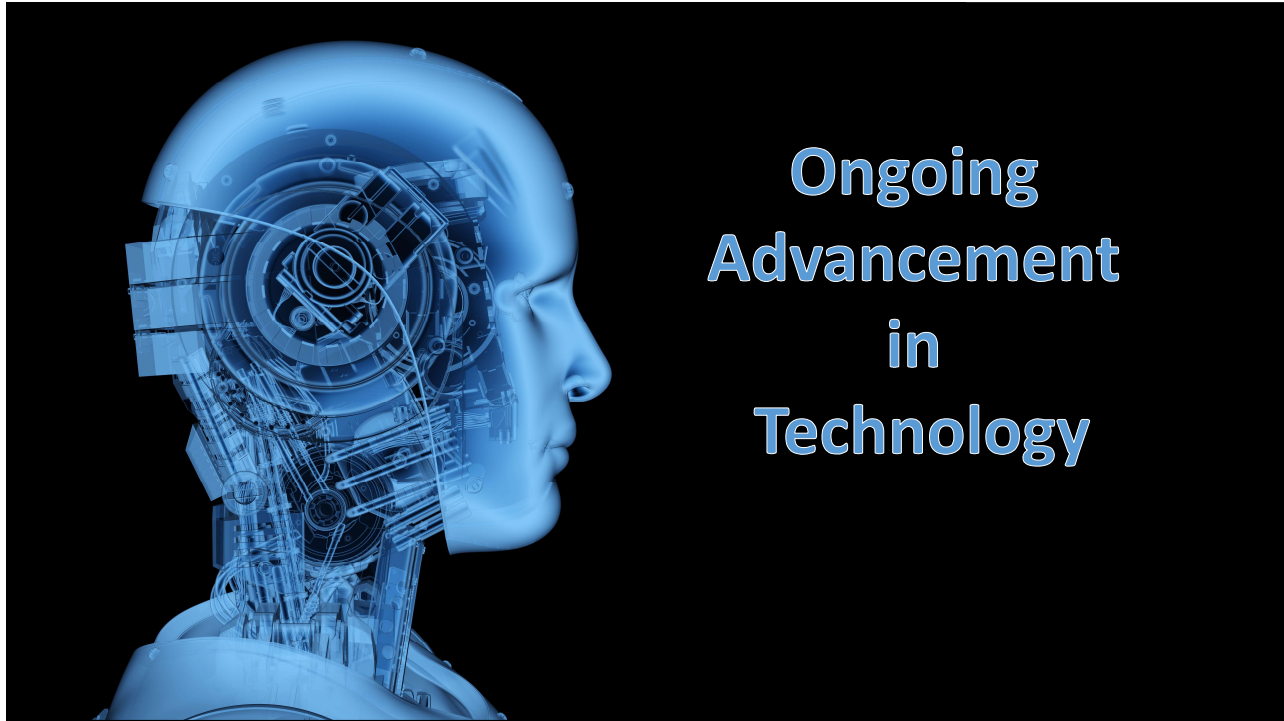
In the following RO-ILS event, a covering dosimetrist helped improve a patient's treatment:

- The planning dosimetrist was out of town and a covering dosimetrist was asked to print a patient's plan in their absence.
- When preparing to print, the covering dosimetrist noticed an area of the target was underdosed.
- Not understanding the need for the underdose, the dosimetrist approached the radiation oncologist for more information.
- After the physician reviewed, they agreed that the target could be better covered without impacting organ at risk tolerances.
- The covering dosimetrist contacted the planning dosimetrist; together, they determined that simply adjusting the normalization of the plan improved the target coverage.
- The planning dosimetrist stated that planning had been rushed, and this contributed to a less-than-ideal plan being pushed to the physician for review.

SAFETY CHECK

- Does your facility have ways to slow the process down so that each member can perform their task safely? How is staff workload managed prior to planned time off to minimize rushing?
- Do staff feel comfortable asking the radiation oncologist(s) questions about target coverage and trade-offs that may be needed during the course of planning? Does the facility's safety culture allow for and encourage this discussion?
- What is your facility's process for reviewing plan target coverage, DVH metrics, and slice-by-slice dose distribution? Is adjusting normalization so that coverage is optimized performed? Does your facility leverage dosimetrist-to-dosimetrist peer review?

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Ongoing Advancement in Technology

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Balancing Innovation with Patient Safety

Celebrate New Technology Benefits

- **Improve treatment accuracy**
 - SGRT enables real-time patient monitoring and motion management
 - Online ART allows daily plan adjustments to account for anatomical changes
- **Reduce effort/time**
- **Reduced human error**
- Potential to **catch errors** through built-in verification tools

Reliability Level	Measure	Effectiveness & Implementation
High Leverage	Forcing functions	Most Effective Hardest to Implement
	Barriers and fail-safes	
	Automation and computerization	
Medium Leverage	Standardization and protocols	
	Redundancies	
	Warnings, alerts, reminders, checklists	
Low Leverage	Rules and policies	Least Effective Easiest to Implement
	Educational programs	
	Available information	
	Suggestions to "be more careful"	

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Balancing Innovation with Patient Safety

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Manage Possible Safety Concerns

- **New error pathways** unique to each technology that may not be anticipated
- **Over-reliance** on technology at the expense of fundamental safety practices
- **Staff training gaps** when deploying too quickly without adequate preparation and experience
- **Added complexity** in workflows may not always make practices safer
- **Technology limitations** and software quirks that may introduce unforeseen issues

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Surface Guided Radiation Therapy

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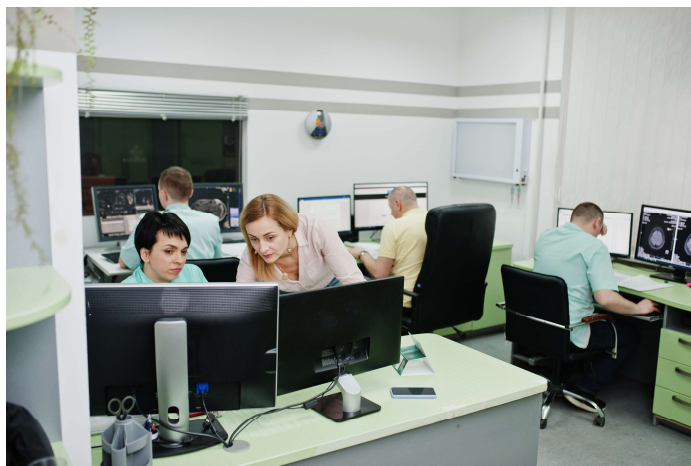
Case 1: Body Contour Bolus with Density

- A patient with breast cancer was being planned for VMAT.
- Dosimetrist was testing a new method to create flash.
- Dosimetrist incorporated an 8mm bolus structure in the body contour and assigned it a density during planning.
- Bolus structures will not allow SGRT to recognize the surface contour and dosimetrist did not remove structures prior to tx.
- The error was caught by automated plan check reviewing for HU overrides.

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Case 1: Take Home Lessons

- Review new procedures
- Peer review
- Documentation

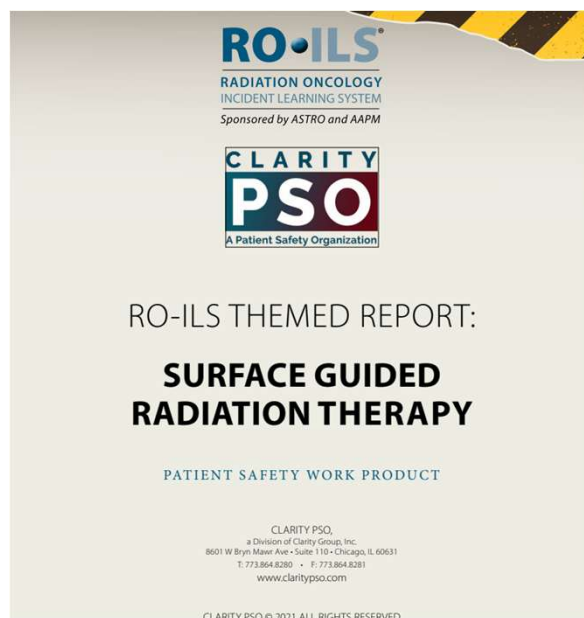


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Case 2: Historical SGRT Used

- Patient with prior radiation therapy returned for tx.
- Therapist set up the patient for treatment and used SGRT.
- The patient was 8 cm off after the first CBCT.
- Therapist discovered that surface imaging used for alignment was from prior tx.

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Incomplete Plan Transfer

- A patient with breast cancer was to be treated with 4-fields.
- Dosimetrist only sent the tangent plan.
- Error not caught at SGRT setup field import but during patient setup.
- Correcting error took significant time resulting in delayed tx.

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Case 2: Take Home Lessons

- Identify new error pathways, especially with increase in re-treatments
- Implement process to archive prior plans
- Review of data transfer processes
 - Confirm all plans/isocenters are transferred
 - Confirm historical surfaces are not accidentally attached to current treatment plans
- Highlight the importance of robust pre-treatment QA

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Adaptive Radiation Therapy

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Case 3: Stray ITV Contour

- Patient with lung cancer was planned for online adaptive MRgRT SBRT tx; prescription 10 Gy x 5 fxs for 50 Gy.
- During fx 2 adaptation, there was a stray ITV contour which resulted in 10 Gy being delivered to lung outside the PTV.
- Error coincidentally noticed during post-tx review after fx 4.
- Contributing factors included rushing given time pressures inherent to ART.

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Case 4: Incorrect Reference Plan Used

- Patient with prostate cancer was planned for online adaptive MRgRT SBRT tx.
- Per the tx directives, the therapists manually switch to the correct reference plan for each treatment – step verified by physicist.
- The wrong reference plan was used for 1 fx.
- Two reference plans had a small difference in electronic density value assigned to the external contour.

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Case 3 and 4: Take Home Lessons

- Review fundamentals
- Redundant checks needed especially for manual processes
- If possible, disable reference plans or suggest improvement to vendors, if not currently feasible



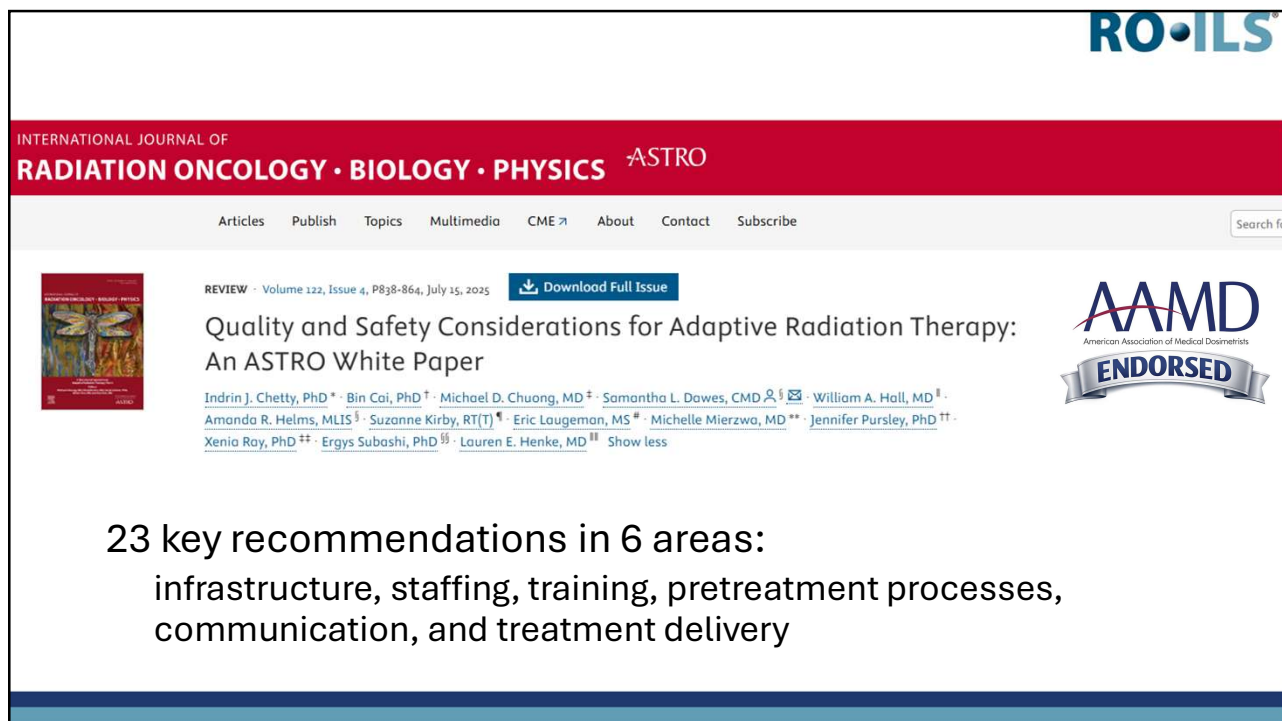
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Case 5: Cropped Body Contour

- Patient was being treated with online ART using a lateralized isocenter.
- The CBCT cropped the body contour and this was used for planning.
- The error was not discovered until after all 3 txs were completed, resulting in underdosing to the target.

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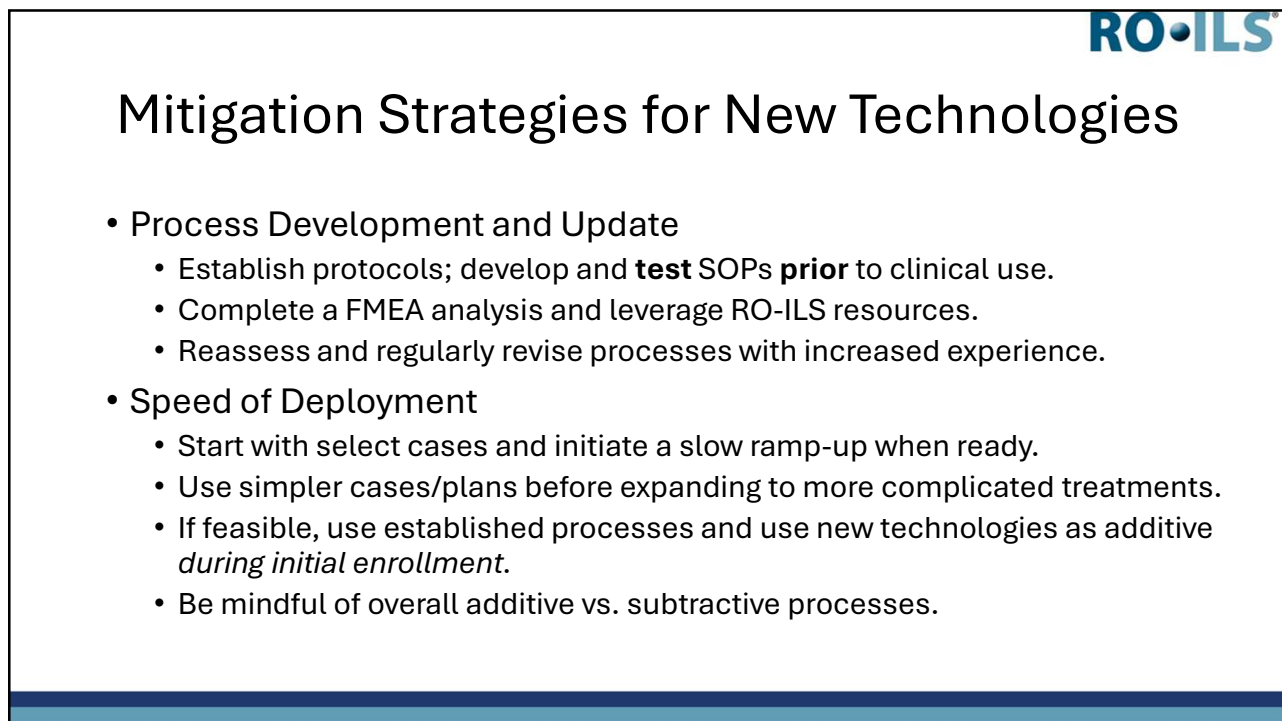
**Quality and Safety Considerations for Adaptive Radiation Therapy:
 An ASTRO White Paper**

[Indrin J. Chetty, PhD*](#) · [Bin Cai, PhD†](#) · [Michael D. Chuong, MD‡](#) · [Samantha L. Dawes, CMD§](#) · [William A. Hall, MD¶](#) ·
[Amanda R. Helms, MLIS§](#) · [Suzanne Kirby, RT\(T\)*](#) · [Eric Laugeman, MS#](#) · [Michelle Mierzwa, MD**](#) · [Jennifer Pursley, PhD††](#) ·
[Xenia Ray, PhD‡‡](#) · [Ergys Subashi, PhD§§](#) · [Lauren E. Henke, MD||](#) [Show less](#)

AAMD
 American Association of Medical Dosimetrists
ENDORSED

23 key recommendations in 6 areas:
 infrastructure, staffing, training, pretreatment processes,
 communication, and treatment delivery

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Mitigation Strategies for New Technologies

- Process Development and Update
 - Establish protocols; develop and **test** SOPs **prior** to clinical use.
 - Complete a FMEA analysis and leverage RO-ILS resources.
 - Reassess and regularly revise processes with increased experience.
- Speed of Deployment
 - Start with select cases and initiate a slow ramp-up when ready.
 - Use simpler cases/plans before expanding to more complicated treatments.
 - If feasible, use established processes and use new technologies as additive *during initial enrollment*.
 - Be mindful of overall additive vs. subtractive processes.

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Mitigation Strategies for New Technologies

- Staff Training and Comfort
 - Consider initially training a smaller, specialized group of staff before expanding to a broader cohort of staff.
 - Advocate for lead staff to attend external trainings.
- Safety Fundamentals
 - Staff need to trust their instinct if something doesn't feel right.
 - Staff need to be empowered to "stop the line" whether to question a colleague or equipment.
 - Technology is not a substitute for fundamentals like peer review and timeouts.

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RO•ILS[®] Supports Continuous Quality Improvement



<https://6sigma.us>

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Leverage RO-ILS for Sustained QI

- **Instill a positive safety culture**
- **Discover Events**
 - Being aware
 - Voicing concerns
 - Stopping the line
- **Report Events**
 - Normalizing event reporting
- **Investigate/analyze data**
 - Serving as a RO-ILS Reviewer
 - Tracking error trends
 - Participating in local Quality and Safety committee/meetings
- **Develop/implement solutions**
 - Identifying mitigation strategies
 - Getting staff buy-in and track effects

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Become a
**CHAMPION
OF SAFETY!**

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