Advancements in Patient Safety and Quality Improvement Training

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*Washington University in St. Louis*

Disclosures

- ACR Innovation Grant
- Quality and Safety Editor for RadOncQuestions.com
On Q&S Education

- Q&S Education in Practice (or lack there of?)
- Recent Advancements in Q&S Education
- Future Directions
- Some brilliant point that is made all the better by this beautiful new slide format
On Q&S Education

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Q&S in Practice

Quality and Safety is Important...

...and research and society guidance reflect this fact.

Safety in Medicine/Radiation Oncology

- IOM Crossing the Quality Chasm 1996
- ASTRO/AAPM Safety is No Accident 2012
- 2008 BIR Towards Safer Radiotherapy
- 2019 ASTRO/AAPM Safety is No Accident Update
Safety is No Accident 2019

- Update to 2012 publication to reflected Q&S advances and new technology
- Covers process and staffing
- Specific sections on safety and quality management

“... all clinical staff should be empowered to play an active role in the culture of safety program.”

Q&S in Practice

Clinical Q&S needs interdisciplinary leadership...
Q&S in Practice

...therefore, all must be equipped to contribute to positive Q&S culture in their clinic.

Are the residents equipped?

A survey of residents’ experience with patient safety and quality improvement concepts in radiation oncology

Matthew B. Spraker MD, PhD*, Matthew Nyflot PhD, Kristi Hendrickson PhD, Eric Ford PhD, Gabrielle Kane MB, EdD, FRCPC, Jing Zeng MD
Resident Opinions of Q&S Ed

- Surveyed about 950 US and Canadian MD and Physics Residents; ~25% response rate
- Large and small programs sizes
- ~50/50 "early" versus "late" residents

<table>
<thead>
<tr>
<th>Incident Learning Systems</th>
<th>Physics</th>
<th>Medical</th>
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<td>No exposure</td>
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<th>Root Cause Analysis</th>
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<th>Failure Modes and Effects Analysis</th>
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Have you been exposed?

- p<0.01
- p=0.03
- p<0.001
Are you competent?

This is scary data.

ILS to the rescue?

My Q&S training is adequate.
Don’t blame the program directors

Some of the most specific Q&S bits from ACGE...

Programs must provide formal educational activities that promote patient safety-related goals, tools, and techniques. (Core)

engagement in quality improvement and patient safety; (Core)

working in interprofessional teams to enhance patient safety and improve patient care quality; (Core)

ACGME Program Requirements for Radiation Oncology, 2019

CAMPEP Program Requirements

• Specific mention of QA processes/procedures

• Some specific mention of Q&S techniques
  
  o Failure mode effects analysis (FMEA) principles/applications
  o Root cause analysis (RCA) principles/applications

• No mention of event reporting (ILS), leadership, or maintaining safety culture
Radiation oncology resident training in patient safety and quality improvement: a national survey of residency program directors

Matthew B. Spraker, Matthew J. Nyfot, Kristi R. G. Hendrickson, Stephanie Terezakis, Shannon E. Fogh, Gabrielle M. Kane, Eric C. Ford and Jing Zeng
Program Director Opinions of Q&S Ed

- Surveyed ~170 program directors; ~30% response rate
- Accredited medical physics (MP) and RO programs in US and Canada
- Large and small programs

PDs think safety is important.
AAMD 44th Annual Meeting  
June 16 – 20, 2019

**A**  
**On Adequacy of Safety/QI Training**  
% of faculty or residents agreeing that patient safety and QI training is adequate

**B**  
**On Exposure to Safety/QI Activities**  
% of faculty agreeing residents are well exposed and % of residents reporting formal exposure to ILS, RCA, and FMEA

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**What are programs doing?**

**And how are they doing it?**

Resources Used In Creating/Improving Program
The Problem According to PDs

Barriers Faced in Creating a Patient Safety/QI Training Experience

Challenges to Address

- Lack of Educational Content
  - Lack of expertise
  - Lack of time

- Implementing Experiential Learning
  - Lack of resources
Take home

• Everyone thinks Q&S is important.

• Residents get a mixed Q&S education experience

• A need for PD support in developing/improving Q&S education

Q&S education, so hot right now...
On Q&S Education

• Q&S Education in Practice (or lack there of?)

• Recent Advancements in Q&S Education

• Future Directions

Answering the Call

• Curriculums for RO and MP

• Society Efforts

• Online Q&S Course
A Q&S Curriculum for RO Residents

Development of a Quality and Safety Competency Curriculum for Radiation Oncology Residency: An International Delphi Study

Jenna Adleman, MD, MSc,* Caitlin Gillan, MRT(T), BSc, MEd, FCAMRT,⁎,†
Amanda Caissie, MD, PhD, FRCP©,†,‡
Carol-Anne Davis, RT(T), AC(T), MSc, FCAMRT,†,¶
Brian Liszewski, MRT(T), BSc,⁎ Andrea McNiven, PhD, MCCPM,⁎,†
and Meredith Giuliani, MBBS, MEd, FRCP©,†

Gives specificity to Q&S curriculum for RO

A Q&S Curriculum for RO Residents

• International Delphi study including RO, MP, and RTT participants

• Candidate Q&S competency items assessed

• Final competency list published

Gives specificity to Q&S curriculum for RO
A Q&S Curriculum for RO Residents

- Key competencies include:

  - **Appreciation for the system**: abstract and applied (i.e. process maps)
  - **Standardization and benchmarking**
  - **Risk management**: abstract and applied (i.e. FMEA)
  - **Appreciation for variation**: abstract and applied (i.e. ILS reporting)
  - **Incident management**: abstract (i.e. breaking news) and applied (i.e. ILS reporting)
  - **Psychology and culture**: abstract and applied (i.e. surveying safety culture)

What about MP residents?

**A patient safety education program in a medical physics residency**

Eric C. Ford | Matthew Nyflot | Matthew B. Spraker | Gabrielle Kane | Kristi R. G. Hendrickson

Eric Ford
### Table 2  Sample rotation outline including reading assignments and related lectures.

<table>
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<th>Topic area &amp; associated references</th>
<th>Rotation project</th>
<th>Lecture</th>
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<tr>
<td></td>
<td></td>
<td>Example here: FMEA</td>
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<td>Week 1</td>
<td>Watershed accidents:34-36,39,42&lt;br&gt;Overview of QM chapter:37 (Ch 12)&lt;br&gt;Harm estimates:40&lt;br&gt;Studies linking quality and outcomes:36,43,44&lt;br&gt;FMEA TG100:47 (Ch 4)</td>
<td>FMEA process map</td>
<td>1: Overview lecture&lt;br&gt;2: Watershed accidents&lt;br&gt;3: FMEA</td>
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<td>Week 2</td>
<td>FMEA:7,45,46&lt;br&gt;Incident learning papers:24,48-51&lt;br&gt;Root-cause analysis:62&lt;br&gt;National incident learning system:25</td>
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"Experiential Learning"
• Safety is No Accident

• TG-100 Primer

• Safety Profile Assessment

• Working Group on RO-ILS Curriculum
  • Part 1: Didactic learning
  • Part 2: Entering ILS Reports
  • Completion Certificate

http://www.aapm.org/QualitySafety/

Experiential Learning!

IAEA **FREE** Q&S Web-based Training Course

**Safety and Quality in Radiotherapy**

*Safety and Quality in Radiotherapy* provides continuing safety and quality education to radiotherapy professionals. Participants improve their understanding of safety in radiotherapy, learn techniques to reduce and avoid radiotherapy incidents and understand the value and use of incident learning systems.
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https://www.iaea.org/resources/rpop/resources/online-training#2

Room For a Workshop?

A long, long time ago (~2013) in a galaxy far, far away (California)...

**BRIEF REPORT AND OPINION**

**A Report on Quality and Safety Education for Radiation Oncology Residents**

Shannon Fogh, MD,* and Todd Pawlicki, PhD†

*Department of Radiation Oncology, University of California San Francisco, San Francisco, California; and †Department of Radiation Medicine and Applied Sciences, University of California San Diego, La Jolla, California
Room For a Workshop?

• Joint UCSD and UCSF Patient Safety Workshop
• 18 medical and 5 physics residents
• Didactics: process maps, FMEA, RCA, ILS, M&M
• Designed as short lectures + group discussion; maximize engagement

"I have adequate education in quality improvement..."

22% 72%

What about in the clinic?

- Woodhouse et al., PRO, 2016
What about in the clinic?

![Graph showing Department AHRQ Patient Safety Grade](image)

**Program Implemented**

Impressive Results

![Image of Pumbaa and Timon](image)
Impressive Results

But is it scalable?

PD Challenges:
- Time
- Expertise
- Resources

On Q&S Education

- Q&S Education in Practice (or lack there of?)
- Recent Advancements in Q&S
- Future Directions
To Infinity and Beyond!

- Web-based learning increases access to expertise/resources
- Simulation-Based Medical Education is ideal
- Teaching to the Test (MCQ Banks)

Simulation-based Medical Education (SBME)

*Development of a Virtual Radiation Oncology Clinic for training and simulation of errors in the radiation oncology workflow*

Twyla R. Willoughby, PhD a,*, Sanford L. Meeks, PhD a, Patrick Kelly, MD a, Tomas Dvorak, MD b, Keith Muller, PhD b, Thomas M. Dana, PhD c, Frank Bova, PhD d
Simulation-Based Medical Education (SBME)

- Virtual RO Center created with Aria and Eclipse
- Tools for education on error mitigation, error severity, RCA
- Simulated Case
  - Consultation
  - Contouring
  - Treatment Planning
  - Treatment Verification

Barriers to implementation?

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Required data for virtual patient</th>
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<tbody>
<tr>
<td>Type of files</td>
<td>Data required</td>
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<tr>
<td>Documents</td>
<td>Pathology</td>
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<tr>
<td></td>
<td>Consultation</td>
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<tr>
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<td>Procedure notes</td>
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<tr>
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<td>Diagnostic radiology reports</td>
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<tr>
<td>Patient DICOM information</td>
<td>Treatment planning CT</td>
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<tr>
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<td>Other images (PET and/or MRI)</td>
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<td>RT plan from clinical case</td>
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<td></td>
<td>RT structure from clinical case</td>
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<tr>
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<td>Copy of CBCT images from clinical case</td>
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<tr>
<td>Patient archives from Eclipse:</td>
<td>Patient archive: Clean with only normal tissue contours; no plans</td>
</tr>
<tr>
<td></td>
<td>Patient archive: Multiple treatment plans and expert contours</td>
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<tr>
<td></td>
<td>Patient archive: Baseline; expert contours and plan</td>
</tr>
<tr>
<td>Created template files from Eclipse</td>
<td>DRRs representing portal images for all treatment beams</td>
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<tr>
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<td>DRRs representing AP and lateral kV images</td>
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<td>RT treatments from manual recorded treatments for “expert” treatment file</td>
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AP, anteroposterior; CBCT, cone beam computed tomography; DICOM, Digital Imaging and Communications in Medicine; DRR, digitally reconstructed radiography; MRI, magnetic resonance imaging; PET, positron emission tomography; RT, radiation therapy.
“Serious Games” for Q&S Education

• ACR Innovation Grant to develop a web-based Q&S game

Collaboration

Q&S Programs
Educational Programs

• Story has two 30-minute “episodes” with discrete learning objectives

• Case: 37 year old female getting 20 Gy in 5 fractions to T8 vertebral body, mistreatment on fraction 4
Pilot Study (Early 2020)

Plans to test the "Serious Game" among RO and MP residents

Concluding thoughts/discussion

What is the role of dosimetry in Q&S education?
- Q&S Education Leaders
- Teach RO/MP dosimetry process
- Important stewards for safe and efficient radiotherapy treatment

Patty Sponseller (UW): ACR "Serious Game” Case Writer, Departmental Q&S Leadership

Andrew Lindsey (WUSTL): Departmental Q&S Leadership, Workflow Design Team
Concluding thoughts/discussion

What is the dosimetrists role?

Examples of Safety Related Roles of Dosimetrist

| Dosimetrist | • Perform treatment planning | • Changing modalities involved in image cataloging/manipulation (e.g., PET/MRI fusion/registration/segmentation) | • Adequate instruction in anatomy
|            | • Assist physicist in IMRT/IGRT equipment QA | • Proper utilization of emerging imaging/segmentation tools | • Communication
|            | • Evolution in planning (e.g., knowledge-based planning, particle therapy planning, biological modeling) |
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