Quality and safety analytics as a pathway to evidence-based therapy practice

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UW Medicine

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Disclosures

- AHRQ R18 HS022204-01
- NCI UG3 CA211310-01

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Adherence to best practices

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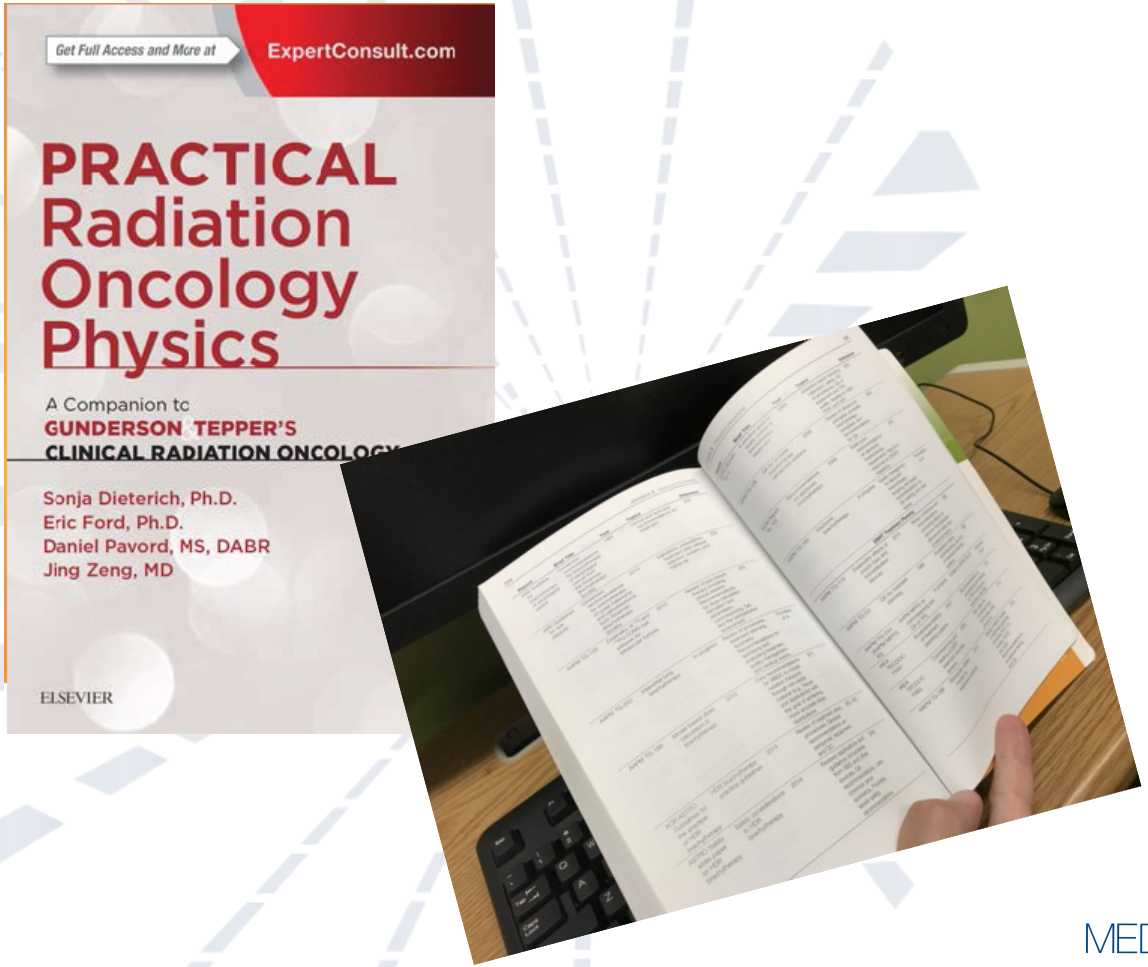
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Sonja Dieterich, Ph.D.
Eric Ford, Ph.D.
Daniel Pavord, MS, DABR
Jing Zeng, MD
ELSEVIER

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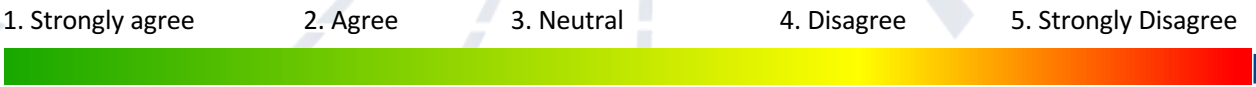
Examples : Good adherence

Performance Indicator	Mean Score
Dosimetry equipment is calibrated every two years by an accredited dosimetry calibration laboratory.	1.03
Pre-treatment patient-specific dose verification is performed for IMRT QA	1.06



Practical Radiation Oncology (2015) 5, e423-e429

practical radiation oncology
pro
www.practicalradonc.org

Original Report

Patterns of practice for safety-critical processes in radiation oncology in the United States from the AAPM safety profile assessment survey

Eric C. Ford PhD [a,*], Derek Brown PhD [b], Holly Donaldson MPH [c], Anne Greener PhD [d], Michael O'Neill MD [e], Steven Sutlief PhD [b], Michael Woodward [f], Ellen Yorke PhD [g], Peter Dunscombe PhD [h]

Infinity B (RM1) - Static 5 Channel

Data Download

No New Data Available

Last Download:

Thursday, July 27, 2017 6:52:19 PM

Energy Select

Photons | Electrons

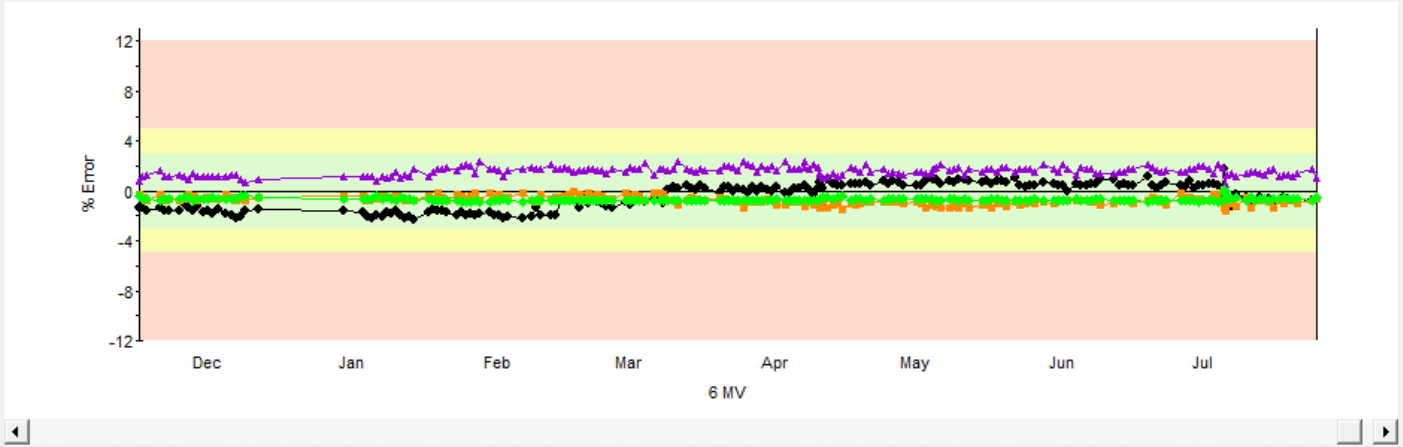
6 MV

Baseline Parameters

Gantry Angle (°):	0	Dose (MU):	100
Field Size (x,y) (cm):	20, 20	Dose Rate (MU/min):	600
SSD (cm):	100	Expected Output (%):	100.0
Baseline Date:	5/25/2016		

Chart View | Table View

Begin Date: 16-Nov-16 End Date: 25- Jul -17



Print | Constancy | Axial Symmetry | Transverse Symmetry | Flatness | Export

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What is Medical Physics 3.0?

Redefining and Reinvigorating the Role of Physics in Modern Medicine

QA circa 2017

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ArcCHECK QA of Dose Distribution

QA File Parameter

Patient Name	:
Patient ID	:
Plan Date	: 3/14/2014
SSD	: 86.7cm
Depth	: 2.9cm (3.3cm H2O eq)
Energy	: 6 MV
Angle	: P2R_G182_178 SBRT_2%/2mm

Absolute Dose Comparison

% Diff	: 2.0
Distance (mm)	: 2.0
Threshold	: 10.0
Rotation Angle	: 0.0 Degs
Meas Uncertainty	: Yes
Dose Diff Thresh	: 0.0 cGy
Use VanDyk	: Yes

Summary (Gamma A

Total Points	: 392
Passed	: 387
Failed	: 5
% Passed	: 98.7

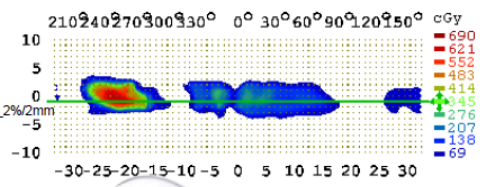
*DTA/Gamma is using 2D Mod

Dose Values in cGy

	CAX	Norm	Sel	Max
Set1		682.51	634.83	682.51
Set2	138.20	674.20	623.07	686.93

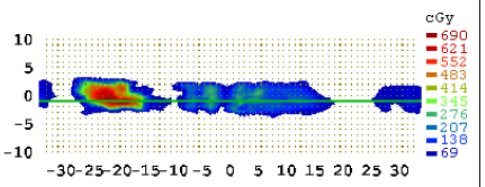
Reviewed By :

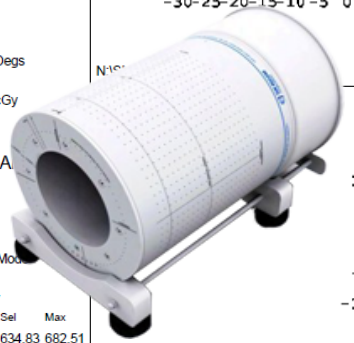
Set1

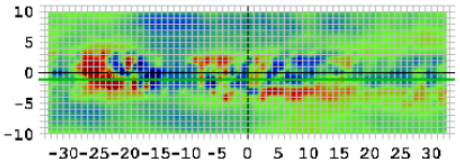


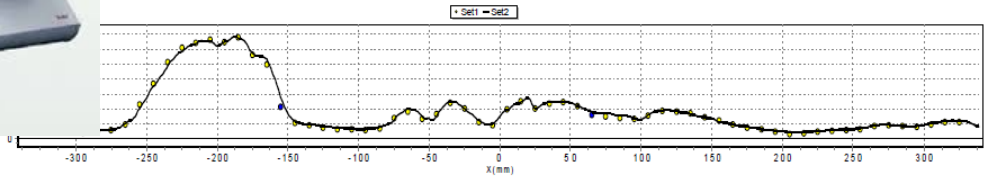
Set2

CAX Offset X=0 Y=-1









Gamma Index Summary

	Minimum	Maximum	Average	Stdv
Points Within Threshold	0.00	1.42	0.38	0.27
All Points	0.00	1.42	0.23	0.21

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Published in final edited form as:
Int J Radiat Oncol Biol Phys. 2014 December 1; 90(5): 1195–1201. doi:10.1016/j.ijrobp.2014.08.334.

Institutional patient-specific intensity-modulated radiation therapy quality assurance does not predict unacceptable plan delivery as measured by IROC Houston's head and neck phantom

Stephen F. Kry, PhD[1,2,*], **Andrea Molineu, MS**[1], **James Kerns, MS**[1,2], **Austin Faught**[1,2], **Jessie Y. Huang**[1,2], **Kiley Pulliam, MS**[1,2], **Jackie Tonigan, MS**[1,2], **Paola Alvarez, MS**[1], **Francesco Stingo, PhD**[2,3], and **David S. Followill, PhD**[1,2]

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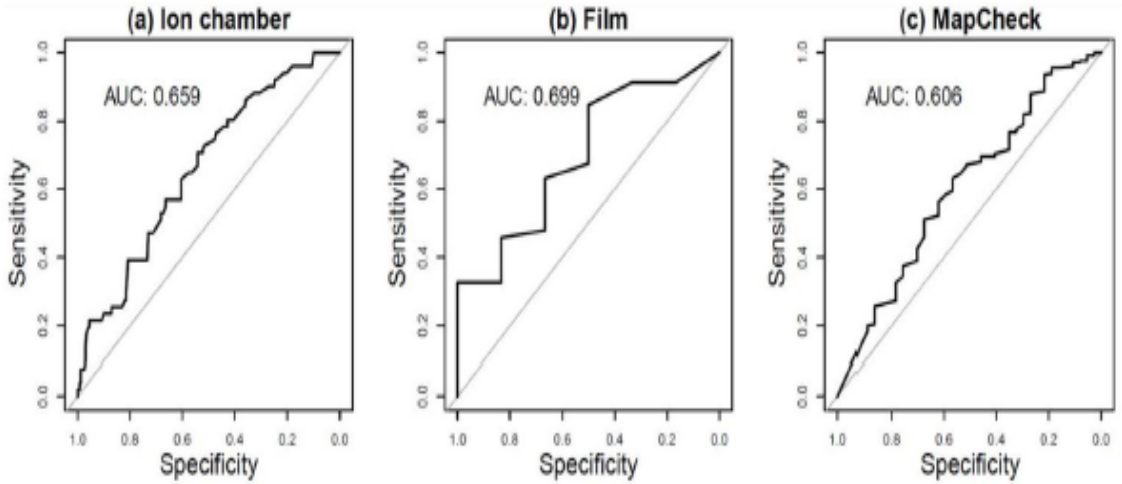

Figure 5.
ROC curves for the ion chamber (a), film (b), and MapCheck (c), devices, indicating the

Kry et al. IJROBP, 2014

2017 --->

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What is Medical Physics 3.0?

Redefining and Reinvigorating the Role of Physics in Modern Medicine

Quality & Safety Analytics
Practical Tools

Task	Test or Assessment
Routine QA	Sensitivity test
New services / systems	
Chart checks	
Plan review	
Error tracking	
Overall department	

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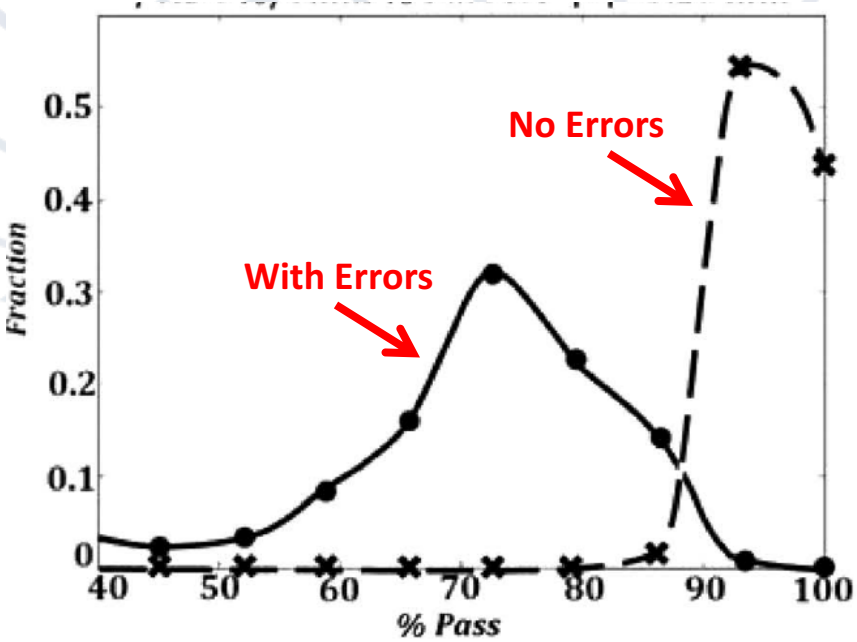
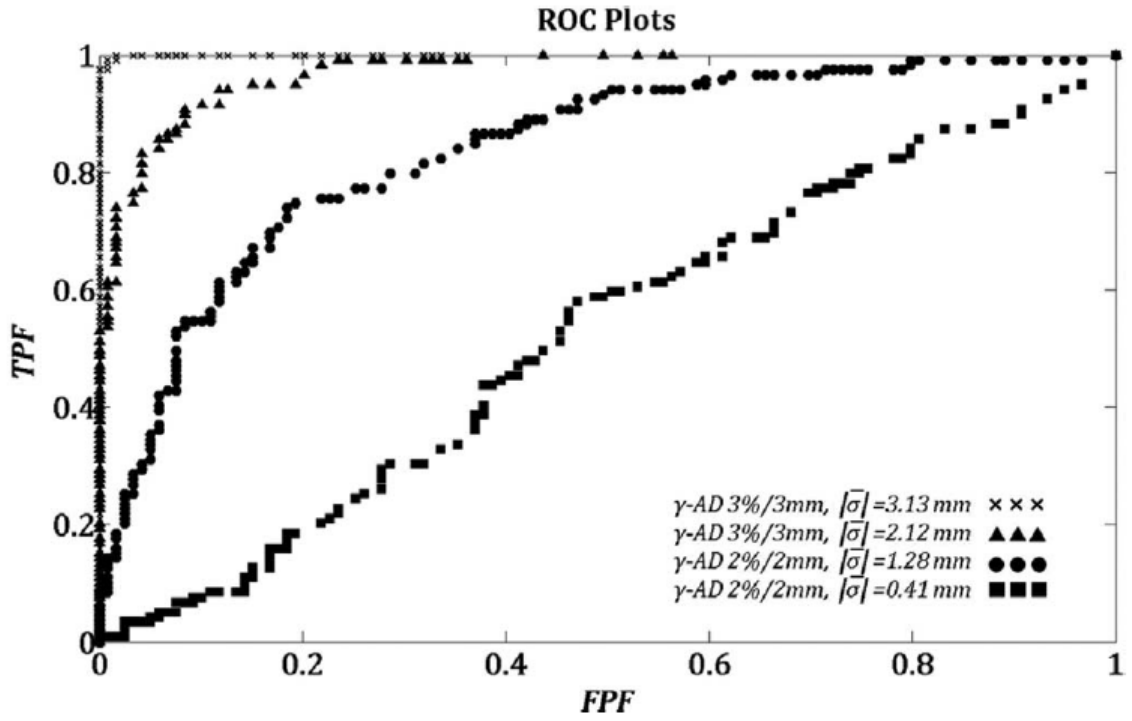


Carlone et al., Med Phys, 40, 042103 (2013)



Carlone et al., Med Phys, 40, 042103 (2013)

Quality & Safety Analytics
Practical Tools

Task	Test or Assessment
Routine QA	Sensitivity test
New services / systems	Risk assessment
Chart checks	
Plan review	
Error tracking	
Overall department	

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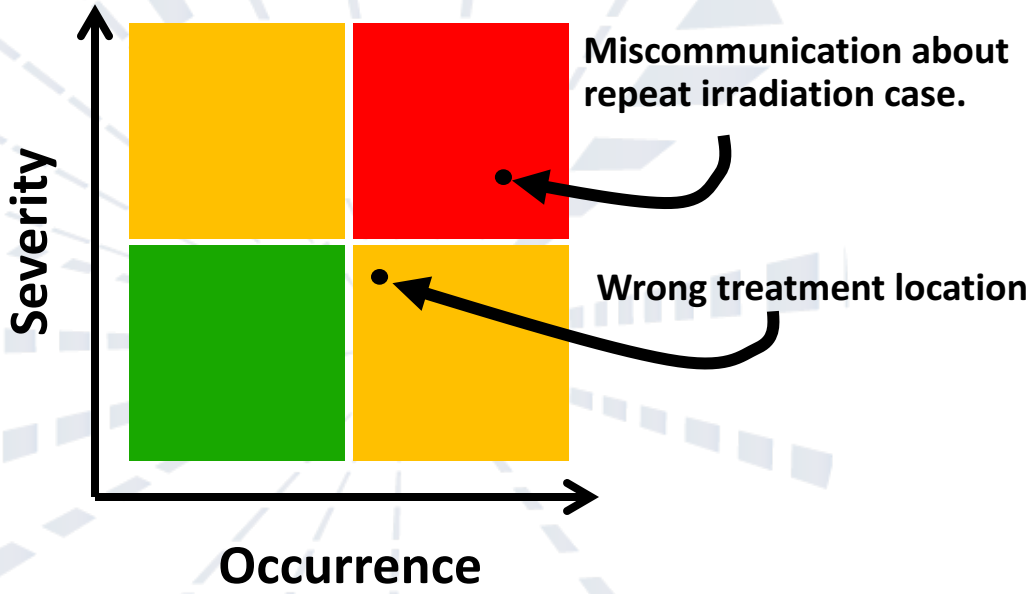
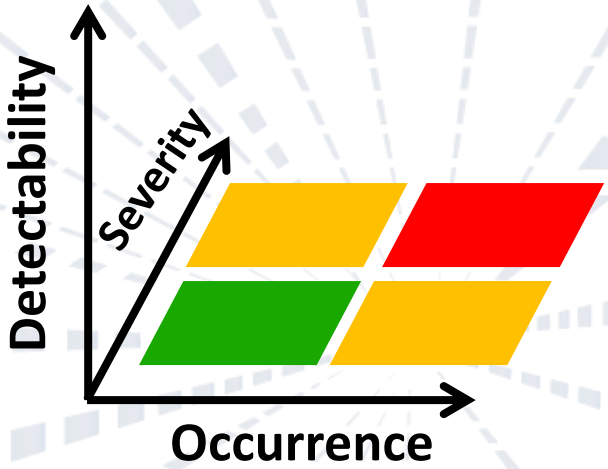
Risk Matrix


Miscommunication about repeat irradiation case.
Wrong treatment location
Severity
Occurrence

FMEA Risk Priority Number



Risk Priority Number, $RPN = S \times O \times D$

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AAPM
Task Group 100

The report of Task Group 100 of the AAPM: Application of risk analysis methods to radiation therapy quality management

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(Received 13 May 2015; revised 13 March 2016; accepted for publication 14 March 2016; published 15 June 2016)

+ 10 institutional series reports dating back to 2009

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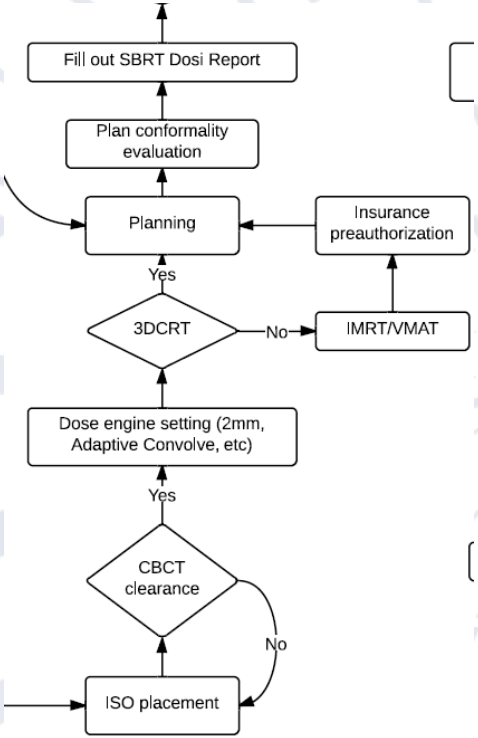
FMEA of New(ish) SBRT service



Yang et al. *Med Phys*, 42(6), 2777-2785, 2015

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FMEA of New(ish) SBRT service

Failure Mode	Severity	Occurrence	Detectability	RPN
Miscommunication about repeat treatment case	7	7	6	294
Wrong treatment location. Human error in identifying location in imaging system.	8	6	2	96

Yang et al. *Med Phys*, 42(6), 2777-2785, 2015

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Quality & Safety Analytics
Practical Tools

Task	Test or Assessment
Routine QA	Sensitivity test
New services / systems	Risk assessment
Chart checks	Performance metrics
Plan review	Plan quality metrics
Error tracking	
Overall department	

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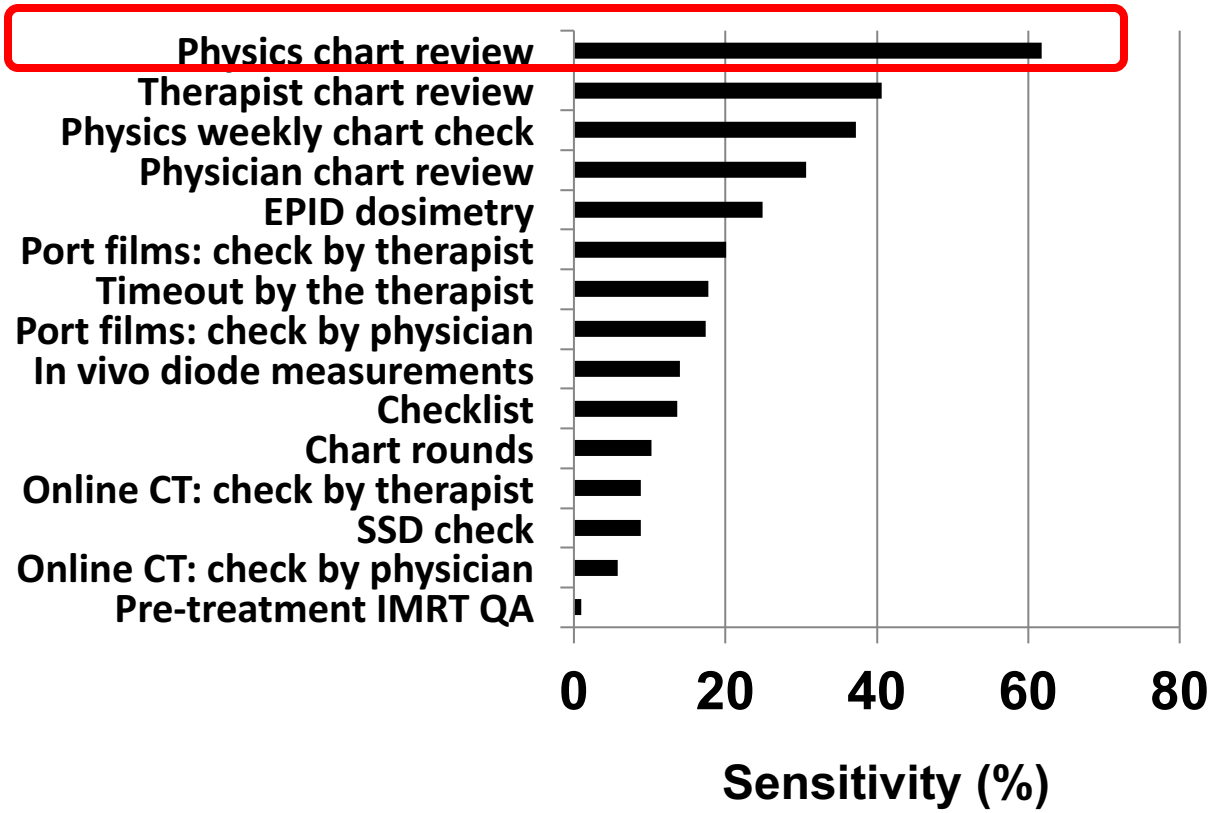
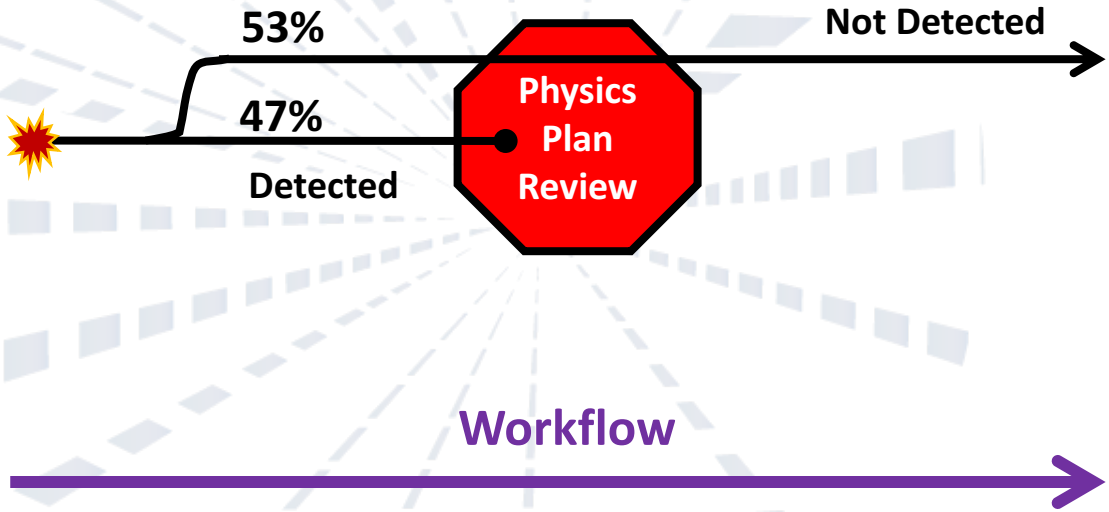


Ford et al. Int J Radiat Oncol Biol Phys, 84(3), e263-9 (2012)

Efficacy of Physics Plan Review



Gopan et al. Med Phys 2016

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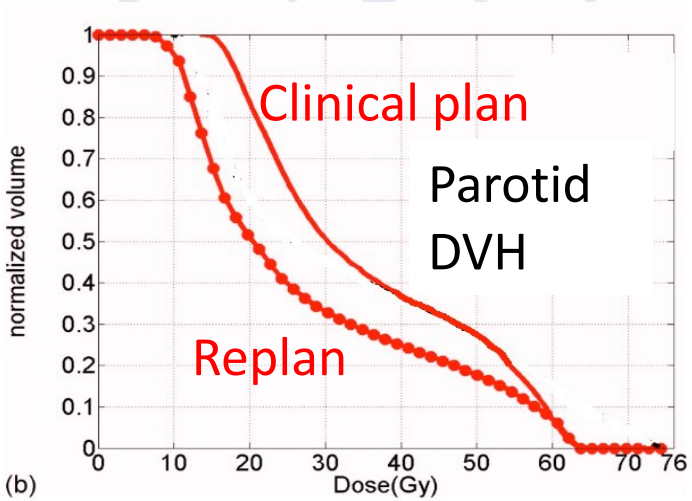
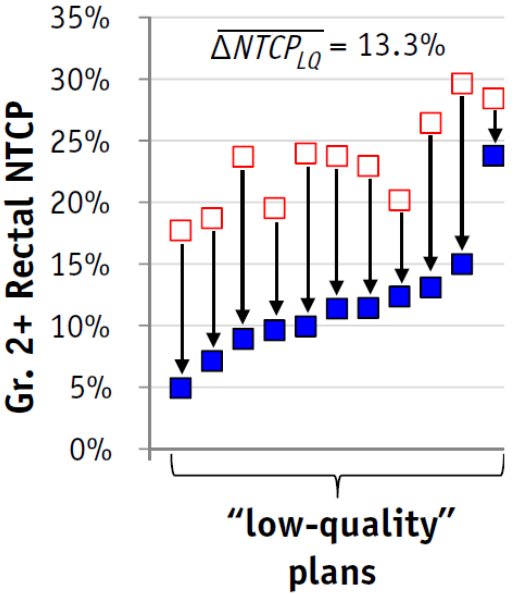
Plan Quality

H&N



Wu et al. Med Phys, 36, 5497 (2009)

Prostate



Moore et al. Int J Radiat Oncol Biol Phys, 92(2), 228-235 (2015)

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Quality & Safety Analytics
Practical Tools

Task	Test or Assessment
Routine QA	Sensitivity test
New services / systems	Risk assessment
Chart checks	Performance metrics
Plan review	Plan quality metrics
Error tracking	System stats
Overall department	Safety-profile, accreditation

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Examples : Less adherence

Performance Indicator	Mean Score
Potential risks associated with the introduction of new clinical systems and processes are assessed prior to implementation.	2.34
Physician peer review of new treatment plans occurs within the first week of treatment.	2.43
The Radiation Oncology Department formally reviews reports of near-misses.	2.59

1. Strongly agree 2. Agree 3. Neutral 4. Disagree 5. Strongly Disagree

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RO-ILS

RADIATION ONCOLOGY
INCIDENT LEARNING SYSTEM

Sponsored by ASTRO and AAPM

The RO-ILS mission 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.

Launched: June 2014

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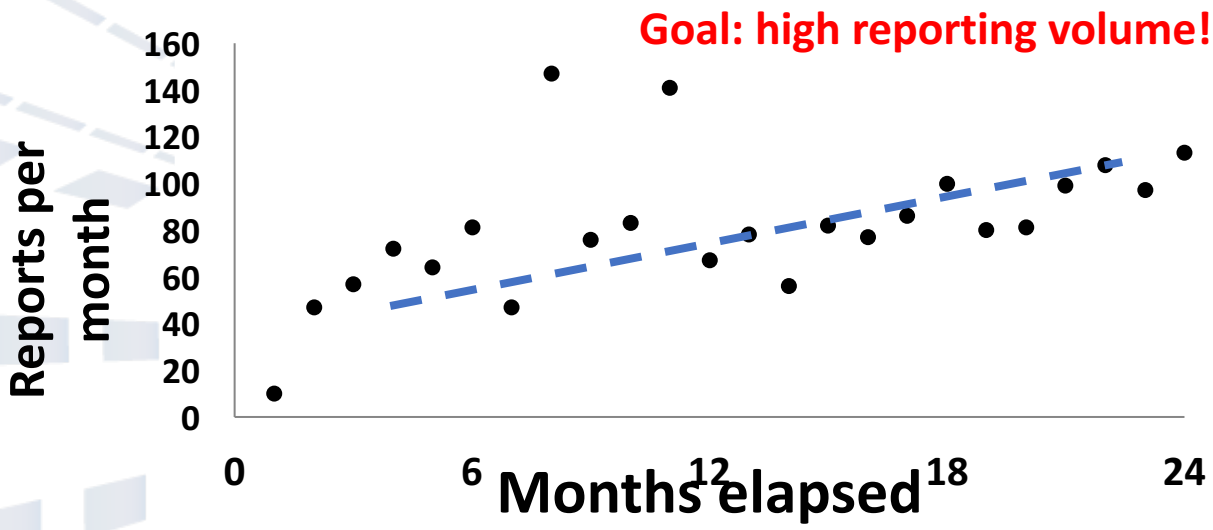
Measuring health of your ILS system



Nyflot et al. Prac Rad Onc 2015

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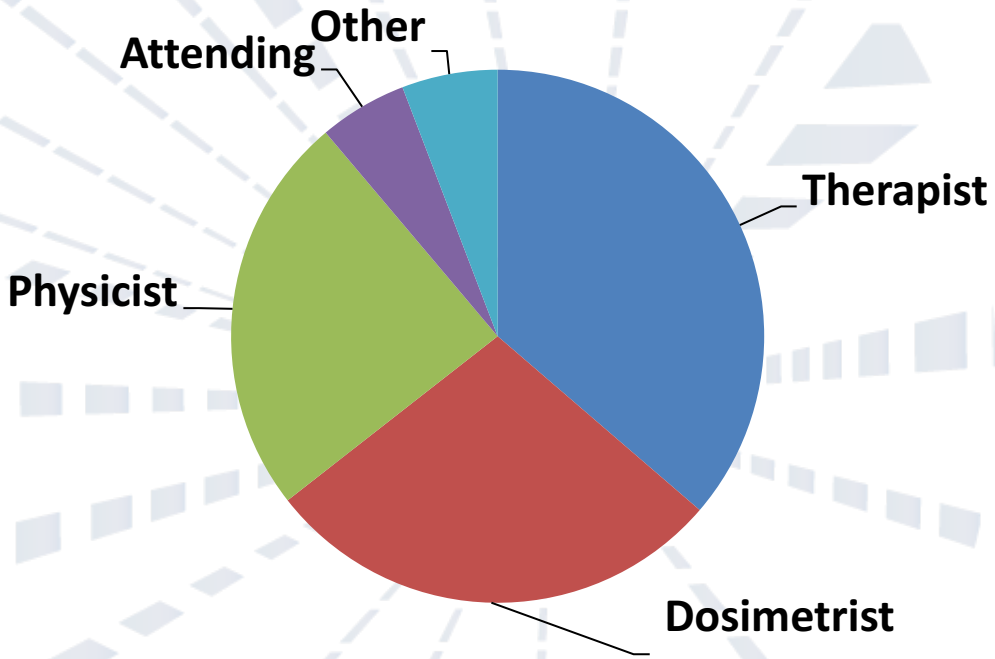
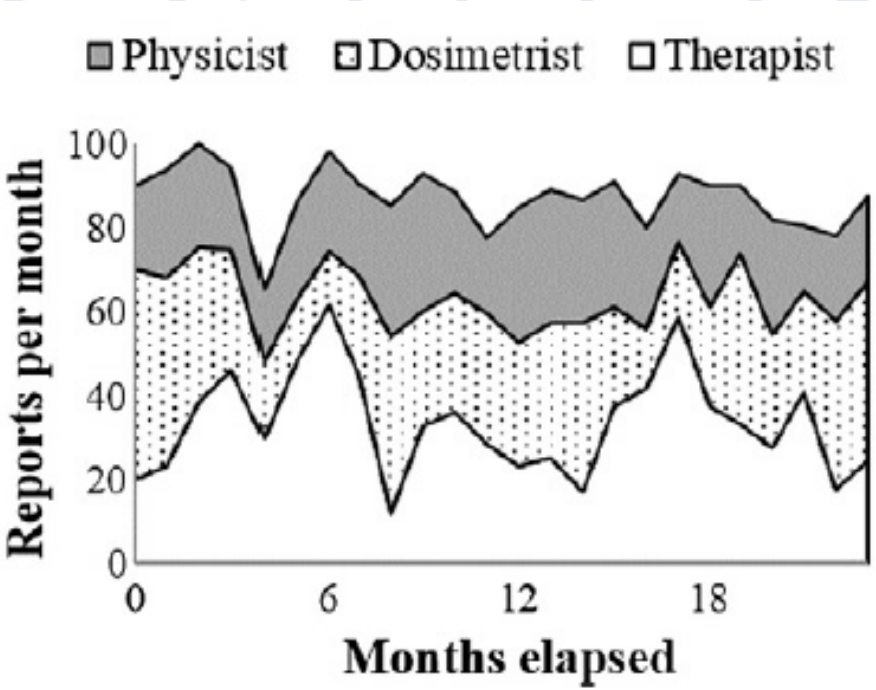
Measuring health of your ILS system



- **Engagement across professional groups**

Nyflot et al. Prac Rad Onc 2015

Measuring health of your ILS system



Nyflot et al. Prac Rad Onc 2015

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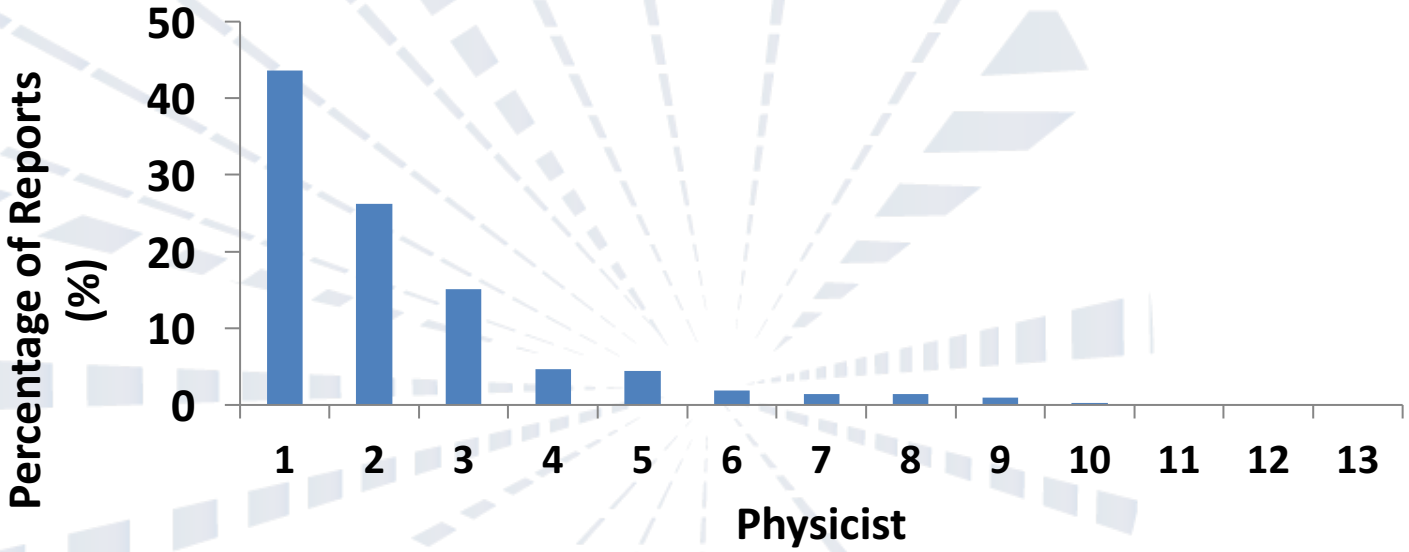
Measuring health of your ILS system



- 85% of reports come from three people
- 8 people have submitted <8 reports in 2 years

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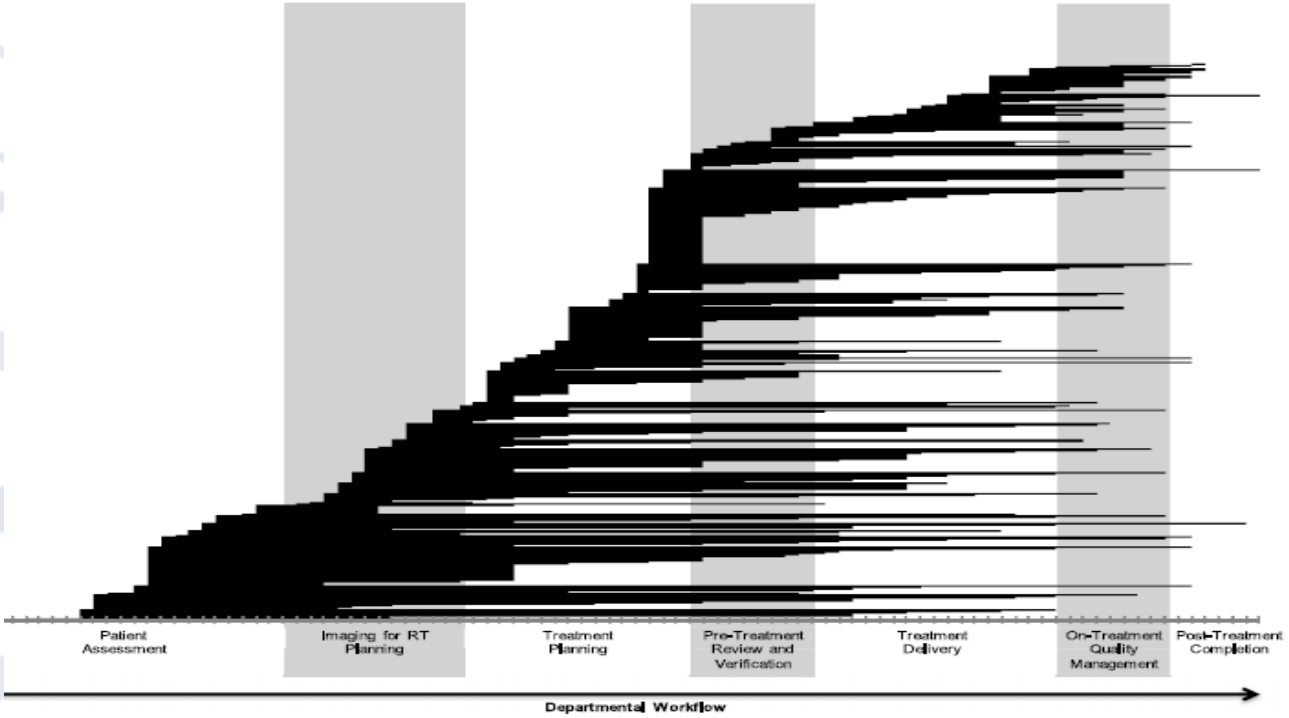
Where are errors occurring, being identified?



Novak et al. Med Phys, 2053-2062, 2016

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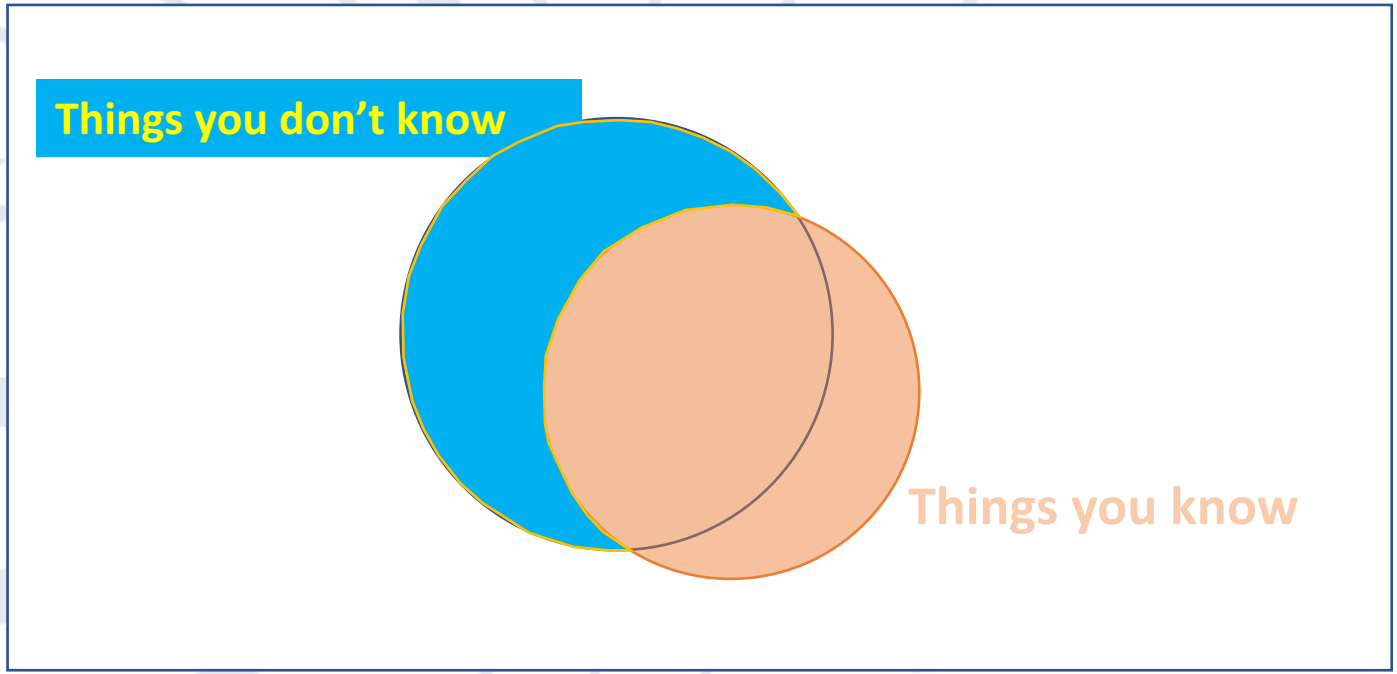

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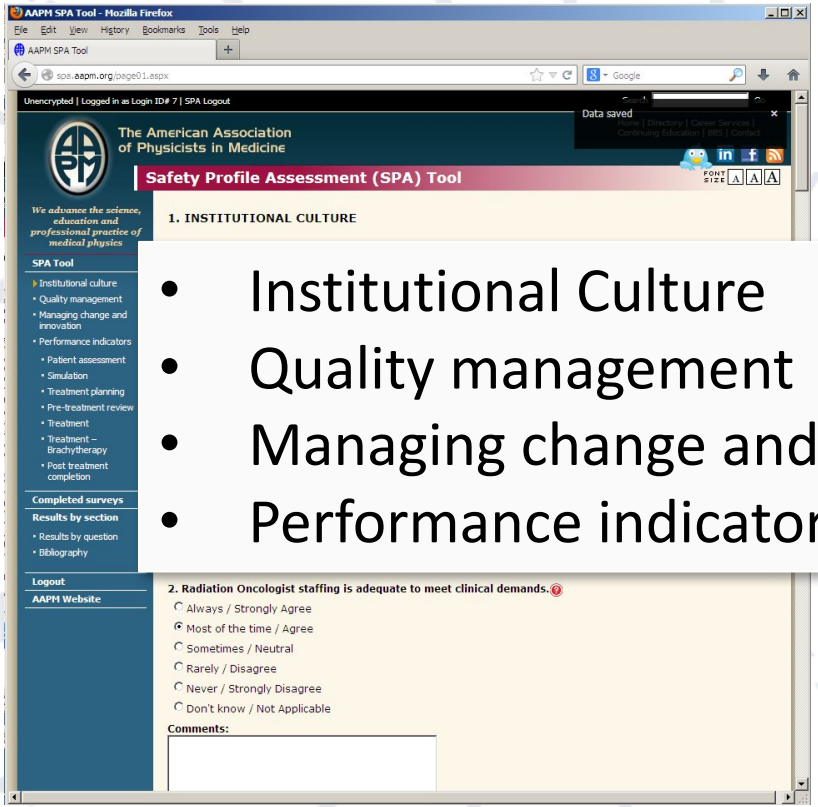
Safety Profile Assessment



92 questions
4 topic areas

- Institutional Culture
- Quality management
- Managing change and innovation
- Performance indicators

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Conclusions

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As important to assess what you're do as it is to do it!

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Acknowledgments

Lulu Jordan, (BS)RTT
Lora Holland, (BS)RTT
Patty Sponseller, CMD
Sunshine Gray, RN
Avrey Novak
Tom Mullen, MD
Wendy Gao, MD
Matt Spraker, MD
Michael Gensheimer, MD
Aaron Kusano, MD
Casey Bojechko, PhD
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Mark Phillips, PhD
Joshua Carlson
Olga Gopan, PhD
Matt Nyflot, PhD
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UW Rad Onc Quality Team

National Cancer Institute

AHRQ Advancing Excellence in Health Care

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