The National Landscape of Radiation Therapy Safety Efforts – part II

Jennifer L Johnson, MS, MBA
Chair, WGPE

WGPE Brief History

- Charges (12 May 2005)
- Provide a historical database of errors reported in the Radiotherapy Community.
- To assess the utility methodologies and tools used in error reduction for application in medical physics.
- Make recommendations to the Radiotherapy Community in terms of: staffing, processes, tools needed to carry out particular procedures in order to avoid errors and provide guidance in the practice of error reduction techniques.






(Working Group on Prevention of Errors in Radiation Oncology (WGPE), 2016)

WGPE Brief History

AAPM COMMITTEE TREE

Work Group on Prevention of Errors in Radiation Oncology

delete bookmark (bookmarks show under "My AAPM" in the menu to left)

Committee Website | Committee Wiki | **Directory:** Committee | Membership

Email You may send email to this group now using gmail or outlook.
- or -
You may save the address *2016.WGPE@aapm.org*
to your local address book. This alias updates hourly from the AAPM Directory.

Bylaws: Not Referenced. **Rules:** Not Referenced.

Approved Date(s) Start: 1/20/2005
End: n/a

Committee Keywords: WGPE

- Board of Directors [Status]
  - Science Council [Status]
    - Therapy Physics [Status]
      - Quality Assurance and Outcome Improvement SC [Status]
        - **Work Group on Prevention of Errors in Radiation Oncology** [Status]
          - TG100 Method for Evaluating QA Needs in Radiation Therapy [Status]
          - TG275 Strategies for Effective Physics Plan and Chart Review in Radiation Therapy [Status]

» Active Task Group listing

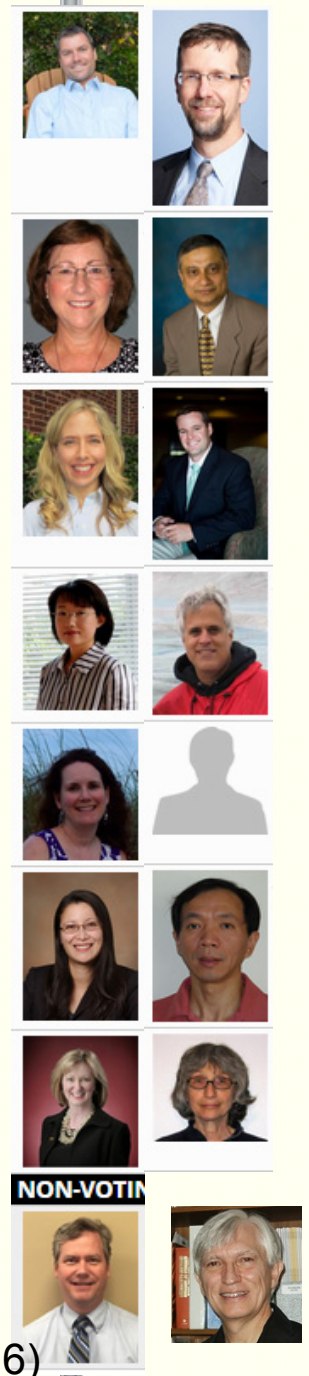
Chair

Jennifer Lynn Johnson
Workgroup Chair

(WGPE, 2016)

WGPE Brief History

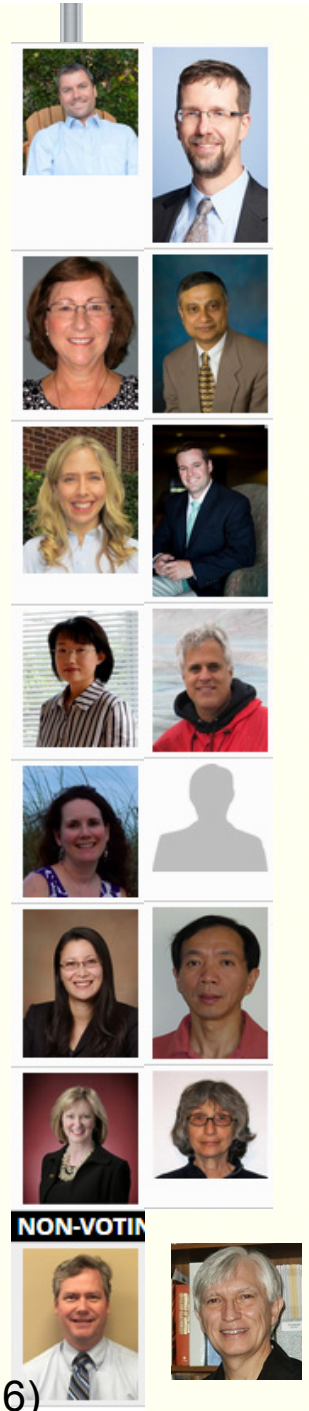
- Charges (Dec 2013)
- Develop and disseminate tools to improve safety and quality in all the clinical areas of medical physics using approaches that extend beyond traditional measurement- based QA
- Foster collaborative safety initiatives and projects with other professional societies within therapeutic and diagnostic radiation medicine
- Facilitate interactive sharing of knowledge and experience in the areas of patient safety and quality.



(WGPE, 2016)

WGPE Brief History

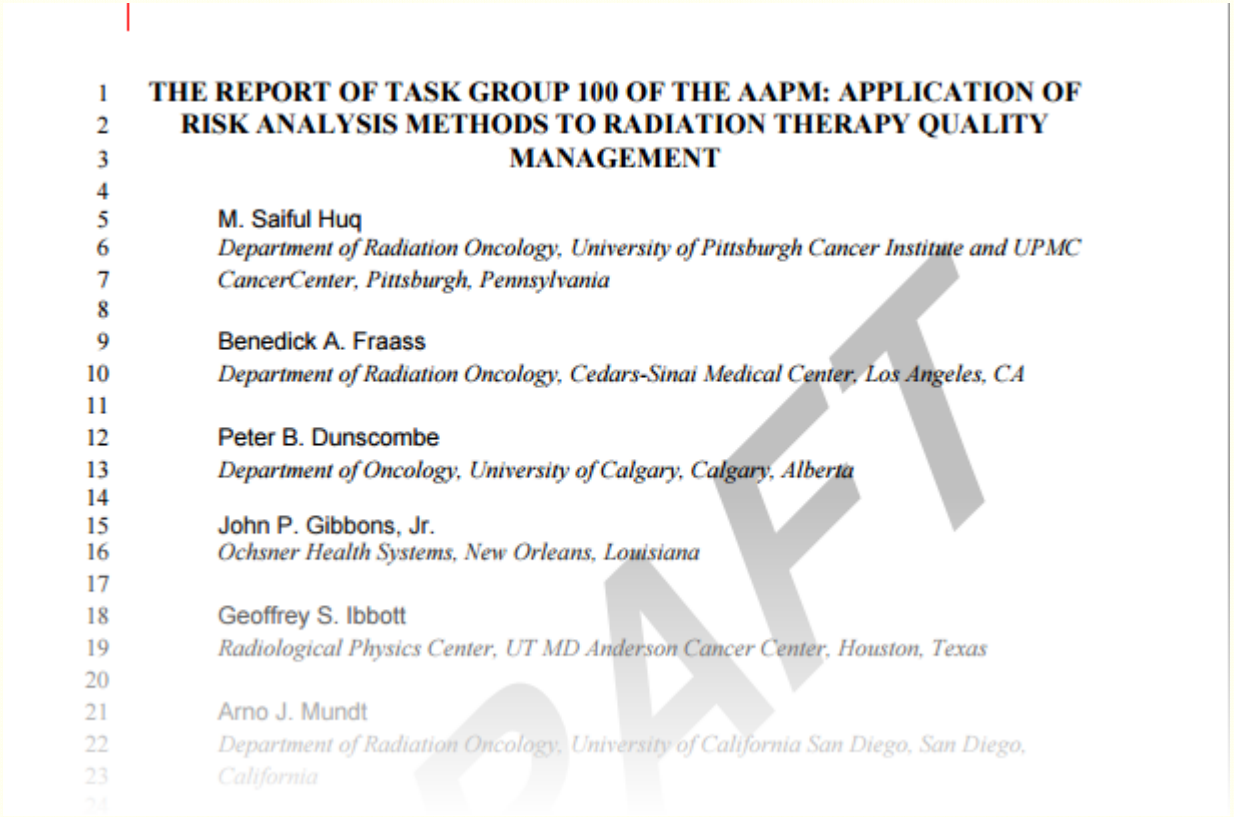
- Charges (Dec 2013) con't
- Disseminate information to the AAPM membership and the radiological community in general on issues involving safety and quality in all the clinical areas of medical physics
- Oversee and coordinate societal and inter-societal initiatives on the areas of patient safety and quality improvement, such as the implementation of the recommendations from Task Group 100
- Participate and provide guidance on distributed incident learning systems at the national and international level.



(WGPE, 2016)

WGPE Contributions

- Task Group 100 - Method for Evaluating QA Needs in Radiation Therapy (FMEA)



THE REPORT OF TASK GROUP 100 OF THE AAPM: APPLICATION OF RISK ANALYSIS METHODS TO RADIATION THERAPY QUALITY MANAGEMENT

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Peter B. Dunscombe
Department of Oncology, University of Calgary, Calgary, Alberta

John P. Gibbons, Jr.
Ochsner Health Systems, New Orleans, Louisiana

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Radiological Physics Center, UT MD Anderson Cancer Center, Houston, Texas

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Department of Radiation Oncology, University of California San Diego, San Diego, California

(M.S. Huq *et. al.*, 2016)

WGPE Contributions

- Consensus recommendations for incident learning database structures in radiation oncology

Consensus recommendations for incident learning database structures in radiation oncology

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(Received 29 June 2012; revised 16 August 2012; accepted for publication 15 October 2012; published 26 November 2012)

Purpose: Incident learning plays a key role in improving quality and safety in a wide range of industries and medical disciplines. However, implementing an effective incident learning system is complex, especially in radiation oncology. One current barrier is the lack of technical standards to guide

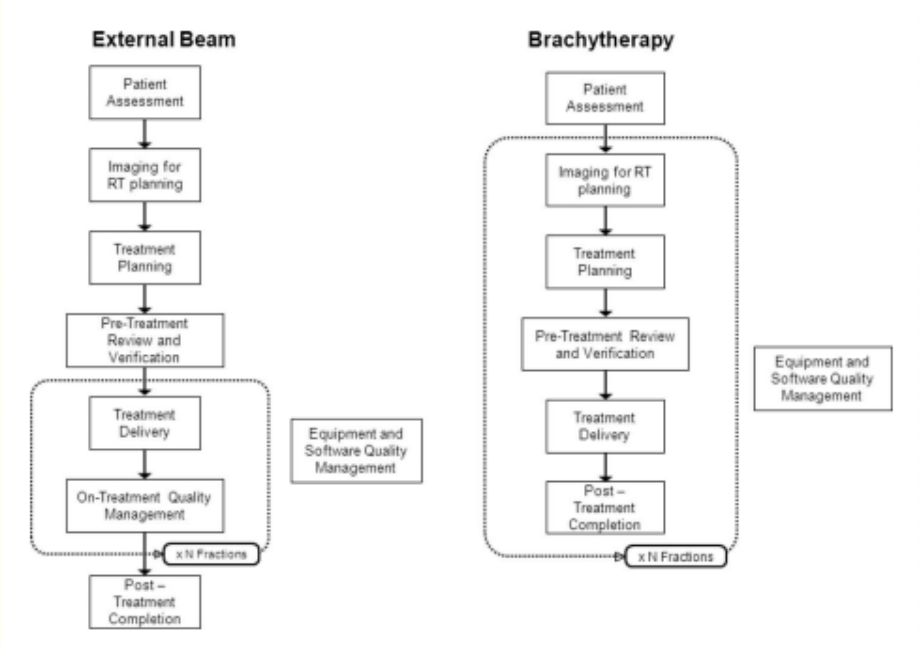
RO·ILS
RADIATION ONCOLOGY
INCIDENT LEARNING SYSTEM
Sponsored by ASTRO and AAPM

MOC

- Definitions

(E. Ford *et. al.*, 2012)

- Process maps common tasks



- Potential safety barriers

8. Equipment and software quality management		
SB	8.1	Acceptance testing
SB	8.2	Commissioning
	8.3	Application/system training
SB	8.4	Ongoing quality management (e.g., daily, monthly, annual QA, etc.)
SB	8.5	Preventive maintenance (PM)
	8.6	Equipment repair and software changes/updates
SB	8.7	Post-repair/changes verification
	8.8	Documentation of quality management
	8.9	Respond to medical device alerts
	8.10	Other

(E. Ford *et. al.*, 2012)

- Severity scales

1. Medical severity scale

Score	Consequences (actual or predicted)
10	Premature death
8/9	Life threatening—intervention essential. Possible recurrence due to underdose.
7	Permanent major disability (or grade 3/4 permanent toxicity)
5/6	Permanent minor disability (or grade 1/2 permanent toxicity)
3/4	Temporary side effects—major treatment/hospitalization
2	Temporary side effects—intervention indicated
1	Temporary side effects--intervention not indicated
0	No harm
…	Unknown

2. Dosimetric scale

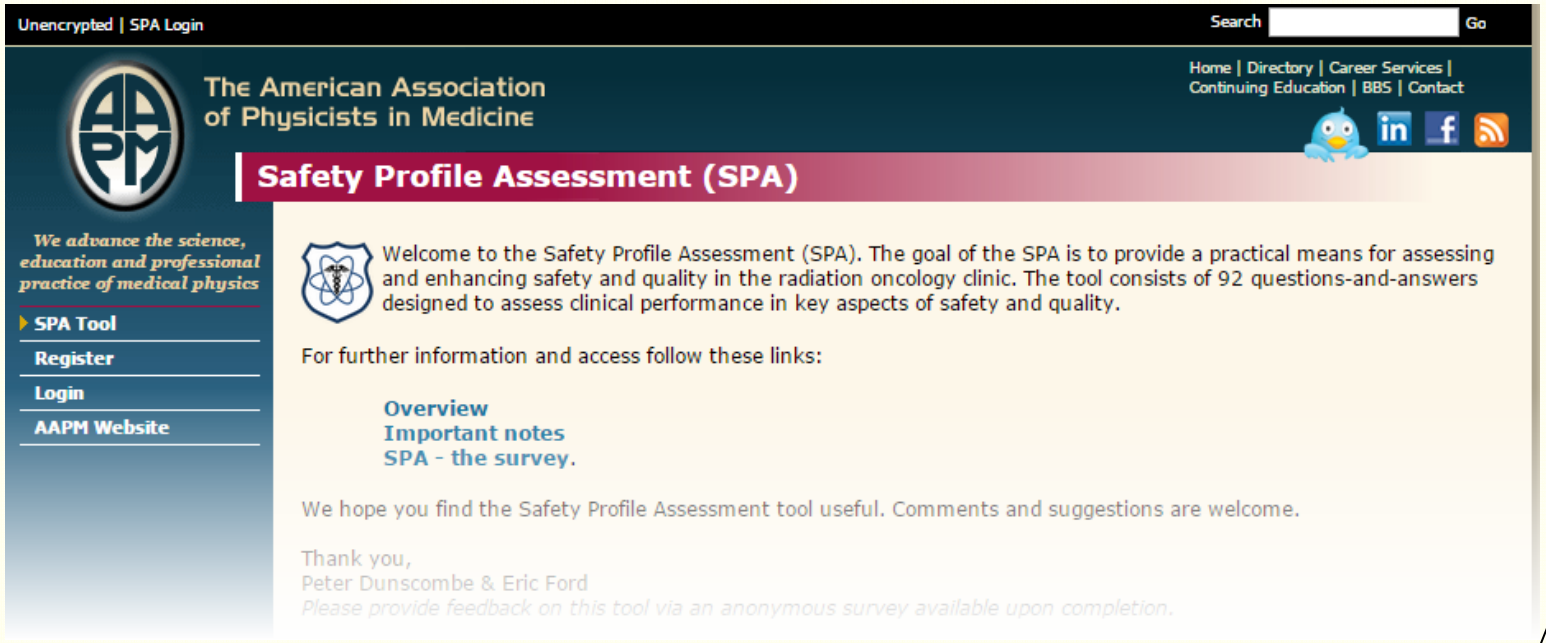
Score	Dose deviation per course
9/10	>100% absolute dose deviation from the total prescription for any structure
7/8	>25%–100% absolute dose deviation from the total prescription for any structure
5/6	>10%–25% absolute dose deviation from the total prescription for any structure
3/4	>5%–10% absolute dose deviation from the total prescription for any structure
1/2	<5% absolute dose deviation from the total prescription for any structure
…	Not applicable

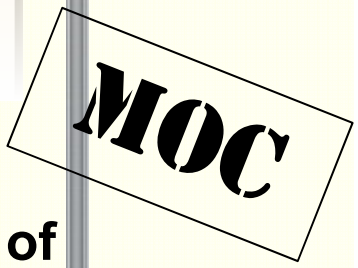
- Causality
  - Organizational management
  - Technical
  - Human behavior involving staff
  - Patient-related circumstances
  - External factors (beyond facility control)
  - Procedural issues

(E. Ford *et. al.*, 2012)

WGPE Contributions

- Safety Profile Assessment (SPA) tool





"Qualified by the American Board of Radiology as meeting the criteria for Practice Quality Improvement requirements of the ABR Maintenance of Certification Program." (6/19/2014)

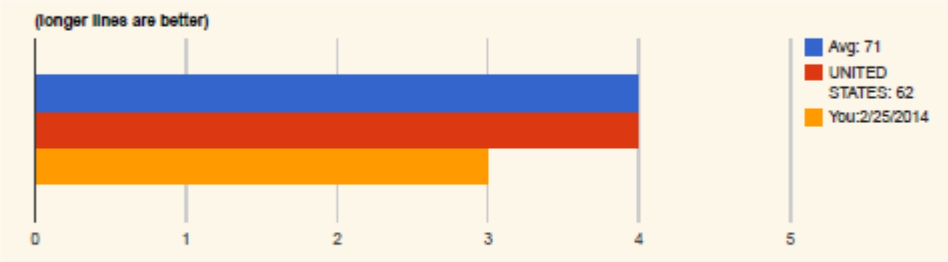
(P. Dunscombe *et. al.*, 2015)

- Safety Profile Assessment (SPA) tool con't
- User assess clinical performance in key aspects of safety & quality in radiotherapy
- Based on AHRQ survey and others, but FREE
- Center's results are benchmarked to participants in the following:
  - Institutional culture
  - Quality management
  - Managing change & innovation
  - Clinical process safety barriers section
  - Overall score

(P. Dunscombe *et. al.*, 2015)

5. Therapist staffing is adequate to meet clinical demands.

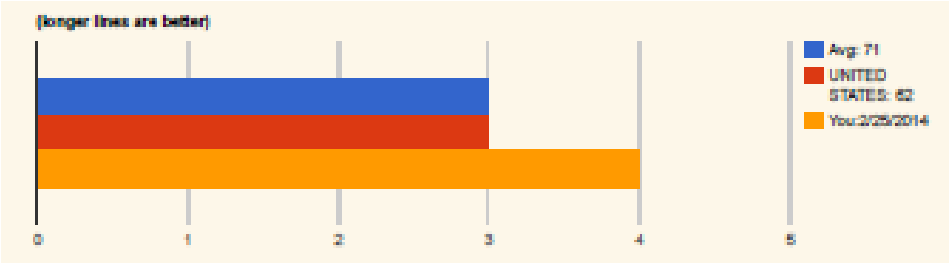
You answered **Sometimes / Neutral** for a score of 3



Zeltman A, Palta J, Steinberg M. Safety is No Accident: A Framework for Quality Radiation Oncology and Care: ASTRO; 2012
https://www.astro.org/Clinical-Practice/Patient-Safety/Safety-Book/Safety-Is-No-Accident.aspx
Comment: Chapter 2 discusses staffing levels. Table 2.3 lists "Minimum Personnel Requirements for Clinical Radiation Therapy" by professional group.

38. An independent review of commissioning results is performed prior to implementation of new clinical systems and processes.

You answered **Most of the time / Agree** for a score of 4

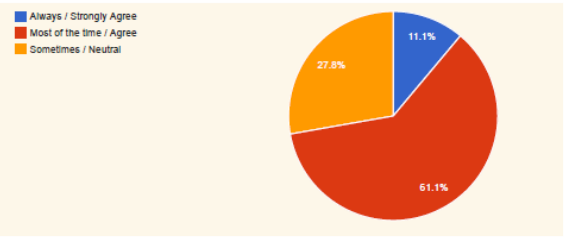


ACR Technical Standard for the Performance of Radiation Oncology Physics for External Beam Therapy Res. 7 – 2010.
http://www.acr.org/~/media/ACR/Documents/PGTS/standards/ROPhysicsExtBeamTherapy.pdf.
Quote: "The qualified medical physicist should review the final results of the commissioning process and independently repeat a subset of the measurements. The qualified medical physicist determines when the therapy system can commence clinical use and communicates any possible limitations on the scope of use."

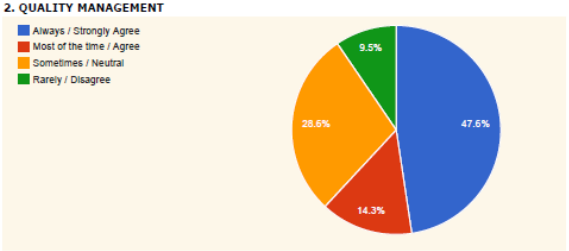
Indra J Das; C -M Cheng; Ronald J Watts; Anders Ahnesjoe; John Gibbons; X Allen Li; Jessica Lowenstein; Raj K Mitra; William E Simon; Timothy C Zhu. Accelerator beam data commissioning equipment and procedures: Report of the TG-106 of the Therapy Physics Committee of the AAPM. Medical Physics, v35 n9 (2008 Sep 15): 4186-4215.
Quote: "Check on the report and collected data. Have a qualified medical physicist perform an independent audit of the collected data and subsequent report."

World Health Organization, "Radiotherapy Risk Profile." 2008.
http://www.who.int/patientsafety/activities/technical/radiotherapy_risk_profile.pdf.
Comment: Sited as one of 9 safety processes "Audit of equipment commissioning and processes". Due to the pervasive impact on linear accelerator commissioning on subsequent usage, it is imperative to obtain independent review of commissioning documentation.

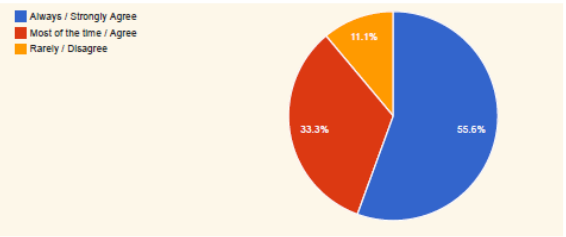
1. INSTITUTIONAL CULTURE



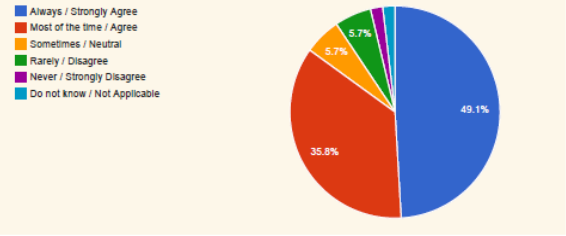
2. QUALITY MANAGEMENT



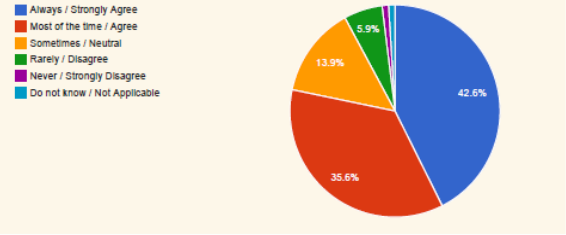
3. MANAGING CHANGE AND INNOVATION



4. CLINICAL PROCESS SAFETY BARRIERS SECTION

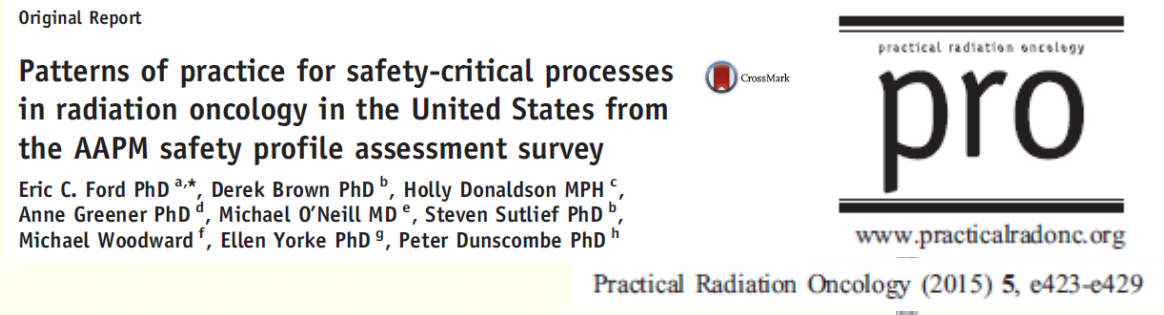


OVERALL



(J. L. Johnson *et. al.*, 2015)

- Results



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]

practical radiation oncology
pro
www.practicalradonc.org

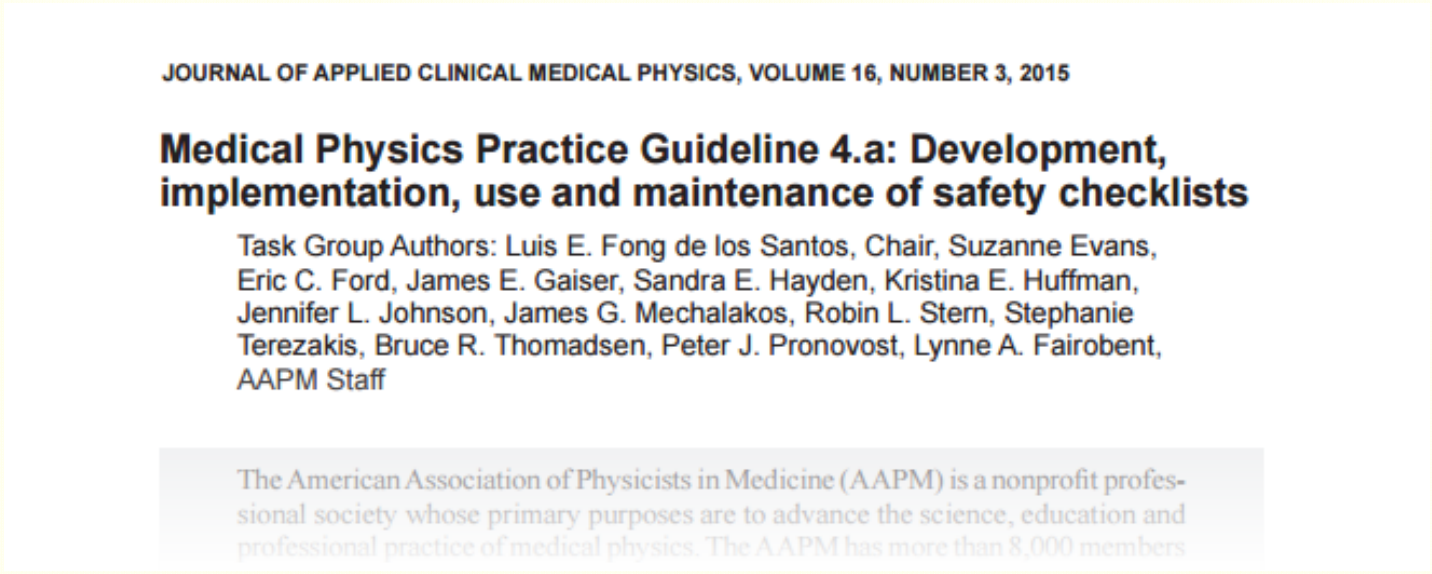
Practical Radiation Oncology (2015) 5, e423-e429

- Statistically significant (P<0.05 level) differences between Institutional Culture and Clinical Performance Indicators
- Highest-ranked compliance levels were associated with items regulated, billable, or considered good practice (ASTRO, ACR, elsewhere)
- Lowest-ranked compliance & greater variability
  - Fewer well-established recommendations
  - Physician peer-review prior treatment
  - Near-miss incident collection and analysis
  - Risk assessment of new clinical systems

(E. Ford *et. al.*, 2015)

WGPE Contributions

- Task Group 230 – Medical Physics Practice Guidelines (MPPG) 4.a Safety Checklists



JOURNAL OF APPLIED CLINICAL MEDICAL PHYSICS, VOLUME 16, NUMBER 3, 2015

Medical Physics Practice Guideline 4.a: Development, implementation, use and maintenance of safety checklists

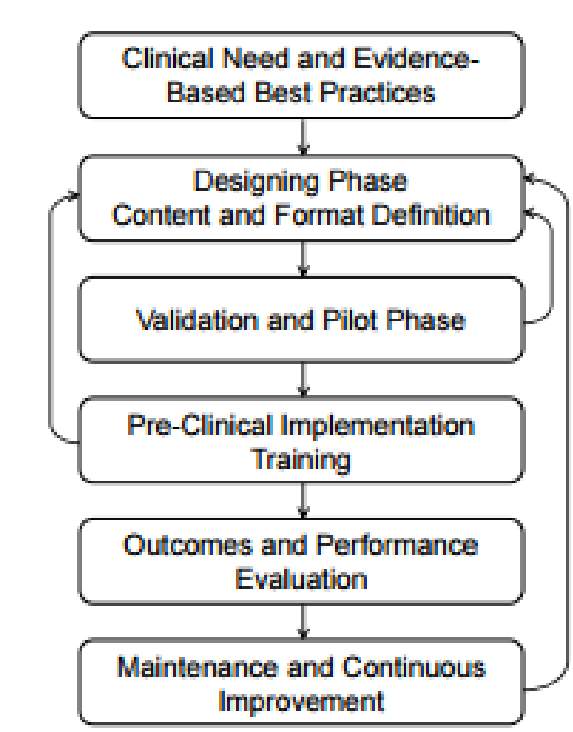
Task Group Authors: Luis E. Fong de los Santos, Chair, Suzanne Evans, Eric C. Ford, James E. Gaiser, Sandra E. Hayden, Kristina E. Huffman, Jennifer L. Johnson, James G. Mechalakos, Robin L. Stern, Stephanie Terezakis, Bruce R. Thomadsen, Peter J. Pronovost, Lynne A. Fairobent, AAPM Staff

The American Association of Physicists in Medicine (AAPM) is a nonprofit professional society whose primary purposes are to advance the science, education and professional practice of medical physics. The AAPM has more than 8,000 members

(L. E. Fong de los Santos *et. al.*, 2015)

- Role of checklists
- Organizational influences on checklists : safety culture
- Teamwork essential

- Development & Implementation
- Revision
- Maintenance



(L. E. Fong de los Santos *et. al.*, 2015)

- Use of checklists

TABLE 1. Checklist approaches with corresponding redundancy strategies (i.e., initial configuration redundancy or mutual redundancy). The clinical examples provide situations or processes where these approaches can be utilized.

Checklist Approach	*Redundancy*	*Example*
Static parallel or call-do	None ("cook book" approach)	Procedure to set up a water tank
Static sequential with verification	Initial configuration	Plan check process
Static sequential with verification and confirmation	Initial configuration and mutual	SBRT procedural pause
Dynamic	Initial configuration, mutual or "cook book" approach	HDR emergency procedure

- Design recommendations
  - Content
  - Workflow, layout & format
  - Physical characteristics
    - E.g., font size, text color, shading

(L. E. Fong de los Santos *et. al.*, 2015)

WGPE Contributions

- Educational sessions

MOC

3 SAMs sessions

(2015ILS, 2015)

WGPE Contributions

- By the end of the workshop, participants will be able to
  - Explain the utility of an effective incident learning system
  - Learn how to design corrective actions and provide feedback to department members
  - Effectively undertake root cause analyses of radiation oncology incidents
  - Use specific tools to promote a positive "safety culture" in an organization
  - Design a Practice Quality Improvement (PQI) project in patient safety

(2015ILS, 2015)

WGPE Current Work

- Task Group 275 – Strategies for Effective Physics Plan and Chart Review (Charges)
  - Literature review of existing data and recommendations that support the use of physics plan and chart review; and to review the current recommendations on the qualifications for performing these.
  - Design, pilot, and distribute a survey on current practices in the community with respect to physics plan and chart review.

MOC

SDEP document template; AAPM email 12 Feb 2016

(TG 275, 2016)

WGPE Current Work

- Task Group 275 – Strategies for Effective Physics Plan and Chart Review (Charges) con't
  - Provide risk-based recommendations (based on FMEA formalism) for the effective use of the following physics review:
    - Initial plan check process
    - On-treatment chart check process
    - End-of-treatment chart check
  - Provide recommendations to software vendors for systems design and operations that best facilitate physics plan and chart review.

(TG 275, 2016)

WGPE Current Work

- Task Group 100 rollout
- Consensus for imaging incident learning
  - Bruce Thomadsen (Chair), William Geisler (Vice-Chair)
- Writing an incident report
  - Bruce Thomadsen (Chair), Ajay Kapur (Vice-Chair)

(WGPE, 2016)

WGPE Current Work

- Examining safety barriers and their effectiveness from ROILS data
- Developing policy and procedure templates built from SPA results

(WGPE, 2016)

Reference List

- Dunscombe, P., Brown, D., Donaldson, H., Greener, A., O'Neill, M., Sutlief, S., ... & Ford, E. (2015). Safety Profile Assessment: An online tool to gauge safety-critical performance in radiation oncology. *Practical radiation oncology*, *5*(2), 127-134.
- Fong de los Santos, L. E., Evans, S., Ford, E. C., Gaiser, J. E., Hayden, S. E., Huffman, K. E., ... & Thomadsen, B. R. (2015). Medical Physics Practice Guideline 4. a: Development, implementation, use and maintenance of safety checklists. *Journal of Applied Clinical Medical Physics*, *16*(3).
- Ford, E. C., Brown, D., Donaldson, H., Greener, A., O'Neill, M., Sutlief, S., ... & Dunscombe, P. (2015). Patterns of practice for safety-critical processes in radiation oncology in the United States from the AAPM safety profile assessment survey. *Practical radiation oncology*, *5*(5), e423-e429.
- Ford, E. C., Fong de Los Santos, L. E., Pawlicki, T., Sutlief, S., & Dunscombe, P. (2012). Consensus recommendations for incident learning database structures in radiation oncology. *Medical physics*, *39*(12), 7272-7290.
- Huq, M. S., Fraass, B. A., Dunscombe, P. B., Gibbons, J. P., Mundt, A. J., Mutic, S. Palta, J. R., Rath, F., Thomadsen, B. R., Williamson, J. F., Yorke, E. D. (2016). The Report of Task Group 100 of the AAPM: Application of Risk Analysis Methods to Radiation Therapy Quality Management. Retrieved from: http://www.aapm.org/announcements/TG100PrePublicationDraft.asp
- "2015ILS." (2015). Incident Learning Systems and Root Cause Analysis for Safer Radiation Oncology: A Hands-On Workshop. Retrieved from: http://www.aapm.org/meetings/2015ILS/
- "TG 275." (2016). Task Group No. 275: Strategies for Effective Physics Plan and Chart Review in Radiation Therapy. Retrieved from: http://www.aapm.org/org/structure/default.asp?committee_code=TG275
- "WGPE." (2016). Retrieved from: http://www.aapm.org/org/structure/default.asp?committee_code=WGPE

Consensus recommendations for Incident Learning Systems (ILS) include which of the following:

20%	1.	Definitions
20%	2.	Process maps
20%	3.	Severity scales
20%	4.	Causality
20%	5.	All of the above

Consensus recommendations for Incident Learning Systems (ILS) include which of the following:

20%	1.	Definitions
20%	2.	Process maps
20%	3.	Severity scales
20%	4.	Causality
20%	**5.**	**All of the above**

Answer: 5. All of the above

Reference: Ford, E. C., de Los Santos, L. F., Pawlicki, T., Sutlief, S., & Dunscombe, P. (2012). Consensus recommendations for incident learning database structures in radiation oncology. *Medical physics*, *39*(12), 7272-7290.

The Safety Profile Assessment (SPA) tool results include which of the following:

20%	1. Institutional culture
20%	2. Quality management
20%	3. Managing change and innovation
20%	4. Clinical process safety barriers
20%	5. All of the above

The Safety Profile Assessment (SPA) tool results include which of the following:

20%	1.	Institutional culture
20%	2.	Quality management
20%	3.	Managing change and innovation
20%	4.	Clinical process safety barriers
20%	**5.**	**All of the above**

Answer: 5. All of the above

Reference: Dunscombe, P., Brown, D., Donaldson, H., Greener, A., O'Neill, M., Sutlief, S., ... & Ford, E. (2015). Safety Profile Assessment: An online tool to gauge safety-critical performance in radiation oncology. *Practical radiation oncology*,*5*(2), 127-134.

The Medical Physics Practice Guideline (MPPG) 4.a on Safety Checklists include all of the following EXCEPT:

20%	1. Repository of checklists
20%	2. Role of checklists
20%	3. Development of checklists
20%	4. Implementation of checklists
20%	5. Use of checklists

The Medical Physics Practice Guideline (MPPG) 4.a on Safety Checklists include all of the following EXCEPT:

20%	1.	**Repository of checklists**
20%	2.	Role of checklists
20%	3.	Development of checklists
20%	4.	Implementation of checklists
20%	5.	Use of checklists

Answer: 1. Repository of checklists

Reference: Fong de los Santos, L., Evans, S., Ford, E., Gaiser, J., Hayden, S., Huffman, K., Johnson, J., Mechalakos, J., Stern, R., Terezakis, S., Thomadsen, B., Pronovost, P., & Fairobent, L. (2015). Medical Physics Practice Guideline 4.a: Development, implementation, use and maintenance of safety checklists. *Journal Of Applied Clinical Medical Physics, 16*(3). doi:10.1120/jacmp.v16i3.5431.