# National Efforts in Patient Safety

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# Disclosures

- I am a member of committees in AAPM (TPC) and ASTRO (Multi-disciplinary QASC) related to Quality and Safety; I was chair of the group which wrote the white paper on Safety Considerations for IMRT
- I am a member of the Michigan Radiation Oncology Consortium funded by BCBS of Michigan
- I have an approved project related to accelerator quality assurance funded by Varian Medical Systems

# Acknowledgments


- Benedick Fraass, PhD., Cedars-Sinai
  - AAPM, ASTRO, ACR efforts
- Eric Ford, Ph.D., Johns Hopkins
  - Chair of Workgroup on Prevention of Errors in Radiation Oncology
- Emily Wilson, ASTRO
- Lynne Fairobent, Government and Regulatory Affairs Specialist, AAPM
- Steve Bolton, Leicester, England

# Making Progress

- There is a renewed spirit of cooperation across societies
- It is clear that the entire treatment team needs to be aware of safety considerations
- Challenges:
  - Balance between quality and safety
  - Poor quality care is clearly unsafe
  - Limited resources: time, staffing, equipment, continuing to try and support more with less

# Safety Stakeholders in Radiation Oncology

- Led by representatives from MITA (the Medical Imaging and Technology Alliance), AAPM, and ASTRO
  - Meetings at ASTRO 2010, AAPM 2011, ASTRO 2011 annual meetings
- Groups:  RT System Usability, Error Messages, QA, Training, and Nomenclature
  - Focusing on short-term goals
- Members of AAMD and ASRT are also participating, outreach to other groups as appropriate

# AAPM Work Group on Prevention of Errors
# Eric Ford, Chair

- White paper recommendations on **incident learning systems**
  - Data structure and use issues within a single clinic and between clinics
  - Timeline: Under review by Therapy Physics Committee; then will be reviewed by other societies for endorsement and submitted for publication
- Report on the use of **checklists** in radiation therapy
  - Effort is likely to cross Science and Professional Councils; ASTRO will also be part of the effort; Expert Peter Pronovost of Johns Hopkins will be a member of the group
  - Timeline: approximately 1 year

# Personnel

- **Multi-society effort:** *What are the staffing needs in the era of advanced radiation therapy?*
  - HDR, IGRT, IMRT, SBRT, SRS
  - Blue Book is being updated
- The Conference of Radiation Control Program Directors (CRCPD) is now operating a registry of certified medical physicists.
  - American Board of Radiology
  - American Board of Medical Physicists
  - Canadian College of Physicists in Medicien
  - American Board of Science in Nuclear Medicine
  - http://www.crcpd.org/QMP/aboutQMP.aspx

# Additional Efforts: Online Learning

- ASTRO is preparing a new online CME course
  - Emphasis on patient safety in radiation oncology
  - Timeline: expected by the end of the year
- AAPM WGPE is developing an online "**Safety Fitness Test**"
  - Tool will be developed for evaluation of safety practices and culture
  - Can be used for self-improvement; joint with ASTRO, possible applications for accreditation
  - Timeline: approximately 1 year

# National Database for Machine-Based Radiation Medical Events

- Conference of Radiation Control Program Directors (CRCPD) has a committee working on:
  - Develop definitions of reportable events
  - Standardizing the reporting structure for use in all states
  - Reviewing reports for accuracy
  - Overseeing the development and maintenance of a national database

# ASTRO Multi-disciplinary Subcommittee

- This group has overseen the creation of the Safety White Paper Series – led by Dick Fraass, Todd Pawlicki, and Larry Marks
  - Effort requested by the ASTRO Board of Directors in January 2010
- Safety white papers differ from other guidance documents because the groups are deliberately multi-disciplinary and reports have an emphasis on patient safety and catastrophic failures

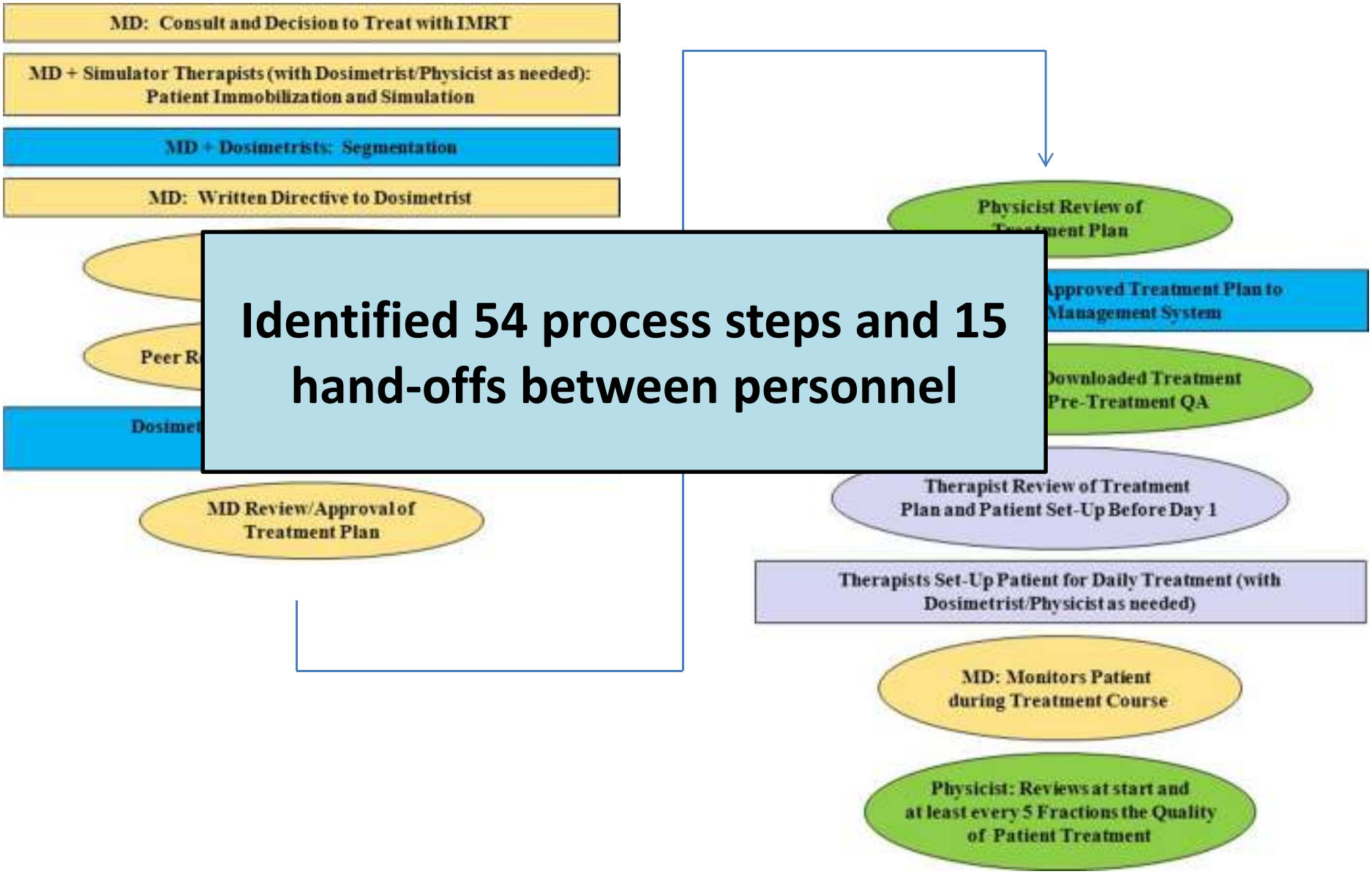
# ASTRO White Papers on Safety

- Review process
  - Expert review, public comment period, review by major stakeholders for endorsement, publication
  - Revisions made at all review steps
  - Executive Summaries published in PRO with access to the full length documents as supplemental materials
- IMRT (July 2011) and SBRT (in press) published in PRO
- IGRT – at revision stage after expert review, next step is public comment period
- HDR – about to be submitted for expert review

# Safety Considerations for (IM)RT

- 1st paper in the series, therefore scope overlapped with good practice in external beam radiation therapy
- Key Recommendations
  - Clearly defined roles and responsibilities
  - Use of standard operating procedures
  - Adequate personnel, training, and equipment
  - Event tracking
  - Continuous quality improvement

# Example IMRT Process



# IMRT White Paper (continued)

- Potential **hazards** identified
  - Wrong detector used for QA (e.g. poor resolution)
  - Changing a measurement point repeatedly when prior measurements fail QA
  - Applying too generous dose-distance criteria for agreement
  - Inadequate testing of the data transfer to the treatment management system
- Report includes example problems and communication flow to remediate problems

# Recommendations to Guard Against Catastrophic Failures

- Potentially **catastrophic** steps and personnel duties were identified
- Example: Before the first treatment or for any change in treatment, perform patient-specific QA to guarantee that data transfer between systems is correct before patient treatment begins
  - Performed by physicist, dosimetrist, therapist or physics assistant
  - Primary review:  Physicist
  - Secondary review: Therapists confirm that only fully approved plans are used for treatment

# Continued need for rigorous QA: RPC Head-and-neck credentialing phantom

- End-to-end test
- Failure rates are ~ 20% (RPC – 2009) with dose/distance criteria of 7%/4 mm
- A common cause of errors are factors that should be identified during commissioning – leaf-end corrections, incorrect output factors, incorrect PDDs

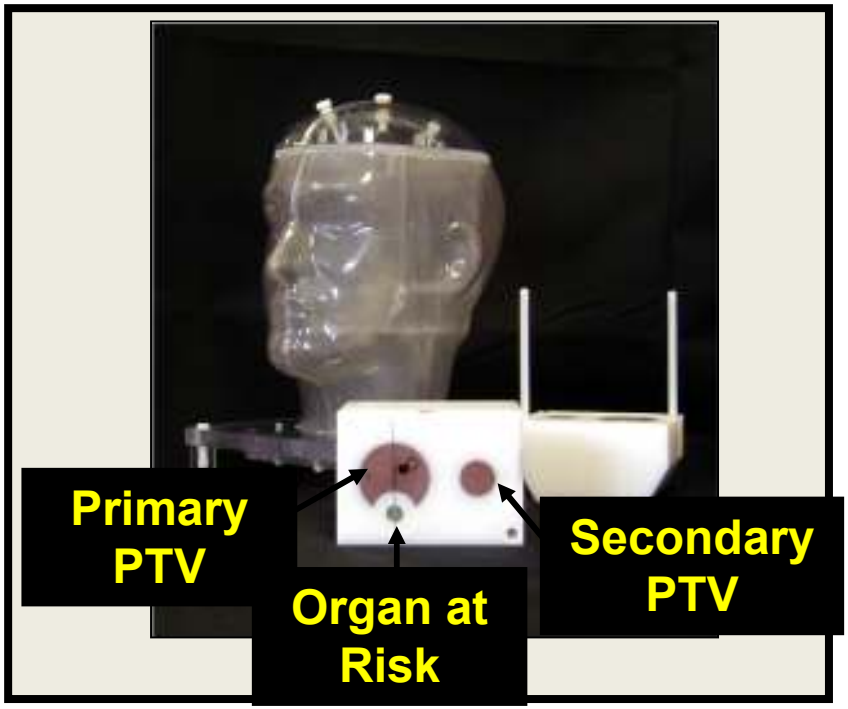
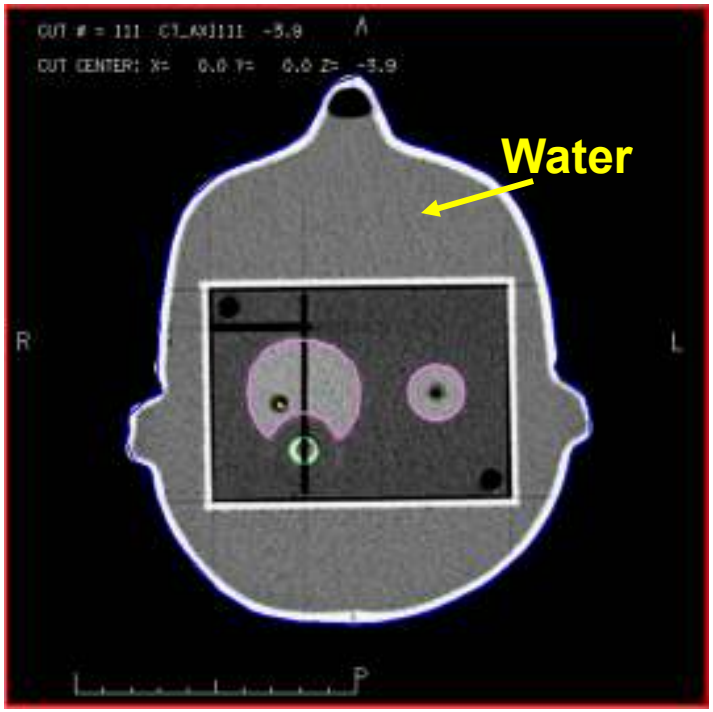



Photo courtesy of Andrea Molineu - RPC



# End-to-end Tests

- From CT simulation through delivery
- Perform at commissioning and at the time of any significant hardware or software changes
- Can also use to investigate/commission new treatment techniques

# Collaboration between Users and Manufacturers

- Improved methods for directly and independently verifying the patient plan and treatment data prior to, during, and after delivery
- Integration of safety measures into the IMRT workflow – communication, checklists, data integration and tracking
  - Robust handling of physician requested changes
- Integration of IMRT sub-systems and QA procedures
  - Including safe system defaults (e.g. when missing MLC data – default leaves closed instead of open)
- We need to be able provide safe patient care, with reasonable effort

# IHE-RO

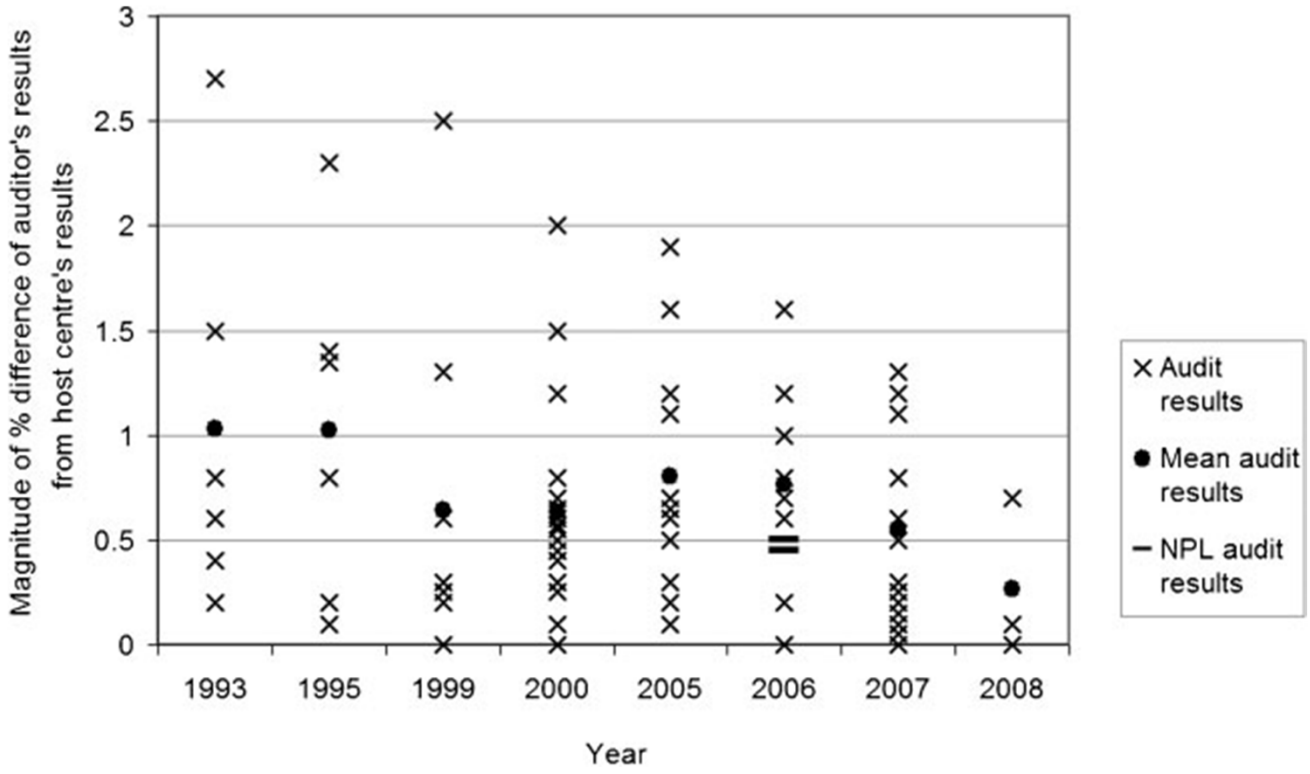
- Integrating the Healthcare Enterprise-Radiation Oncology
  - Long-standing effort at improving connectivity between systems made by different manufacturers
  - Practical Radiation Oncology 1(4): 226-231, 2011
  - Bruce Curran and Jatinder Palta are two of the physicists who have been very active in this area

# UK Audit Program

- Clinical audit program since 1989
- Began with basic dosimetry checks
- Supported regionally
- Fundamentals audited as well as new technologies
  - Extended to IMRT


Courtesy of Steve Bolton – Leceister, UK

# Impact of UK Regional Audits – Photon Output




Palmer, et al. Analysis of regional radiotherapy dosimetry audit data and recommendations for future audits. British Journal of Radiology, 84: 733-742 (2011).

# AT LAST!! Practical, free help with IMRT!!

This is a once in a lifetime chance to perform your own IMRT audit and get your own personal results sent straight to your inbox!

NRIG the National Radiotherapy Implementation Group is keen to encourage the wider take up of routine IMRT within the UK. To this end a working party has developed a means whereby all radiotherapy departments can set up an IMRT plan of their own choosing on their TPS and then irradiate Kodak EDR film (supplied free courtesy of AXREM) in a standard water equivalent phantom at 95 cm FSD, 5 cm deep.

Also, supplied by the NPL, will be a set of alanine dosemeters which will be used to measure absolute delivered dose at a known point.

Any commercial planning system can be used as long as the calculated dose grid can be exported in a standard format (DICOM or ASCII).

Courtesy of Steve Bolton – Leceister, UK

# US – Independent Checks

- Remote dosimetry program by the Radiological Physics Center for clinical trials or by the Remote Dosimetry Service of MDACC
- Ph
  M
- A
  ac
- Data submission to independent group such as the Quality Assurance Review Center
- Peer evaluation

Should there be formal recommendations, separate from clinical trials, on the frequency and type of independent evaluation in the US?

# Safety White Papers

- Thank you to those who made comments during the different phases of the review process for the IMRT white paper.
- Everyone is encouraged to participate in the review of these types of documents during the public comment period.
  - The feedback is invaluable to make sure that the guidelines make sense, especially in different practice environments.
- There will likely be more guidelines created which will go through this robust review process. Your input makes a difference.

# References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- Solberg et al. Quality and safety considerations in stereotactic body radiation therapy: Executive Summary; in press:
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