
Brian Napolitano, MHL, CMD
June 19, 2018 – 43rd AAMD Annual Meeting

Disclosures

• No conflicts of interest to report
About last time...

- A bit controversial
- Against topic
- Fundamental disagreement
- Very heated topic
- Personally not a fan
- Another arrogant east coast government lacky (SIC)

TG 275 Intent

- Practical, evidence-based recommendations for physics plan & chart reviews
  - Initial
  - Weekly
  - End of treatment
TG 275 Intent

- Key component of radiotherapy treatment
  - Photon/electron external beam radiotherapy
  - Proton radiotherapy
  - HDR-GYN Brachytherapy
    - Typically highest volume in clinical practice

Radiotherapy Plan & Chart Review

- Performed by qualified medical physicist (or designee)
- Aim to ensure safe, high quality treatment
  - One of the most effective safety barriers
  - Identifies errors and quality disparities for safety of care
- Examples of factors to be considered:
  - Technical parameters (data transfer integrity)
  - Calculation accuracy
  - Plan quality
  - Proper consideration of technically-related clinical factors
Radiotherapy Plan & Chart Review

• Gaps in performance based on human inspection
  • Gopan et al – 38% of errors potentially detectable
  • Ezzell et al – 25-37% of errors pass through normal checks
• One of two dedicated medical physics CPT codes
• Very little recent guidance on requirements since TG40 (1994)
AAPM Task Group 40

- Recommends establishment of institutional quality schedule and chart review and peer review procedures
- Initial plan review:
  - Identify and resolve discrepancies in MU calculations >5%
  - Review by medical physicist

AAPM Task Group 40

- Weekly checks:
  - Compare treated field versus planned fields
  - Detect discrepancies/modifications
- End of treatment review
  - Documentation per department policy
  - Prescribed dose delivered
  - Physician summary created
AAPM Task Group 40

- Published in 1994…but a lot has changed
  - Vastly complex treatments (SBRT, IMRT, VMAT)
  - Variation between clinical practices
  - Unique combination of vendor solutions
  - Higher potential for errors pre-treatment
  - Increasing difficulty in detection

Societal Practice Guidelines

  - Call for verification of planning system MU calculations
  - Prior to 3rd treatment or prior to 1st treatment for fewer than 5 fractions
  - Consistent with TG40

- ACR-ASTRO Practice Guideline for IMRT (2016)
  - State that patient-specific QA must be performed before clinical treatment begins
  - No explicit guidance on plan and chart reviews
Error Rates

- Majority happen pre-treatment
  - Need for improved QA processes throughout
- Clark et al (2010)
  - >50% of incident reports originate during treatment preparation process
- Novak et al (2016)
  - 33% of near misses in treatment planning process
- RO-ILS 2016 Q3 Report
  - Most common process step for events = treatment planning

Error Detection

  - Initial physics plan check – 1st most effective quality control check
    - Sensitivity of 62%
  - Weekly physics check – 2nd most effective quality control check
    - Sensitivity of 43%
- Gopan et al (2016)
  - Reviewed 3 years of institutional data of 125 incidents
  - 38% detected during review
- Ezzell et al (2018)
  - 25% and 37% of errors passed through normal checks
Automation

  - 1st report of automatic error detection
- University of Iowa Efforts
  - Checks for treatment overrides & inconsistencies in delivery
- University of Michigan Experience
  - Time saved by automation now spent of evaluation of plan quality
- Massachusetts General Hospital Practice
  - Framework for acquiring, organizing, checking, & displaying data

Oncology Information System

- Main components
  - Treatment Planning System
  - Treatment Management System
  - Parts of the Treatment Delivery System (Record & Verify System)
  - Oncology-specific electronic medical record
    - Includes radiation oncology & enterprise-wide systems

Image Source: https://www.lifewire.com/what-are-hops-hop-counts-2625905
Automation Opportunities

• QA of contours using machine-learning algorithm
• DVH comparisons to established constraints
• Treatment delivery QA based on machine log files
• IHE-RO Proposal
  • Linac queries and verifies consistency of significant delivery parameters just before treatment
• “Big Data” analysis
  • Identify outliers based on intra-plan and inter-plan comparisons
  • Evaluation of probability distributions for planning parameters

Current Clinical Practice

• Establish a baseline for diverse current clinical practice using survey of AAPM’s membership
  • Use to evaluate FMEA risk analysis
• 103 multiple choice questions – both demographic and process-based
  • Identified 261 items to be evaluated among the process-based questions
• 1526 respondents – 33% response rate
  • 39% community hospitals, 31% academic-affiliates
  • 39% had <50 daily patient treatments, 34% had 50-100 daily patient treatments, 27% had >100 daily patient treatments
Failure Mode and Effects Analysis

- Based on AAPM TG100 principles
  - Available for free from AAPM
- Determine highest-risk aspect of each process
- Often guided by process map to identify potential failure points
  - Collected from Task Group membership
  - Also queried Safety in Radiation Oncology (SAFRON) reporting system
  - Validated against RO-ILS incident reports with good agreement
Failure Mode and Effects Analysis

• Failure modes/causes scored for severity (S), occurrence (O), & detectability (D)
  • Scored by Task Group membership & other volunteers
  • Severity was scored as if unidentified & affected the patient
  • Most likely scenario was considered for occurrence & detectability

• 594 total failure modes/causes pairs scored
• Risk Priority Number (RPN) = (S) x (O) x (D)
• Highest scored RPN included
  • 112 for photon/electron initial review
  • 55 for weekly and end-of-treatment review
  • 24 for proton initial review
    • Less hardware/software standardization
  • 48 for HDR brachytherapy
FMEA & AAPM Survey Correlation

- Relationship between RPN of the failure mode & frequency of use of checks was instructive
- Upper right – Higher risk, but routine checks in place
- Lower left – Lower risk, but no routine checks in place

High Risk Failure Modes – Initial Checks

<table>
<thead>
<tr>
<th>Failure Mode</th>
<th>Cause</th>
<th>RPN</th>
<th>S</th>
<th>O</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Wrong&quot; or inaccurate MD contours</td>
<td>Workflow/Communication issue, e.g., Attending MD does not review resident contours, MD does not clearly identify dose levels, Incorrect CT dataset, Fusion incorrect or with wrong image set, Target motion not considered, Wrong set of contours imported</td>
<td>261.3</td>
<td>7.4</td>
<td>4.9</td>
<td>7.2</td>
</tr>
<tr>
<td>Miscommunication about prior dose, pacemaker, pregnancy</td>
<td>Information not communicated or available information incorrect</td>
<td>214.1</td>
<td>7.4</td>
<td>5.5</td>
<td>5.3</td>
</tr>
<tr>
<td>Improper margins for PTV</td>
<td>Information not communicated or available information incorrect</td>
<td>198.0</td>
<td>5.5</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Unintentional re-irradiation of a previously treated site</td>
<td>Lack of coordination or miscommunication with e.g. surgeons, medical onc, etc.</td>
<td>181.2</td>
<td>7.7</td>
<td>3.8</td>
<td>6.2</td>
</tr>
<tr>
<td>Incorrect or missing pathology</td>
<td>e.g. 220x30 vs. 200x33) maybe via email, MD unintentionally writes Rx to max dose, wrong Rx signed off in chart or Rx not signed</td>
<td>180.3</td>
<td>8.8</td>
<td>3.6</td>
<td>7.3</td>
</tr>
<tr>
<td>Dose in plan does not match intended</td>
<td>Lack of coordination or miscommunication with e.g. surgeons, medical onc, etc.</td>
<td>175.3</td>
<td>8.4</td>
<td>5.8</td>
<td>4.8</td>
</tr>
<tr>
<td>Sub-optimal treatment plan or approach related to communication or coordination with multidisciplinary care</td>
<td>Lack of coordination or miscommunication with e.g. surgeons, medical onc, etc.</td>
<td>175.2</td>
<td>8.2</td>
<td>5.5</td>
<td>5.2</td>
</tr>
<tr>
<td>Plan does not reflect intent: ex. prostate/SVs vs. prostate/SVs &amp; nodes</td>
<td>Incomplete or incorrect treatment planning note or prescription</td>
<td>160.2</td>
<td>4.9</td>
<td>4.3</td>
<td>7.6</td>
</tr>
<tr>
<td>Unable to assess potential overlap of prior and current treatment fields</td>
<td>Missing or inadequate prior radiation records</td>
<td>155.9</td>
<td>6.5</td>
<td>4.8</td>
<td>5.0</td>
</tr>
</tbody>
</table>
Initial Plan/Chart Review Recommendations

- **What is the daily workload for initial plan/chart reviews?**
  - 74.1% of respondents 1-5 plans
  - 17.7% of respondents 6-10 plans
  - 8.2% of respondents >11 plans
  - Requires review of staffing model to achieve optimal institutional standards

- **What is the time allotted for initial plan/chart reviews?**
  - 33.5% of respondents have less than one day to complete initial plan check
    - Prudent to identify high-risk cases if it is not possible to check every plan prior to 1\textsuperscript{st} fraction
  - 63.8% have one to three 3 days for initial
    - Allow adequate time for feedback to be incorporated into planning process
  - Requires review of internal processes (ex – patient scheduling) to achieve ideal clinical practice
Initial Plan/Chart Review Recommendations

• *What policies/procedures support the initial plan/chart review?*
  - 72.5% - Documented procedure in place for initial checks
  - 64.2% - Use checklists to complete reviews
  - 52.1% - Some form of automation
  - 51% reported recording near-misses and deviations during initial checks
    • Tracking of incidents during initial plan check is strongly encouraged

Initial Plan/Chart Review Recommendations

• *Are there any approvals required of the initial plan/chart?*
  - 86.2% - Physicist approval of plan and/or fields prior to 1st treatment required
    • Provides permanent record of parameters from time of approval
  - 58.2% - Forcing functions to prevent treatment prior to checks and approvals
  - 35.8% - Rely on communication and good processes
  - 1.2% - Have no preventative measures
### High Risk Failure Modes – Weekly Review

<table>
<thead>
<tr>
<th>FM#</th>
<th>Process Step</th>
<th>Failure Mode</th>
<th>Cause</th>
<th>RPN</th>
<th>S</th>
<th>O</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tx Deliv</td>
<td>Incorrect dose administered</td>
<td>Patient was unable to physically maintain position for treatment and one or more fields not treated and no documentation in chart</td>
<td>216.0</td>
<td>3.0</td>
<td>8.0</td>
<td>9.0</td>
</tr>
<tr>
<td>2</td>
<td>Tx Deliv</td>
<td>Proper IGRT not performed</td>
<td>Therapist did not follow MD imaging instructions</td>
<td>136.1</td>
<td>4.0</td>
<td>6.3</td>
<td>5.4</td>
</tr>
<tr>
<td>3</td>
<td>Tx Deliv</td>
<td>Incorrect dose administered</td>
<td>Chart documentation was unclear/insufficient and one or more fields not treated and no documentation</td>
<td>123.8</td>
<td>5.8</td>
<td>3.5</td>
<td>6.1</td>
</tr>
<tr>
<td>4</td>
<td>Tx Deliv</td>
<td>Incorrect dose administered</td>
<td>MD changes dose in prescription and not communicated to planning or treatment therapist</td>
<td>121.9</td>
<td>5.3</td>
<td>4.6</td>
<td>5.0</td>
</tr>
<tr>
<td>5</td>
<td>Tx Deliv</td>
<td>Pacemaker not monitored according to instructions</td>
<td>No instructions in chart for in vivo dosimetry</td>
<td>113.7</td>
<td>5.5</td>
<td>3.9</td>
<td>5.3</td>
</tr>
<tr>
<td>6</td>
<td>Tx Deliv</td>
<td>Proper IGRT not performed</td>
<td>MD did not review images as per policy</td>
<td>108.0</td>
<td>2.0</td>
<td>6.0</td>
<td>9.0</td>
</tr>
<tr>
<td>7</td>
<td>Tx Deliv</td>
<td>Incorrect laterality/site</td>
<td>First weekly only: Patient mismarked</td>
<td>103.9</td>
<td>7.1</td>
<td>2.4</td>
<td>6.1</td>
</tr>
<tr>
<td>8</td>
<td>Tx Deliv</td>
<td>Incorrect laterality/site</td>
<td>No imaging performed pre-treatment</td>
<td>102.1</td>
<td>7.4</td>
<td>2.3</td>
<td>6.0</td>
</tr>
<tr>
<td>9</td>
<td>Tx Deliv</td>
<td>Wrong treatment fields delivered to wrong site during XRT to multiple sites</td>
<td>Unclear/insufficient documentation</td>
<td>98.8</td>
<td>6.3</td>
<td>2.8</td>
<td>5.6</td>
</tr>
<tr>
<td>10</td>
<td>Tx Deliv</td>
<td>Fraction not delivered as intended</td>
<td>Treatment delivered out of clinical mode, but not charted</td>
<td>96.0</td>
<td>4.0</td>
<td>4.0</td>
<td>6.0</td>
</tr>
</tbody>
</table>

#### Weekly Chart Review Recommendations

- Most significant failure modes generally detected during initial plan/chart reviews
- Failure modes for weekly checks fall into four categories:
  - Items missed during initial checks
  - Information obtained after 1st treatment
  - Changes in prescription that are handled poorly
  - Treatments are incorrectly delivered
- Numerous failure modes fall outside the scope of weekly physics checks
  - Might be caught by on-treatment reviews by physicians, therapists, etc.
  - Outside the charge of this report
### High Risk Failure Modes – EOT

<table>
<thead>
<tr>
<th>FM#</th>
<th>Process Step</th>
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<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TX Deliv</td>
<td>Incorrect dose administered</td>
<td>MD changes dose in prescription and not communicated to planning or treatment therapists</td>
<td>121.9</td>
<td>5.3</td>
<td>4.6</td>
<td>5.0</td>
</tr>
<tr>
<td>2</td>
<td>TX Deliv</td>
<td>Incorrect dose administered</td>
<td>Dose delivered out of clinical and not recorded as part of patient treatment</td>
<td>110.0</td>
<td>4.9</td>
<td>3.3</td>
<td>6.8</td>
</tr>
<tr>
<td>3</td>
<td>TX Deliv</td>
<td>Fraction not delivered as intended</td>
<td>Treatment delivered, but not charted</td>
<td>96.0</td>
<td>4.0</td>
<td>4.0</td>
<td>6.0</td>
</tr>
<tr>
<td>4</td>
<td>On-TX Quality Mgt</td>
<td>Deviation from treatment not detected</td>
<td>Inadequate review of plan and/or chart</td>
<td>138.2</td>
<td>4.8</td>
<td>4.5</td>
<td>6.4</td>
</tr>
</tbody>
</table>

#### End of Treatment Check Recommendations

- Recommended to be completed within one week of finish
  - Might be enough time to partly mitigate severe harm
- Prior recommendations suggest audit of entire chart at the completion of therapy, including:
  - Prescribed dose delivered
  - Proper documentation in accordance with department policy
  - Treatment summary documenting completion of intended therapy
- Most failure modes detected likely to be documentation
  - Can lead to gap analysis of initial or weekly checks
## High Risk Failure Modes – Protons

<table>
<thead>
<tr>
<th>FM#</th>
<th>Process Step</th>
<th>Failure Mode</th>
<th>Cause</th>
<th>RPN</th>
<th>S</th>
<th>O</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tx Plan</td>
<td>Tumor growth while waiting for treatment start</td>
<td>Waiting for insurance clearance</td>
<td>150.5</td>
<td>4.0</td>
<td>5.7</td>
<td>6.6</td>
</tr>
<tr>
<td>2</td>
<td>Sim</td>
<td>Strong, unrepairable metal artifacts</td>
<td>Patient has extensive or high density metal</td>
<td>148.5</td>
<td>3.1</td>
<td>7.5</td>
<td>6.5</td>
</tr>
<tr>
<td>3</td>
<td>Tx Plan</td>
<td>Over-dosing normal structures</td>
<td></td>
<td>6.3</td>
<td>3.3</td>
<td>3.3</td>
<td>6.3</td>
</tr>
<tr>
<td>4</td>
<td>Tx Plan</td>
<td>Inaccurate proton range calculation</td>
<td></td>
<td>3.2</td>
<td>5.5</td>
<td>6.7</td>
<td>6.7</td>
</tr>
<tr>
<td>5</td>
<td>On-TX Quality Mgt</td>
<td>Adaptive plan was not created</td>
<td>Significant/major changes in patient anatomy in the beam path due to inadequate staff training or no well-established guideline etc.</td>
<td>111.6</td>
<td>3.4</td>
<td>4.9</td>
<td>6.7</td>
</tr>
<tr>
<td>6</td>
<td>Tx Plan</td>
<td>Inaccurate proton range calculation</td>
<td>Inappropriate manual override of CT numbers for artifacts or metal objects etc.)</td>
<td>106.1</td>
<td>3.4</td>
<td>4.8</td>
<td>6.5</td>
</tr>
<tr>
<td>7</td>
<td>Tx Plan</td>
<td>Over-dosing normal structures</td>
<td>Inadequate treatment robustness evaluation</td>
<td>102.9</td>
<td>3.5</td>
<td>4.9</td>
<td>6.0</td>
</tr>
<tr>
<td>8</td>
<td>Pre-Tx Rev</td>
<td>Patient specific devices were not manufactured</td>
<td>Wrong plan sent to machine shop</td>
<td>101.6</td>
<td>4.0</td>
<td>3.6</td>
<td>7.0</td>
</tr>
<tr>
<td>9</td>
<td>Tx Plan</td>
<td>Over-dosing normal structures</td>
<td>Inadequate range uncertainty estimation</td>
<td>101.5</td>
<td>4.0</td>
<td>4.3</td>
<td>5.9</td>
</tr>
<tr>
<td>10</td>
<td>Tx Plan</td>
<td>Inaccurate proton dose calculation</td>
<td>Inaccurate modeling of proton beams</td>
<td>99.7</td>
<td>3.6</td>
<td>3.9</td>
<td>7.1</td>
</tr>
</tbody>
</table>

### Proton Therapy Recommendations

- **Highest RPN was “Waiting for insurance authorization”**
  - Concern over tumor progression with significant delays
  - Potential role for adaptive radiotherapy
    - 46.2% of respondents indicated process was performed
- **Proton-specific failures marked by CT image artifact and proton range uncertainties**
  - 17% of causes are from inaccurate range estimation
    - Beam angle selection
    - Robust evaluation of setup uncertainty
# High Risk Failure Modes – HDR-GYN

<table>
<thead>
<tr>
<th>FM#</th>
<th>Process step</th>
<th>Failure Mode</th>
<th>Cause</th>
<th>RPN</th>
<th>S</th>
<th>O</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Planning</td>
<td>Wrong MD contours</td>
<td>Physical environment - interruptions, MD rushed, etc.</td>
<td>131.8</td>
<td>4.6</td>
<td>4.8</td>
<td>6.0</td>
</tr>
<tr>
<td>2</td>
<td>Planning</td>
<td>Catheters digitized incorrectly (e.g., digitizing something other than the catheter)</td>
<td>Planner not familiar with procedure or confused - poor training, vague policies, incomplete documentation, etc.</td>
<td>120.8</td>
<td>5.0</td>
<td>4.6</td>
<td>5.3</td>
</tr>
<tr>
<td>3</td>
<td>Planning</td>
<td>Incorrect treatment length planned</td>
<td>Communication - MD intention not relayed properly to planner</td>
<td>119.0</td>
<td>4.9</td>
<td>4.3</td>
<td>5.7</td>
</tr>
<tr>
<td>4</td>
<td>Planning</td>
<td>Wrong distal reference length entered into TPS</td>
<td>Planner not familiar with procedure or confused - poor training, vague policies, incomplete documentation, etc.</td>
<td>98.3</td>
<td>4.9</td>
<td>3.8</td>
<td>5.4</td>
</tr>
<tr>
<td>5</td>
<td>Imaging</td>
<td>Incorrect measurement and/or documentation of channel lengths or number</td>
<td>Slip or lapse caused by inattention, distraction, etc. - staff misread measurement</td>
<td>95.3</td>
<td>5.1</td>
<td>4.4</td>
<td>4.3</td>
</tr>
<tr>
<td>6</td>
<td>Imaging</td>
<td>Wrong dataset exported (i.e. 2nd scan performed after applicator adjustment but 1st scan sent for planning)</td>
<td>Communication - Poor, incomplete, unclear, or missing documentation - incorrect scan entered into simulation documentation</td>
<td>91.6</td>
<td>4.3</td>
<td>3.8</td>
<td>5.8</td>
</tr>
<tr>
<td>7</td>
<td>Planning</td>
<td>Channel mapping incorrect (e.g. tandem must be 3 but set to 1)</td>
<td>Planner not familiar with procedure or confused - poor training, vague policies, incomplete documentation, etc.</td>
<td>83.5</td>
<td>4.6</td>
<td>4.4</td>
<td>4.1</td>
</tr>
<tr>
<td>8</td>
<td>Applicator Placement</td>
<td>Shielded cylinder inserted incorrectly</td>
<td>Equipment related - shielding labeling difficult to detect</td>
<td>82.0</td>
<td>4.4</td>
<td>3.8</td>
<td>5.0</td>
</tr>
<tr>
<td>9</td>
<td>Planning</td>
<td>BED calculated using wrong formulation</td>
<td>Planner not familiar with procedure or confused - poor training, vague policies, incomplete documentation, etc.</td>
<td>80.9</td>
<td>3.8</td>
<td>3.8</td>
<td>5.8</td>
</tr>
<tr>
<td>10</td>
<td>Planning</td>
<td>Prior treatment not taken into account</td>
<td>Communication - poor incomplete, unclear, or missing documentation</td>
<td>78.9</td>
<td>4.9</td>
<td>3.5</td>
<td>4.8</td>
</tr>
</tbody>
</table>

## HDR-GYN Recommendations

- Basic work from TG-59 remains true for current practice
- Suggest person performing checks/reviews be different from one performing planning processes
  - Concerns for inherent bias and misunderstanding of technique
  - Delayed self-verification should be instituted if independent checks cannot be performed
Report Limitations

- Samples clinics mostly in United States
- FMEA method has limitations
  - Scores may vary from system to system
  - Linking failure modes to corresponding check items
- Impact of recommendations on workload
  - Only one of many responsibilities
- “Checklist Autopilot”

General Recommendations

- Guidelines for Qualified Medical Physicists (QMPs) and others to interpret and use for their individual institution
  - Not intended to be prescriptive
- Ensure compliance with site-specific & state-mandated requirements that may modify usage of these recommendations
General Recommendations

• Each practice should undertake their own formal risk assessment prior to making adjustments
• Perform incident review to confirm all prior incidents were addressed

General Recommendations

• Who performs physics plan & chart reviews?
  • 91.5% of respondents indicated QMP performed
  • Work should be supervised by a QMP at minimum if not able to be performed
  • Clarify who did which aspect of review
  • Structure workflow so review can be performed
  • Include hard stop/forcing function to ensure completion
General Recommendations

- **When do initial reviews get performed?**
  - 89.6% of respondents complete prior to 1st fraction, 9.5% within 3 days of 1st fraction, 0.9% within 5 days of 1st fraction
  - Several advantages to reviewing early in workflow:
    - Reduce likelihood of reaching the patient
    - Issues may be more easily identified & fixed before treatment
    - Wasted effort and rework may be avoided
    - May allow for several shorter, more focused checklists

Vendor Recommendations

- Software systems play central role in error identification during plan and chart review
  - Highlight items that are difficult to check and review
- Need for further automation efforts
  - Current processes rely on manual human inspection
    - Time-intensive and error-prone

Vendor Recommendations

• Display review information in presentable manner for easier digestion to busy personnel
• Require information in single interface in intuitive format
  • Solicit clinical partner feedback for user interface design
• Develop workflow tools to assist in communication and review enforcement

Key Recommendations

• Physics plan/chart reviews should be based on risk analysis
• Identify failure modes which are high-risk and/or high potential severity
• Establish standard policies for physics plan/chart reviews
Key Recommendations

• Failure modes out of medical physics scope should be considered by other professional groups at various levels
• Practices should work to incorporate physics reviews as early as feasible into workflow
  • Should not solely rely on review at end of treatment planning

Image Source: http://www.sapyard.com/understanding-the-workflow-part-i/

Key Recommendations

• Initial physics review should occur prior to 1st treatment fraction
  • Approval requirements should be enforced via lockout functions
• Physics reviews should be performed by QMP or under QMP supervision as a minimum

Key Recommendations

• Checklists and standardization should be used to enhance physics plan/chart review performance and communication
• Manual transcription & entry of data should be avoided
  • DICOM RT should be used to move planning information between planning system & treatment control system


Thank You

• Eric Ford, PhD, University of Washington Medical Center, Seattle, WA (TG 275 Chair)
• Leigh Conroy, PhD, The Princess Margaret Cancer Centre, Toronto, ON, Canada
• Lei Dong, PhD, University of Pennsylvania, Philadelphia, PA
• Luis Fong de los Santos, PhD, Mayo Clinic, Rochester, MN
• Anne Greener, PhD, Veterans Affairs NJHCS, East Orange, NJ
• Grace Gwe-Ya Kim, PhD, University of California, San Diego, CA
• Jennifer Johnson, MBA, PhD, Landauer Medical Physics, Houston, TX
• Perry Johnson, PhD, University of Miami, FL
• James G. Mechalakos, PhD, Memorial Sloan-Kettering Cancer Center, NY
• Stephanie Parker, MS, University of North Carolina, High Point, NC
• Debbie Schofield, MS, Saint Vincent Hospital, Worcester, MA
• Koren Smith, MS, Mary Bird Perkin Cancer Center, LA
• Ellen Yorke, PhD, Memorial Sloan-Kettering Cancer Center, NY
• Michelle Wells, MS, Piedmont Cancer, Atlanta, GA
Questions?