Track: Education and Training

Radiation Knowledge Initiative

International Radiotherapy Plan Competition:
A step towards better planning and global transfer of knowledge

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Disclosure

KFSH&RC signed an agreement with Sun Nuclear Corp. to use their PlanIQ software as a benchmarking and evaluation tool for our 2016 radiotherapy plan competition, a non-clinical license was provided for a period of 3 months.
Plan Quality Variation?

Planning Knowledge

- Articles
- Coworkers
- School or Training
- Clinical Experience
- Personal Skills

Non-Optimal Quality

- Heavy Clinical Load
- Lack of resources
- Short time
- Not up-to-date
- Lack of experience
How to improve planning quality?

- The term “best possible” plan quality is a subjective term
- How can we raise the planning standards to maintain same quality?
- Can quality be improved on large scale (i.e. worldwide)?

*The Answer:* YES, This can be accomplished through *Plan Competition*
2016 Plan Competition – Our First Activity

This is not the first of its kind in the world, this is the second international competition
ROR (Radiation Oncology Resources) initiated the first plan competition in ~ 2011
2013, 2014, and 2015 Plan Challenges in collaboration with AAMD – Personal Experience
Advanced skills were acquired & implemented on the day-to-day clinical cases
We decided to initiated our national competition (Inside Saudi Arabia Only)
The idea was initiated at KFSH&RC and patronized/supported by SOS (Saudi Oncology Society)
Expected number of participants was 20-50 (max)
Expanded to the Middle East, then opened to be a global activity
Participation Level

Total Participants ~ 400
From ~ 55 countries
Competition Process

Register
- Participant personal info
- Plan details (TPS, Technique, ... etc)

Download
- Download CT Image set with contours
- Competition’s rules and dosimetric criteria

Plan
- Generate a plan, show us your planning talent
- Stick to the rules (Energy, fields, ... etc)

Upload
- Upload your best plan to the website
- Provide us with your feedback
2016 Challenge: Left Breast Case

- **Case diagnosis:** Left Breast Cancer
- **R.O. Consultants:** Dr. Noha Jastaniyah (KSA) & Dr. Rana Mahmoud (UK)
- **Treatment Site:** Left breast with axilla and supraclavicular lymph nodes
- **Target:** PTV_TOT_EVAL
- **Dose prescription:** 50.0 Gy in 25 fr.
- **Protocol followed:** RTOG-1304 (Criteria squeezed more!)
- **Techniques:** 3D-CRT, IMRT, VMAT
- **General plan criteria** were set: # of fields, single isocenter, energies, ... etc
- Dose calculation grid should be less than 3 mm
- PB dose calculation is not allowed to be used
- Generated plan should be deliverable (no couch/patient collision)
### PlanIQ™ Evaluation Criteria

#### IQ Algorithm: 2016 Dosimetric Criteria Sheet (100 Max Possible) [18 Metrics] (Page 1 of 2)

<table>
<thead>
<tr>
<th>#</th>
<th>V (%)</th>
<th>D (Gy)</th>
<th>Criteria</th>
<th>Score Vector</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>V (%)</td>
<td>D (Gy)</td>
<td>Dose (Gy) covering 99% of the PTV_TOT_EVAL</td>
<td>≤ 45, &gt; 45, ≤ 47.8</td>
</tr>
<tr>
<td>2</td>
<td>V (%)</td>
<td>D (Gy)</td>
<td>Dose (Gy) covering 95% of the PTV_TOT_EVAL</td>
<td>≤ 45, &gt; 45, ≤ 50</td>
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<tr>
<td>3</td>
<td>V (%)</td>
<td>D (Gy)</td>
<td>Dose (Gy) covering 90% of the PTV_TOT_EVAL</td>
<td>≤ 52, &gt; 52, ≤ 54</td>
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<tr>
<td>4</td>
<td>V (%)</td>
<td>D (Gy)</td>
<td>Dose (Gy) covering 0.3 % of the PTV_TOT_EVAL</td>
<td>≤ 56, &gt; 56, ≤ 57</td>
</tr>
<tr>
<td>5</td>
<td>ROI A</td>
<td>Mean dose (Gy) inside the HART</td>
<td>≤ 6, &gt; 6</td>
<td></td>
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<tr>
<td>6</td>
<td>V (%)</td>
<td>D (Gy)</td>
<td>Volume % of the HART covered by 15 (Gy)</td>
<td>≤ 15, &gt; 15, ≤ 20</td>
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<tr>
<td>7</td>
<td>V (%)</td>
<td>D (Gy)</td>
<td>Dose (Gy) covering 5% of the HART</td>
<td>≤ 20, &gt; 20, ≤ 25</td>
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<tr>
<td>8</td>
<td>V (%)</td>
<td>D (Gy)</td>
<td>Dose (Gy) covering 0.3 % of the BREAST_RIGHT</td>
<td>≤ 3, &gt; 3, ≤ 3</td>
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<tr>
<td>9</td>
<td>V (%)</td>
<td>D (Gy)</td>
<td>Dose (Gy) covering 1% of the BREAST_RIGHT</td>
<td>≤ 3, &gt; 3, ≤ 3</td>
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<tr>
<td>10</td>
<td>V (%)</td>
<td>D (Gy)</td>
<td>Dose (Gy) covering 0.03% of the SPINAL CORD</td>
<td>≤ 20, &gt; 20, ≤ 20</td>
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**Generated By:** Ahmad Naseeb, King Faisal Specialist Hospital and Research Centre | 2/23/2016 6:36:24 PM

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#### Quality Score vs. PTV_TOT_EVAL (D[95.0%]) (Gy)

![Graph of Quality Score vs. PTV_TOT_EVAL (D[95.0%]) (Gy)](chart)
2016 Plan Competition – Top Planners

1. Hugues Mailloux
   RayStation - France

2. Fazal Khan
   RayStation - USA

3. Mikle Byrne
   RayStation - Australia

4. Cameron Ditty
   RayStation - USA

5. Mustafa Khodri
   RayStation - France

6. Simon Hienze
   Tomotherapy - Switzerland

7. Timothee Ruef
   Pinnacle - France

8. Ludovic Michon
   Pinnacle - France

9. Saad Al-Delaijan
   Eclips - Saudi Arabia

10. Perumal Murugan
    Eclipse - India
Knowledge Sharing Activities

Every Year

- Top Planners share their skills via webinars
- Webinars are posted on our YouTube channel
- Webinars (per TPS) can be accessed anytime

Radiotherapy Plan Competition & Medical Physics
More than 7500 views

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Radiation Knowledge
Conclusions

• **Radiation Knowledge** is a cloud-based quality improvement & knowledge sharing platform
• The radiotherapy plan competition is the first activity of our quality improvement initiative

• **Advantages Of Competition-Based Activities:**
  - Stimulate of planners to reach the peak of their personal planning skills
  - Top planners prove that all TPSs can achieve high scores .. The personal skill is the key
  - Unifies the world to plan one case, then best plans will be shared
  - Shares new planning methodologies among planners worldwide
  - It is the best way to share best practice at large scale (worldwide)

• Planning was the first step ... Competition concept will be applied to other fields
• Medical physics societies needs to be involved more, this makes improvements larger in scale
2017 Plan Competition – Join us tomorrow (7:30-9:00 AM)

No. of Countries

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No. Of Participants

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<td>2016</td>
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<tr>
<td>2017</td>
<td>1670</td>
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Radiation Knowledge

www.radiationknowledge.org

THANK YOU