Experience of an image guided radiotherapy (IGRT) training programme for Clinical Oncology trainees at Leeds Cancer Centre

Background

- Image guided radiotherapy (IGRT) is essential for safe and effective radiotherapy delivery
- Imaging prior to and during treatment delivery permits verification of patient set up and correction for tumour/internal organ motion
- Clinical Oncology trainees often have little experience in IGRT, as most decisions are made by radiographers and consultants

Methods

- We arranged two in-house training days in IGRT for clinical oncology registrars
- 11/21 (52%) trainees attended the first training day and 5/21 (24%) trainees attended the second training day
- In the morning, principles of IGRT were explained through lectures and interactive case-based discussions using cone beam CT (CBCT) images by radiographers and consultants
- In the afternoon, all trainees gained hands-on experience by shadowing radiographers performing IGRT in clinical practice on treatment machines
- Feedback was obtained from the training day and shadowing sessions
- A 23 question pre and post-course quiz was used for the second training day to evaluate effectiveness of the IGRT teaching sessions. Example cases with questions are shown in Figures 1 and 2

Table 1: Table showing pre and post-course quiz scores

<table>
<thead>
<tr>
<th>Candidate</th>
<th>Pre-course quiz</th>
<th>Post-course quiz</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15/23 (67%)</td>
<td>16.5/23 (72%)</td>
</tr>
<tr>
<td>2</td>
<td>4/23 (17%)</td>
<td>17/23 (74%)</td>
</tr>
<tr>
<td>3</td>
<td>12/23 (52%)</td>
<td>18/23 (78%)</td>
</tr>
<tr>
<td>4</td>
<td>15/23 (65%)</td>
<td>18/23 (78%)</td>
</tr>
</tbody>
</table>

Figure 1: CBCT image for lung stereotactic ablative radiotherapy (SABR) comparing planning CT position (purple) with on treatment position (green)

Questions asked regarding this image:
- 1. What is the change in this image? (Resolution of pleural effusion and change in tumour position)
- 2. What problems could this cause? (Loss of fluid could affect dosimetry to planning target volume (PTV) and organs at risk. Change in tumour position risks undercoverage)
- 3. How would you manage these changes? (Re-plan)

Figure 2: CBCT image for bladder radiotherapy demonstrating clinical target volume (CTV, light blue), PTV (dark blue) and rectum (purple)

Questions asked regarding this image:
- 1. What are the changes in this image? (Rectal distension and excess bladder filling causing bladder to move out of PTV)
- 2. What problems could this cause? (Undercoverage of PTV and overdose of rectum/bladder)
- 3. How would you manage these changes? (Ask patient to empty bladder, pass flatus and consider further rectal enema)

Results

- 16/21 (76%) trainees attended one of the two training days
- Individual IGRT teaching sessions were scored as excellent or good in all instances (see Figure 3)
- Post-course quiz results appeared to compare favourably with pre-course quiz results (see Table 1)
- Trainees reported that the teaching sessions and hands-on experience provided insight into radiographer-led solutions; experience in managing tumour motion; understanding about dosimetric consequences of tissue loss or gain and provided opportunities to take decisions following review of CBCT images

Figure 3: Bar chart showing combined feedback scores for individual IGRT teaching sessions over the two training days

Conclusion

- Experience in IGRT should be developed throughout clinical oncology training in collaboration with radiographers and consultants
- Our training programme has improved trainee experience and confidence in IGRT and has received excellent feedback
- We plan to run the course biannually so all trainees will attend/maintain competencies in IGRT and to expand to include trainees from other centres