Are therapeutic radiographers able to achieve a clinically acceptable match for stereotactic lung radiotherapy treatment (SBRT)?

J Hudson, F McDonald, M Ahmed, C Doolan, J Balyckyi, D Frost and H McNair
Royal Marsden NHS Foundation Trust and Institute of Cancer Research
SBRT

- High dose per fraction (Gy/#)
- Daily on-line imaging essential
- Clinical Oncologist present at each treatment
Why an audit?

Aim -
to assess the feasibility of radiographer led verification of CBCT images, providing safe and accurate verification in the absence of a clinical oncologist, for patients with solitary lung tumours.
The Royal Marsden

Method

- Retrospective review of 20 patients’ CBCT images from the first fraction.

- Comparison of clinician’s original verification with retrospective verifications by radiographers.

- A successful match for a given patient was an agreement within 2mm, in all three planes, between the clinician’s verification and the radiographer’s retrospective match.
For the technique to be declared a success, each radiographer should have at least 18 out of 20 correct matches.

For all radiographers combined there should be at least 92 out of 100 correct matches.
## Results

### Individual radiographers match success

<table>
<thead>
<tr>
<th>Observer</th>
<th>Left/right Match success</th>
<th>Superior/inferior Match success</th>
<th>Anterior/posterior Match success</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>19</td>
<td>19</td>
<td>18</td>
</tr>
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<tr>
<td>5</td>
<td>19</td>
<td>17</td>
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</tr>
</tbody>
</table>
All radiographers match success

- Left/right displacement: 94%
- Superior/inferior displacement: 91%
- Anterior/posterior displacement: 89%
Agreements for each CBCT in left/right direction
Agreements for each CBCT in superior/inferior direction
Agreements for each CBCT in anterior/posterior direction
# Verifications > 0.2cm by image ID, direction and observer ID

<table>
<thead>
<tr>
<th>Patient number</th>
<th>Tumour Location</th>
<th>Failed X observer ID</th>
<th>Failed Y observer ID</th>
<th>Failed Z observer ID</th>
<th>Failed XY observer ID</th>
<th>Failed XZ observer ID</th>
<th>Failed YZ observer ID</th>
<th>Failed XYZ observer ID</th>
<th>Total number of failures per CBCT</th>
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<tbody>
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<td>4,5</td>
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<tr>
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<tr>
<td>Number of directional fails</td>
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<td>6</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>1</td>
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</table>
Reasons for failure

**Patient number 2**
Lower left lobe
Small tumour

**Patient Number 7**
Lower left lobe
Small tumour
Bariatric
**Issues for discussion**

- GTV size
- chest wall thickness (at isocentre)
- tumour position

**Example**

Tumour size under $16\text{cm}^3$ with a chest wall thickness $> 4.5\text{cm}$ and the tumour is located in a lower lobe.

Review with clinician prior to commencement of SBRT.
Audit limitations

Radiographers - no specific training

No discussion with clinician

No peer discussion - Radiographer matched alone
Action plan

Anatomy and image review sessions with clinicians

Development of an advanced competency training workbook

Included 20 retrospective verification

Local implementation of radiographer-led on-line image verification for SBRT.
Local implementation

Completion of training sessions and workbook

1st fraction clinician present

2nd fraction onwards - radiographer led

Continuing audit to ensure competencies maintained.

Data collection has now commenced
Acknowledgements

Volunteer Radiographers

Volunteer clinicians

Study was undertaken as part of MSc at Kingston University
References


