Verification of Patient Treatment Accessories and Posture

Hui Zhao Ph.D.
Associate Professor
Radiation Oncology, Division of Medical Physics
University of Utah School of Medicine
Huntsman Cancer Institute

Conflict of interest
• None

Treatment Deviation
• A non-trivial percentage of radiation therapy treatment deviations are related to patient setup errors.

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physician order deviation</td>
<td>21</td>
<td>19.4%</td>
</tr>
<tr>
<td>Treatment planning deviation</td>
<td>26</td>
<td>24.1%</td>
</tr>
<tr>
<td>Treatment delivery deviation</td>
<td>61</td>
<td>56.5%</td>
</tr>
<tr>
<td>Total</td>
<td>108</td>
<td>100%</td>
</tr>
</tbody>
</table>

University of Utah 8-year retrospective study
Patient setup errors

• Patient ID error
• Patient treatment accessory error
• Patient posture error
• Patient treatment position error

Improving the safety and efficiency of patient setup and treatment

IDENTIFY System (HUMEDIQ)

➢ Biometric authentication (palm reader)
➢ Radiofrequency identification (RFID)
➢ Surface matching

Unique solutions target patient setup errors

• Patient ID error
• Patient treatment accessory error
• Patient posture error
• Patient treatment position error

Palm reader
RFID
Orthopedic surface
Surface guidance
Patient ID

- Face photo
- Biometric palm reader

  an improvement over the previous patient ID procedure
  - face photo
  - date of birth
  especially for non-English speaking patients

RFID for patient-specific setup devices

- Presence of immobilization and accessory devices
- Correct location of index-able immobilization and accessory device

Direct verification approach VS assuming therapists had followed the Setup Instructions correctly.
Orthopedic patient setup

- Accurate initial patient position and orientation at loading position
  - patient self-positioning
  - color-coded video feedback (agreement of real-time surface with simulation surface)
  - ceiling mounted screen display

- Noticeable improvement in setup efficiency by patient self-positioning

SGRT

- Similar function as AlignRT and C-Rad
  - patient treatment position body surface matching (CT simulation body contour DICOM from treatment planning system or captured body surface as reference)
  - Intra-fractional patient motion monitoring during IGRT imaging and treatment delivery.
  - DIBH application
    - handheld coaching monitor attached to the treatment couch for patients self-adjust breathing levels
Technology advantages
Combination of biometric, RFID, and surface matching enhancing
➢ safety
➢ efficiency
➢ treatment deviations prevention

Treatment deviation study in Utah
A retrospective study at University of Utah
• assess the potential of Identify technology to prevent treatment delivery related deviations
• over 8-year time frame
• 79% of treatment deviations regarded as preventable by Identify system
<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physician order deviation</td>
<td>21</td>
<td>19.4%</td>
</tr>
<tr>
<td>Treatment planning deviation</td>
<td>26</td>
<td>24.1%</td>
</tr>
<tr>
<td>Treatment delivery deviation</td>
<td>61</td>
<td>56.5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>108</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Deviation prevented by HumediQ IDENTIFY</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Likely</td>
<td>48</td>
<td>78.7%</td>
</tr>
<tr>
<td>Not likely</td>
<td>13</td>
<td>21.3%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>61</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Thank You!