DXA Decision Tree Tool: A New Solution for Interpretive and Workflow Inconsistencies
Authors

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Disclosures

Dr. Laura Bancroft
- receives book royalties from Lippincott Williams & Wilkins
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- is an editor-in-chief for Seminars in Musculoskeletal Radiology by Thieme Medical Publishers
Purpose

• Dual-energy X-ray absorptiometry (DXA) is the mainstay for evaluation of abnormal bone mineralization

• DXA is also one of the most commonly performed studies across any radiologic enterprise

• Due to the high volume of DXA studies performed, recurring inconsistencies are magnified
Purpose

• The most common inconsistency identified at our institution was placement of region of interest (ROI) markers, which often resulted in incorrect vertebral body exclusion/inclusion due to inaccurate T-scores

• These inaccuracies led to prolonged interpretation, decreased throughput, and increased risk to patients

• This quality improvement study sought to develop a systems-based solution that could be employed at any institution to mitigate this risk
Materials and Methods

• An electronic decision tool was developed, which integrated performance standards developed by the:
  • American College of Radiology (ACR)
  • Society for Pediatric Radiology (SPR)
  • Society of Skeletal Radiology (SSR)

• Interpretive guidelines set forth by the International Society for Clinical Densitometry (ISCD) were also incorporated
Materials and Methods

- The DXA decision tree tool was designed to ensure proper initial ROI placement and correct level exclusion.
- The tool was implemented at 19 imaging sites.
- Rates of study keywording for technologist correction and overall exclusion errors were analyzed 3 months before and 3 months after implementation.
DXA Decision Tree Tool Examples

DXA Decision Tree Tool Recommendations
DXA Decision Tree Tool Examples

<table>
<thead>
<tr>
<th>Region</th>
<th>BMD (g/cm²)</th>
<th>Young-Adult T-score</th>
<th>Age-Matched (%)</th>
<th>Z-score</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>0.993</td>
<td>-1.2</td>
<td>109</td>
<td>0.7</td>
</tr>
<tr>
<td>L2</td>
<td>1.221</td>
<td>0.1</td>
<td>124</td>
<td>2.0</td>
</tr>
<tr>
<td>L3</td>
<td>1.230</td>
<td>0.1</td>
<td>124</td>
<td>2.0</td>
</tr>
<tr>
<td>L4</td>
<td>1.151</td>
<td>-0.5</td>
<td>117</td>
<td>1.3</td>
</tr>
<tr>
<td>L1-L4 (L2,L3)</td>
<td>1.086</td>
<td>-0.8</td>
<td>114</td>
<td>1.1</td>
</tr>
</tbody>
</table>

DXA Decision Tree Tool Recommendations
DXA Decision Tree Tool Examples

DXA Decision Tree Tool Recommendations

Enter T Scores

L1: -2.6
L2: -1.1
L3: -0.6
L4: -0.4

Exclude

Optional Comments

Scan a Forearm if Rx Available
## Results

### Pre-DXA Decision Tree Tool Implementation (90 Days)

<table>
<thead>
<tr>
<th>Total DXA Cases</th>
<th>Total Keyworded Cases</th>
<th>Include/Exclude Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>5643</td>
<td>333</td>
<td>170</td>
</tr>
</tbody>
</table>

### Post-DXA Decision Tree Tool Implementation (90 Days)

<table>
<thead>
<tr>
<th>Total DXA Cases</th>
<th>Total Keyworded Cases</th>
<th>Include/Exclude Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>7100</td>
<td>248</td>
<td>101</td>
</tr>
</tbody>
</table>
Results

- Implementation of the DXA decision tree tool resulted in an immediate, statistically significant ($p < 0.0001$ using comparison of proportions), reduction in the number of keyworded cases due to ROI-related exclusion/inclusion errors by 52.8%.

- Of the 248 keyworded cases with an ROI-related exclusion/inclusion error after DXA tool implementation, 20 cases (0.3%) were keyworded due to a failure to use or incorrect use of the DXA decision tree tool.

- Approximately 24,400 DXA scans are performed annually across our imaging enterprise, and continued use of the DXA decision tree tool will result in 400 fewer study delays per year due to ROI-related exclusion/inclusion errors.
Conclusion

- Inconsistencies in DXA performance and interpretation fosters delayed and inaccurate diagnoses as well as improper management, with downstream morbidity and mortality implications

- Mandatory utilization of a reliable tool, such as the one developed in this study, can produce immediate and drastic improvement in quality of care within any healthcare setting
Questions or Comments?

• For questions or comments regarding the DXA decision tree tool, please contact Dr. Alexander Leyva via email:

alexander.leyva.md@adventhealth.com