Using 3D stereophotogrammetry to evaluate the stability, and positional accuracy of a breast immobilisation device

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Using 3D stereophotogrammetry to evaluate the stability, and positional accuracy of a breast immobilisation device

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Background
• Breast cancer is the most frequent cancer among women globally, with an estimated 1.7 million new cases diagnosed in 20121.
• Developments in radiotherapy treatment complexity require more accurate breast stabilisation. The rationale supports the evaluation of a novel bra (S4A bra) created by the SuPPORT 4 All study team.
• 3D stereophotogrammetry (3dMD) is a non-invasive system with the potential to evaluate breast positional accuracy within the S4A bra in relation to anatomical landmarks2 ahead of a clinical feasibility study.

Aims & Objectives
1. To assess if 3dMD is a useful tool to establish the capabilities of the S4A bra outside of the clinical setting.
2. To investigate the capability of the S4A bra compared to no bra to accurately reproduce breast shape and position after repeated placement.

Methods
Four surface scanning images of a healthy volunteer were taken: 2 of repeated bra fittings when wearing the S4A bra, and 2 when the participant wore no bra. This allowed direct comparisons to be made.

Results
Presented are the results for a single case as an example. Positional movements of breast tissue (measured in mm), and changes in breast shape were assessed. Table 1 shows the differences between breast placement over 2 repeated images without and with the S4A bra.

<table>
<thead>
<tr>
<th></th>
<th>Average Distance (AD) in mm</th>
<th>AD+</th>
<th>AD-</th>
</tr>
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<tbody>
<tr>
<td>No bra</td>
<td>-0.8</td>
<td>3.6</td>
<td>4.1</td>
</tr>
<tr>
<td>S4A bra</td>
<td>1.8</td>
<td>5.7</td>
<td>3.7</td>
</tr>
</tbody>
</table>

Table 1: Comparison of deviation from 2 overlaid images

The images show the +/-5mm deviation analysis of 2 repeated images overlaid: green colour wash indicates 3mm deviation. Red shows a +5mm error and blue a -5mm error.

Conclusion
Indications are that 3dMD scanning maybe a suitable method for assessing set up accuracy of new immobilisation devices prior to introduction to clinical practice as part of the product development process.

References
1. [http://globocan.iarc.fr/oldFactSheets/cancers/breast-new.asp](http://globocan.iarc.fr/oldFactSheets/cancers/breast-new.asp) last accessed 11/03/16

Further participants will be scanned until a total of twenty cases with repeated images are available for analysis.

This work is funded by the National Institute for Health Research (NIHR) Invention for Innovation Programme (programme grant number: II-LA-0214-20001)