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Paper Title: An Investigation into Force Sensor Performance with Off-loading Materials of Varied Hardness and Thickness

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Abstract

The combined use of off-loading materials and force sensors benefits medical applications such as in pressure injuries (PIs) prevention. Investigating the effects of different material hardness and thickness aids in selecting suitable combinations. This research guides in-house device development by optimizing material-sensor selection. Some reports explored the impact of off-loading materials on force sensors. However, the number of studies was limited, and comparisons between different hardness and thickness were lacking. This study applied standard forces to the Flexiforce™ A201 sensor on top of three different offloading materials (Dynoform, Nora Lunairflex, Nora Lunairmed) with varied hardness and uniform thickness, using the Multicork as a stable base. Additionally, models with different thicknesses but uniform hardness were also tested. The results revealed that when using the Flexiforce™ A201 sensor with softer materials, higher measured resistance was observed, indicating lower force. On the other hand, thicker materials with uniform hardness exhibited increased resistance. However, this study has some limitations, such as a restricted force range due to the sensor's load capacity, a relatively narrow range of hardness and thickness comparisons for off-loading materials, and the use of only one sensor. Future research should address these limitations by utilizing multiple sensors for enhanced accuracy and investigating a broader range of loads, hardness, and thickness of off-loading materials to facilitate more comprehensive comparisons.
