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# Sitting Pressure Analysis Using A Partial Calibrated Pressure Mat

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ABSTRACT

Pressure mapping is a non-invasive and reliable method for clinical assessment of the risk of pressure injury. A pressure mat is a common tool for sitting pressure measurement. Misuse or misalignment of inflator bag can form a partially calibrated pressure mat and generate unreliable and imprecise measurement results. The objectives of this study were (1) to develop a procedure that can improve the applicability of a partially operational pressure mat and (2) to assess the precision of the proposed procedure by validating the sitting pressure distribution and center of pressure (COP) against the simultaneous measurement results of a fully calibrated pressure mat. To this end, first, recordings of pressure sensor elements were sorted by the sensor element position. Second, the recordings obtained by the non-calibrated areas were corrected to zero while the recordings of calibrated areas were kept without any correction. Third, the recordings of calibrated and non-calibrated areas were composed accordingly to form the nominal readings of a fully calibrated pressure mat. Then, the nominal readings were processed by our proposed graphical user interface (GUI) which contained the standard pressure data processing methods used by the relevant commercial pressure mat. Finally, the statistical parameters of pressure distribution and COP were calculated. The proposed procedure was validated by the data measured with two "FSA" pressure mats (Vista Medical Ltd, Canada). One partially calibrated and one fully calibrated pressure mats were placed fully aligned to each other on a flat surface. Both pressure mats recorded synchronously in the following experimental tests: 1) a concentrated weight was applied to predetermined positions to investigate the COP offset of two pressure mats and 2) five participants sat still on the pressure mats 5 times each. The COPs obtained for the five predetermined positions measured by two pressure mats were fitted with a least square method. The fitted origin offset of two mats in the X and Y axis is 2.4 mm and 9.35 mm, respectively. For the sitting pressure measurement, the two pressure mats had the same readings of maximum pressure and similar readings of mean pressure, variance and standard deviation with the difference of less than 10% of the reading of the fully calibrated pressure mat. Similar differences were observed in COP value of X and Y axis. In conclusion, our developed procedure together with a GUI could be a suitable solution to the data processing of a partially calibration pressure mat.