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Objective: To assess the peak interface pressures on the head, scapulothoracic (ST), sacroiliac (SI), and heel regions on a standard spine board (SSB) and the fourth pressure reducing modification of a proof of concept spine board (P-4) during spinal immobilization.

Design: Prospective Study

Participants/Methods: Twelve healthy, able-bodied men and women were evaluated on both the SSB and P-4 boards. Height, weight, sex, and age were recorded pre-study. Volunteers were secured to the back board with arm and foot straps. The FSA Boditrak pressure mapping system was used to monitor interface pressure at the head, scapulothoracic (ST), sacral iliac (SI), and heels for each subject on both SSB and P-4. Measurements were recorded every minute for 15 minutes.



Figure 1: Photo of participant on spine board and FSA Boditrak pressure mapping mat.

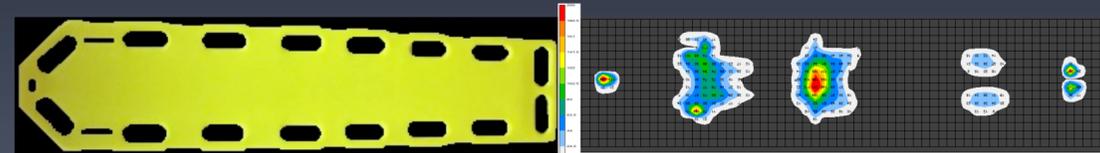


Figure 2: Photo of SSB used in study and representative interface pressure recording.

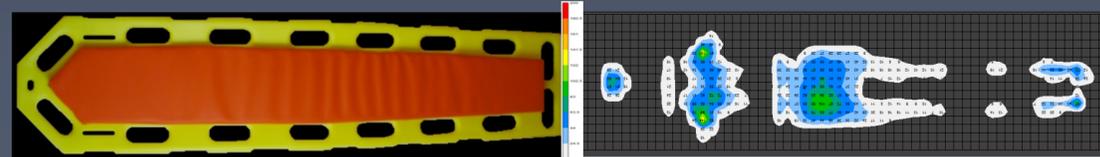


Figure 3: Photo of P-4 used in study and representative interface pressure recording.

Results: The mean age was 28.2 years, mean weight was 161.9 lbs., mean height was 67.7 in., and mean BMI was 24.5. The mean of the peak pressures on SSB at the head, ST, SI, and heel locations were 256.2 mmHg, 165.2 mmHg, 412 mmHg and 281.5 mmHg respectively. The mean of the peak pressures on P-4 at the head, ST, SI, and heel locations were 66.9 mmHg, 77.8 mmHg, 100.9 mmHg and 105.1 mmHg respectively. A repeated measures for pairwise comparisons test, with BMI as a covariate, showed that interface pressures at each body location was significantly lower ($p < .001$) with the P-4 board compared to the SSB.

	SSB	P-4	p-value
Head	256.2	66.9	<0.001
S-T	165.2	77.8	<0.001
S-I	412	100.9	<0.001
Heel	281.5	105.1	<0.001

Table 3: Mean peak interface pressure and statistical significance by board and body area.

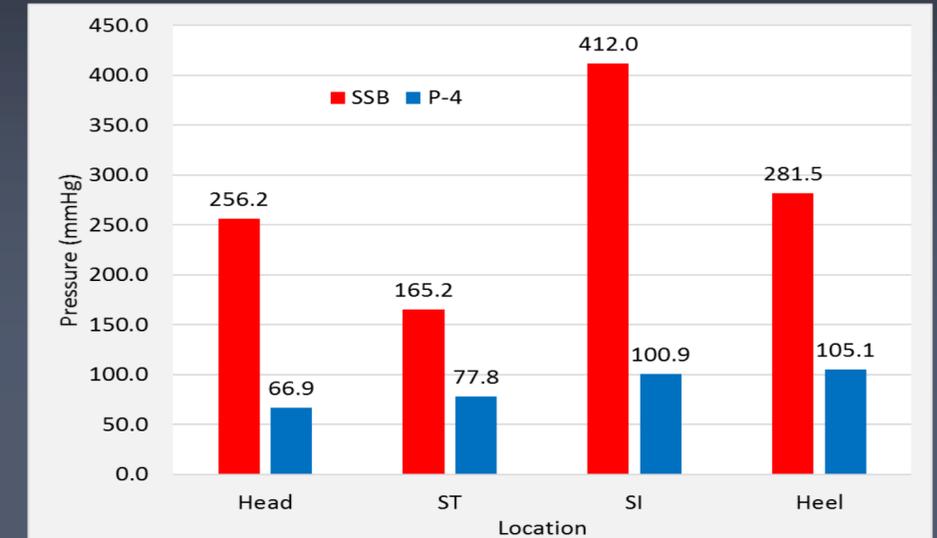


Figure 4: Graphic comparison of interface pressures on SSB compared to P-4.

Conclusion: Spine immobilization on a SSB generates high interface pressures at the head, ST, SI, and heel regions. The P-4 proof of concept modification of the spine board significantly reduced the peak pressures at the head, ST, SI, and heel locations. This study can be used to facilitate future SSB modifications that aim to reduce peak interface pressures in the effort to reduce this contributing factor that can lead to medical device related pressure injury.

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