Ergonomic Back Support Apparatus for Surgeons: A Novel Approach to Lumbar Strain

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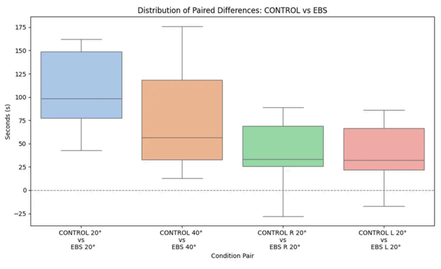
Introduction:
The prevalence of degenerative lumbar spine disease among doctors has increased over the last 20 years. We designed an ergonomic back support harness prototype (EBS) with the goal of reducing lower-back strain.

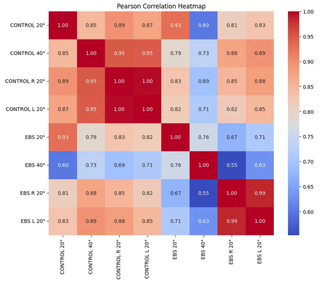
Methods:
Medical students (MS) (n = 10) were instructed to perform endurance tasks under two conditions: without (control) and with the EBS while lifting a 6 kg weight at incline positions of 20°, 40°, leaning right 20°, and leaning left 20°; endurance times were recorded. The device was additionally tested by 4 surgeons over a 30-day period. Likert-scale questionnaires were distributed to each group. Paired t-tests assessed differences in endurance between conditions, and the Shapiro-Wilk test verified normality. Pearson and Spearman correlation analyses evaluated performance trends and subjective questionnaire responses. Cronbach's alpha assessed the reliability of responses separately for MS and surgeons.

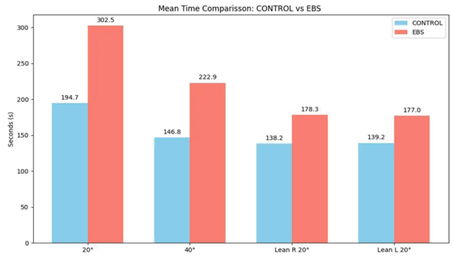
Results:
Total cost amounted to 50.04USD/device. Our data indicated high satisfaction among the surgeons, reporting significant reduction in lower-back pain. In the MS group, EBS significantly increased endurance time across all conditions ($p \leqslant 0.03$), with the largest improvement observed at 20° (mean difference = 107.8s, p = 0.02). Spearman correlations revealed associations between comfort, movement of freedom, and perceived usability. Questionnaire reliability was poor for students ($\alpha = 0.251$) but excellent for surgeons ($\alpha = 0.969$). These findings suggest that EBS enhanced endurance in non-ergonomic postures and was well-received.

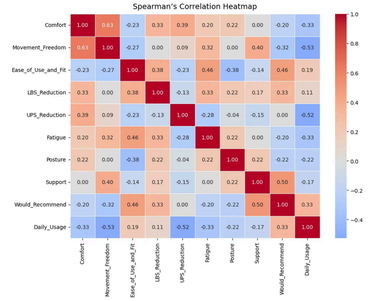
Conclusion:
The low cost, ease of production, and wearability in the OR makes our device a strong candidate for improving surgical ergonomics.

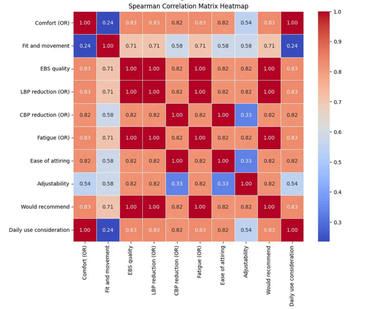














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