Abstracts

Poster: 0043

Validation and Reliability of a Checklist for Evaluating Cab Design Characteristics of Mobile Construction Equipment

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Operators of heavy mobile construction equipment often incur high rates of musculoskeletal disorders (MSDs). This is contributed to, in part, by exposure to awkward postures during the operation of the equipment which are a consequence of the design of the cab, location of controls, and work procedures. However, there is a lack of valid methods capable of describing postural stresses among these operators. The objectives of the study are: 1) to validate a cab design checklist by: a) collecting postural data among operators of ten different types of heavy construction equipment, b) analyzing postural data using video analysis, and c) assessing correlations between scores from the checklist and the postural analysis for specific joints; and 2) assess the reliability of the checklist by: a) collecting data using cab design checklist, and b) assessing the inter-rater reliability of the raters administrating the checklist. Results from the correlation analysis showed that shoulder flexion posture was correlated with scores from the cab design checklist (left shoulder flexion r=0.81, p=0.004; right shoulder flexion r=0.52, p=0.073). However, results of the cab design checklist were not significantly correlated with shoulder abduction (left, r=0.26, p=0.249; right, r=-0.17; p=0.330), neck flexion (r=0.34, p=0.185), neck lateral bending (r=0.01, p=0.492), neck twist (r=0.32, p=0.201), nor any torso postures (flexion, r=-0.49, p=0.88;,lateral bending, r=0.14, p=0.359; twist, r=-0.15, p=0.347). The inter-rater reliability assessment resulted in kappa coefficients ranging from 0.52 to 1.0 (good to excellent reproducibility) across the ten different pieces of construction equipment rated, and an overall kappa coefficient of 0.77 (excellent reproducibility) when considering all equipment ratings together. The results suggest that the cab design checklist can be used as a screening tool to provide an assessment of cab design characteristics that contribute to awkward postures of shoulder, and may be useful for identifying cab design characteristics for further improvement. Additionally, the strength of the inter-rater reliability assessment suggests that outcomes of the cab design checklist administered by different individuals will be consistent independent of the type of equipment being assessed.

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