# Development and Validation of a Novel Survey Measuring Lumbar Activity Levels: The Hospital for Special Surgery Core Health Evaluation - Lumbar Activity Rating Scale (HSS CHEV-LARS)
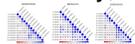
Eric Rong Zhao, Luis Felipe Colon, Kasra Araghi, Olivia Tuma, Tomoyuki Asada, Han Jo Kim, Francis Lovecchio, Sheeraz Qureshi, Sravisht Iyer

INTRODUCTION: Preoperative activity level provides a key baseline metric to evaluate postoperative recovery. While there are surveys measuring activity levels in other areas of orthopedics, there are no such validated surveys in spine surgery. Stratifying patients by preoperative activity level may help guide treatment decisions such as conservative versus surgical management and decompression alone versus fusion in select patients. Our purpose was to develop and validate an activity rating scale for lumbar spine patients.
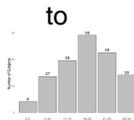
METHODS: This was a phased prospective validation study. During Item Generation/Item Reduction/Pilot-Testing Phases: clinic patients ≥ 18 years with lumbar pathology and no prior lumbar surgery were recruited; during Validation phase: volunteer respondents ≥ 18 and ≤ 89 years in the United States were recruited. We collected demographics, level of activity, Oswestry disability index (ODI), and PROMIS physical function computer adaptive test (PROMIS PF CAT). In phase 1 (item generation), 40 patients were interviewed on activities that involve and are most limited by low back symptoms. 12 activities was generated. In phase 2 (item reduction), 40 separate patients rated activities on a scale from 1-10 for "importance" and "difficulty". Correlation matrices and clinical judgement were used to generate a pilot survey. In phase 3 (pilot-testing), 40 separate patients provided feedback on clarity, structure, and relevance to generate a final lumbar activity rating scale: (HSS CHEV-LARS). In phase 4 (validation) 205 respondents from a secure research crowdsourcing platform (CloudResearchTM) completed the HSS CHEV-LARS, ODI, and PROMIS PF CAT. The same respondents were asked to complete the HSS CHEV-LARS again 1 week later for test-retest validity via intraclass correlation coefficient (ICC). Construct validity was assessed by correlating the HSS CHEV-LARS with ODI, PROMIS PF CAT, age, and BMI. Internal consistency was assessed with Cronbach's alpha.

RESULTS: The 12 activities from phase 1 involved q1) elevation change q2) running q3) walking q4) standing q5) sitting q6-7) carrying objects below and above the waist q8) repetitive or heavy lifting q9) moving objects across the floor q10) bending forward or down q11) handling objects overhead q12) twisting. Q2 was removed due to low importance; q5) was removed due to low difficulty; q3/q4 and q6/q7 were combined due to high correlations; q8/q10 were combined due to similarity; q9 was removed due to overlap with other questions. Two questions on exercise were added based on clinical judgement. The HSS CHEV-LARS showed significant correlation with age (R=-0.182, p=0.009), ODI (R=-0.319, p<0.001), and PROMIS PF CAT (0.434, p<0.001). There was no significant correlation between HSS CHEV-LARS and BMI. Floor effect was observed in 23.4% of ODI responses; no floor or ceiling effects were noted on HSS CHEV-LARS. Cronbach alpha showed good internal consistency (0.80). Responses approached a normal distribution. 151 respondents completed test-retest; ICC showed good/almost excellent reliability (0.867).

DISCUSSION AND CONCLUSION: We developed and validated a novel lumbar activity rating scale. Future studies should investigate associations between HSS CHEV-LARS and other metrics, such as complications and postoperative recovery, to assess prognostic potential.