

## PAPER 37

### Defining minimally important differences in functional outcomes for musculoskeletal oncology patients undergoing lower extremity endoprosthetic reconstruction

#### Cover Letter: Young Investigator Award

I am currently a fourth-year orthopaedic surgery resident and will be undergoing a fellowship in musculoskeletal oncology at the University of Toronto in 2023-24. With respect to the current abstract, I was the lead author who conceived the idea, analyzed the data and wrote the abstract/manuscript.

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#### Abstract

**Background:** Functional outcomes are commonly reported in studies of musculoskeletal oncology patients undergoing limb salvage surgery; however, interpretation requires knowledge of the smallest amount of improvement that is important to patients – the minimally important difference (MID).

**Purpose:** To establish the MIDs for the Musculoskeletal Tumor Society Rating Scale-93 (MSTS-93) and Toronto Extremity Salvage Score (TESS) in patients with bone tumors undergoing lower limb salvage surgery.

**Methods:** This study was a secondary analysis of the recently completed PARITY (Prophylactic Antibiotic Regimens in Tumor Surgery) study evaluating patients with bone and soft tissue tumors undergoing lower extremity limb-salvage surgery and endoprosthetic reconstruction. We used MSTS-93 and TESS data from this trial to calculate: (1) the anchor-based MIDs using an overall function scale and a receiver operating curve analysis, and (2) the distribution-based MIDs based on one-half of the standard deviation of the change scores from baseline to 12-month follow-up.

**Results:** Of the 604 patients included in the PARITY trial, 591 patients had functional outcome scores available for analysis. The Pearson correlation coefficients for the association between changes in MSTS-93 and TESS scores and changes in the external anchor scores were 0.71 and 0.57, indicating “high” and “moderate” correlation. The anchor-based MID was 12 points for the MSTS-93, and 11 points for the TESS. Distribution-based MIDs were larger; 16-17 points for the MSTS-93, and 14 points for the TESS (Table 1).

**Conclusions:** The current study has established MIDs for the MSTS-93 and TESS, based on 591 patients with bone tumors undergoing lower extremity endoprosthetic reconstruction. Our estimates of MIDs for the MSTS-93 and TESS will facilitate interpretation of the importance of treatment effects, which will enable informed decision-making in trading off desirable and undesirable outcomes of alternative management strategies. The MIDs will also guide sample size calculations for subsequent studies of interventions directed at improving health-related quality of life in musculoskeletal oncology and facilitate a shift from a focus on statistical significance to patient-importance and value-based care in oncologic patients. These thresholds for minimally important improvement will also facilitate responder analyses. We suggest use of anchor-based MIDs which are grounded in changes in functional status that are meaningful to patients.

**Table 1.** Distribution and Anchor-Based Minimal Important Differences in MSTS-93 and TESS scores

Outcome Measure	Distribution Based MID		Anchor-based MID
	0.5 SD of Preoperative Scores	0.5 SD of change scores from baseline-12 months	
MSTS-93	15.8	16.8	11.7
TESS	14.2	14.2	10.8
MID = minimal important difference; MSTS-93 = Musculoskeletal Tumor Society Score; TESS = Toronto Extremity Salvage Score; SD = Standard Deviation			