Baseline-Stratified MCID Estimates and Responder Classification After Knee Arthroplasty Rehabilitation

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Key Finding: Baseline-stratified Minimal Clinically Important Differences (MCIDs) increased the mean responder rate across six outcomes from 40.4% to 50.5% (+10.1 percentage points).

Background and Objective

- Heterogeneous baseline health status after knee arthroplasty
- Admission status strongly predicts MCID-based non-response[1]
- Lack of Austrian rehabilitation reference values & MCIDs

- Establish baseline-stratified reference values and MCIDs
- Examine changes in responder classification

Methods

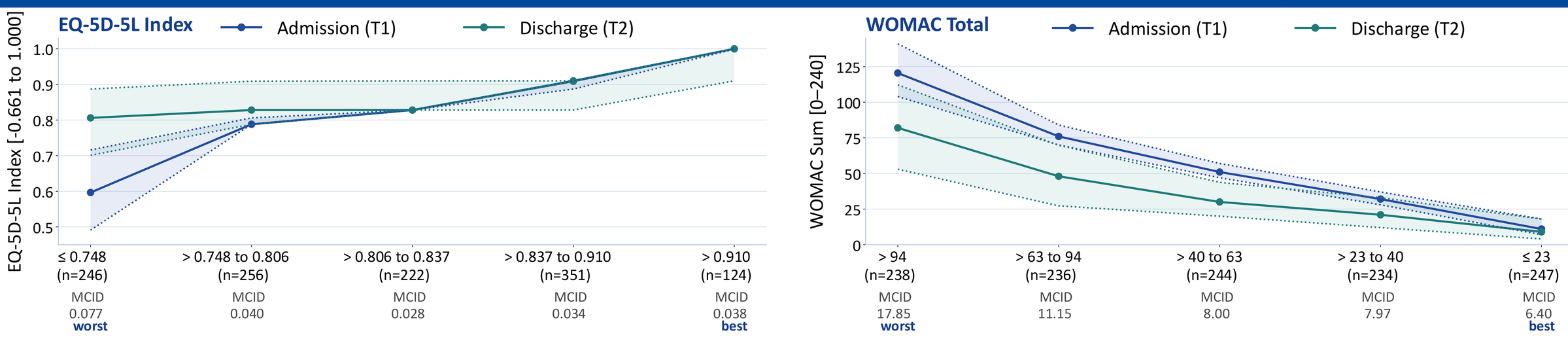
- Retrospective, four Austrian rehabilitation centers (2023–2024)
- Knee arthroplasty patients, complete pre-post data (N = 1,199)
- Six Outcomes: EQ-5D-5L, EQ-VAS, NRS, HAQ, PHQ-4, WOMAC
- Paired t-tests; within-subject Cohen's d; regression models
- Baseline-stratified percentiles; MCIDs = 0.5 × pooled SD
- Exact McNemar tests; Holm–Bonferroni correction

Table 1. Rehabilitation outcomes, MCID estimates, and responder classification (N = 1,199)

Outcome	Admission mean ± SD	Δ Mean	Cohen's d	Global MCID	Baseline-stratified MCID range	Responders global (%)	Responders baseline-stratified (%)	Δ responders (pp)
EQ-5D-5L Index	0.81 ± 0.14	+0.039	0.27 ***	0.07	0.028–0.077	36.4	36.6	+0.3
EQ-VAS	64.3 ± 19.9	+5.18	0.23 ***	10.20	6.26–8.98	32.4	46.1	+13.7 ***
Pain NRS	4.0 ± 2.1	+0.95	0.54 ***	0.99	0.42–0.71	60.6	60.6	0.0
HAQ	0.67 ± 0.49	+0.127	0.38 ***	0.24	0.098–0.179	40.8	49.9	+9.1 ***
PHQ-4	2.66 ± 2.55	+0.83	0.37 ***	1.17	0.46–1.10	29.4	48.8	+19.3 ***
WOMAC total	59.6 ± 41.8	+17.47	0.57 ***	19.90	6.40–17.85	42.7	61.1	+18.4 ***

SD = standard deviation; Δ Mean = mean improvement (positive = better); pp = percentage points; *** $p < 0.001$ (paired t-test for Cohen's d; Holm-adjusted exact McNemar test for Δ responders).

Figure 1. Baseline-stratified reference values at admission and discharge



Solid lines = medians; shaded areas = interquartile ranges (P25–P75); dotted lines = P25 and P75.

Results

- **Cohort:** Age 68.2 ± 9.7 years; 59.8% female; stay 21.4 ± 1.9 days
- **Rehabilitation effects:** All six outcomes improved significantly from admission to discharge ($p < 0.001$).
- **Baseline dependence:** Admission scores were the strongest predictors of discharge outcomes.
- **Responder classification:** Significant differences for EQ-VAS, HAQ, PHQ-4 and WOMAC (Holm-adjusted $p < 0.001$).

Discussion

- **Global vs. stratified MCIDs:** A single threshold may inadequately reflect differences in baseline health status.
- **Methodological considerations:** Differences may partly reflect restricted variability within baseline strata and floor/ceiling effects.

Clinical Implications

- **Baseline-specific reference values:** May support more individualized interpretation and benchmarking of rehabilitation outcomes.
- **Clinical relevance:** Higher responder rates do not necessarily indicate more meaningful improvement

Conclusion

- **Key message:** Baseline-stratified MCIDs substantially influence how rehabilitation success is classified, highlighting the importance of accounting for patients' initial health status when interpreting outcomes.
- **Next step:** Prospective validation using patient-reported anchors to establish clinically meaningful change thresholds.

Literature: [1] Hubel NJ, Prüfer F, Bily W, et al. Development and validation of machine learning models for predicting rehabilitation non-response after knee arthroplasty. Front Rehabil Sci. 2026;7:1930836. doi:10.3389/fresc.2026.1930836.

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