

Patient Reported Outcomes and Clinician Reported Outcomes Commonly Used in Orthopedics and Oncology

Justin E. Bird MD*, Joseph E. Niland, Valerae Lewis MD, Theresa Nalty, PhD, PT, NCS

Justin Bird, MD

E-mail: jebird@mdanderson.org

Joseph Niland, MS

E-mail: jeniland@mdanderson.org

Valerae Lewis, MD

E-mail: volewis@mdanderson.org

Theresa Nalty, PhD, PT, NCS

E-mail: tnalty@mdanderson.org

*Department of Orthopaedic Oncology, University of Texas MD Anderson Cancer Center, Houston TX

Background: There is a plethora of outcome measurements available to assess physical function, pain, quality of life, mobility, and emotional well-being. In the field of orthopedics, these tools have been most commonly to document change in patients with arthritis who undergo joint replacement or spinal fusion surgery. Functional tools designed to assess a specific population (e.g. shoulder injuries in athletes) would not be useful to assess the shoulder of an elderly person. Selecting an outcome tool in orthopedic oncology can be particularly challenging due to the multisystem impact of the disease and the treatments. Oncology specific measures such as the Karnofsky and the ECOG rely on the clinician to rate the patient's function. Recently, there has been an initiative to include patient-reported functional and quality of life measures in the standard of care. In order to make an informed decision on which tool to utilize, a review of the literature was performed to identify the most widely reported orthopedic outcome measures.

Purpose: Identify highly published orthopedic and functional outcome measures for specific regions of the body.

Methods: Commonly used orthopedic outcome measures (including those for arthritis, trauma, and sports injuries) were selected for a literature review using PubMed, Scopus, EMBASSE, EuroPubMed Central, and electronic journals such as JBJS and CORR to determine the frequency of citation in peer-reviewed journals. For measures with acronyms and variations of the name all possible listings were included in the search, but the resulting titles were screened for appropriateness to orthopedic oncology.

Results: See Table 1 for the frequency of published articles for some of the commonly used orthopedic outcome scores and Table 2 for the frequency of published reports using orthopedic oncology and functional outcome scores.

Table 1 Orthopedic Outcome Measures (Publication Frequency in Parentheses)

Cervical Spine	Neck Disability Index [†] (1004)		
Lumbar Spine	Back Pain Index score (1104)	Oswestry Disability Index ^{††} (3749)	
Hip	Harris Hip Score (2844)	WOMAC ^{‡‡} (4513)	Oxford Hip Score (427)
Knee	Knee Society Score ^{†††} (2247)	International Knee Documentation Committee Score (1255)	Knee Injury & Osteoarthritis Outcome (645)
	Modified Cincinnati Rating (74)	Tegner Lysholm Knee Scoring Scale (52)	
Foot/Ankle	American Orthopaedic Foot and Ankle Score [*] (1868)	Foot and Ankle Disability Index (94)	
Shoulder	Constant Shoulder Score ^{**} (1760)	DASH Score (1761) QuickDASH (263)	American Shoulder and Elbow Surgeon Score (ASES) with clinician and patient reported sections (806)
Elbow	MAYO Elbow Score ^{***} (546)		
Wrist	MAYO Wrist Score (330)		
Hand	Michigan Hand Outcomes Questionnaire ^{‡‡} (405)		

Legend:

[†] Also called Vernon & Mior Cervical Spine Score

^{††} Also called Oswestry Disability Index Questionnaire, ODI, Oswestry back pain score, Oswestry Disability Score, Oswestry back pain score

^{†††} Also call Knee Society Clinical Rating System

^{*} Also called American Foot and Ankle score, AOFAS, and Clinical Rating System for the ankle and hindfoot

^{**} Also called Constant Score

^{***} Also called Mayo Elbow Performance Score (MEPS) and Mayo Elbow Performance Index (MEPI), and the Mayo Clinic Performance Index for the Elbow

^{‡‡} Also called Michigan Hand Outcome Questionnaire, MHOQ

^{‡‡‡} name is Western Ontario and McMaster Universities Arthritis Index, but also called by 30 other iterations substituting "University", removing "and", substituting "Score or Scale", abbreviating to WOMAC (index, score, scale) or WOMAC osteoarthritis (index, score, or scale) or WOMAC arthritis (index, score, or scale). The WOMAC HIP is different from WOMAC knee, but not differentiated in keywords except in 15 publications for the hip

Table 2

Cancer Specific	Function Specific	Quality of Life
Karnofsky [‡] (8993)	ASIA [‡] (1038)	SF36 ^{‡‡} (28328) SF36 v 2(106)
Spinal Instability Neoplastic Score [£] (38)	Oxford Shoulder Score ^{‡‡‡} (178)	EORTC QLQ-C30 ^{‡‡‡} (4003)
MSTS ^{££} (778)	Oxford Elbow Score ^ˆ (33)	EuroQOL EQ-5D ^{‡‡} (6959)
Moran Biagini Neurologic Classification (1)	PROMIS Global Health short form (12)	
ECOG [#] (15770)	PROMIS Physical Function 10 q ^ˆ (56)	
MDASI (410) and MDASI spine ^{###} (4)	PROMIS NeuroQOL UE Function ^{ˆˆ}	

	κ (14)	
Edmonton Symptom Assessment ### (324)	Barthel (7225)	
SOSGOQ † (12)	Pelvic Floor Impact Questionnaire (247)	
TESS †† (139)	Brief Fatigue Inventory (451)	
MSKCC Bowel ††† (21)	BORG Rate of Perceived Exertion* (55), BORG Dyspnea (62)	
	Timed Up and Go Test** (2956)	
	FIM **** (3518) FIM stairs (2)	
	10 meter walk test (163)	
	Braden Scale (337)	
	Berg Balance Scale (1826)	
	9 hole peg test (268)	
	Amputee Mobility Predictor (12)	
	Rivermead Mobility (299)	
	VAS pain † (3747)	
	Pelvic Girdle Questionnaire (3)	

Legend:

- £ Also called Spine Instability Neoplastic Score (SINS)
- ££ Also called Musculoskeletal Tumor Society Score (or Scale), and Musculoskeletal Tumor Society Rating Scale
- # Also called ECOG-PS, Eastern Cooperative Oncology Group Performance Status, ECOG Performance Score (Status)
- ### Also called MD Anderson Symptom Inventory, MD Anderson Symptom Inventory Spine
- #### Also called Edmonton Symptom Assessment Score (or Scale), ESAS NRS
- ± Also called Karnofsky Performance Status (or Scale or Score), Karnofsky PS, Karnofsky Scale (or Score)
- † Also called Spine Oncology Study Group Outcomes Questionnaire
- †† Also called Toronto Extremity Salvage Score
- ††† Also called Memorial Sloan Kettering Cancer Center Bowel (or Bowel Function), MSKCC Bowel, MSKCC Bowel Function
- ∅ Also called ASIA Impairment Scale (Score), American Spinal Injury Association Scale (Score or Criteria), ASIA Scale (Score or Criteria), ASIA Scale (Score or Criteria)
- ∅ ∅ Also called Short Form 36, SF-36
- ∅ ∅ ∅ Also called Oxford Shoulder, Oxford Shoulder Scale
- κ Also called Oxford Elbow, Oxford Elbow Scale
- κ κ Also called PROMIS Physical Function, PROMIS-PF 10 a, PROMIS-PF
- κ κ κ Also called Neurology Quality-of-Life Measurement System
- κκ Also called BORG RPE
- κκκ Also called TUG
- κκκκ Also called Functional Independence Measure
- † Also called Visual Analog pain scale (or score), VAS pain score
- † † Also called EQ5D, EQ-5D, EuroQOL EQ5D
- † † † Also called QLQ-c30, QLQ C30, version 3 (or version 3.0, version 2.0, +3, CAT, version 2)

Conclusions: The most commonly cited outcome measures, relevant to our practice of orthopaedic oncology, were identified through a rigorous search of the literature. Many of the most commonly cited orthopaedic outcome measures were developed for the arthritic orthopedic patient population and may not capture the same degree of change in the orthopedic oncology population when comparing pre- to post-operative function and quality of life. Cancer patients carrying a host of co-morbid conditions and/or undergoing adjuvant therapies have unique factors that affect post-operative outcomes. In a time when outcome measures need to be chosen to be a measure of change over time, it is imperative to understand the patient population for which the measure was designed and validated before assuming it will capture change in an orthopedic oncology patient. Furthermore, despite the frequency of reported use of orthopedic outcome measures, future funding sources and stakeholders will undoubtedly demand to know if the tools are valid or reliable. Additional evaluation of the outcome measures is needed to demonstrate the higher levels of reliability and validity in the specific patient population being evaluated. Ongoing studies are underway to determine which measures capture functional and quality of life

changes over the span of cancer survivorship. In the meantime, it is recommended that orthopedic oncologists use both clinician-reported and patient-reported outcome measures with inclusion of quality of life measures in order to identify what is important to the patient in terms of outcome and to identify which interventions provide responsive information on changes over time in the patients' function and quality of life.