

Outcome scores: what they measure, and what they don't

Overview

- Patient-reported outcome measures (PROMs) are critical for capturing the patient's perspective on health status, which cannot be observed through clinical tests or imaging [37].
- The term PROM is a relatively new designation for a range of measures that have existed since at least the 1960s [90].
- Standardized health-related outcome measures require evidence for change and a way to interpret change within individuals or difference between groups [4].
- The minimum clinically important difference (MCID) defines the smallest amount an outcome must change to be meaningful to patients [85].
- The minimum clinically important difference, the standard error of measurement, and the minimum detectable change are proposed as indicators for the clinical interpretation of test scores [1].
- A standardized reporting approach for PROMs incorporates the minimum clinically important difference and the patient acceptable symptom state to report the proportion of patients achieving clinical importance rather than relying solely on mean changes [18].
- An appropriate and validated measure that is suitable for both the particular study population and the reason for collecting the PROMs data should be chosen [3].
- When the domain of the chosen PROM does not correspond to the domain addressed by the research question, clinically meaningful differences may go undetected, producing false-negative results [36].
- Lack of consensus in the literature has led to confusion about which measurement properties are relevant, which concepts they represent, and how to assess these measurement properties in terms of design requirements and preferred statistical methods [28].
- Consensus was reached on how a comprehensive research question can be deduced from the design of a reliability study to determine how the results of a study inform us about the quality of the outcome measurement instrument at issue [2].
- Recommendations for the selection of patient assessed measures of health outcome are needed [16].
- Further studies are needed to provide validated outcome measures to ensure accuracy of the reported results and conclusions [17].

- There are a number of challenges in using patient-reported outcomes in clinical practice [43].
- Currently there is no convincing evidence to support the routine use of patient-based outcome measures in hand surgeons' practices [44].
- Providing access to PROM scores without clearly understanding how and why surgeons may consider using them can result in expensive and underused systems that add little value [75].
- Reasons for limited PROM use include a lack of knowledge on how to use PROMs and the perception that it is too time-consuming to add to regular clinical routine [78].
- Limitations of PROM use shed light on why PROM use may not always improve patient outcomes and provide considerations for the design and implementation of future PROM initiatives [86].
- Successful implementation of patient-reported outcome measures should be tailored by identifying and addressing potential barriers according to setting [11].
- PROMIS measures are efficient and precise tools, and their use is expected to continue to increase across medical and surgical specialties as health systems and payers expand their definition of healthcare quality to include patient-reported health outcomes [88].

How It Works

INTERPRETATION AND CLINICAL THRESHOLDS

- The minimum clinically important difference, standard error of measurement, and minimum detectable change are proposed as indicators for the clinical interpretation of test scores [1].
- Clinicians must be cautious in accepting a minimal clinically important difference score at face value due to the wide variability of established scores available for a single outcome scale [6].
- The instrument for evaluating anchor-based estimates of minimal important differences includes five core criteria and additional criteria for transition rating anchors [31].
- The Forgotten Joint Score shows moderate-to-strong correlations with established anterior cruciate ligament reconstruction patient-reported outcome measures, supporting construct validity [51].
- Clinically meaningful thresholds have been reported for the Forgotten Joint Score, supporting clinical interpretability [51].
- The magnitude of responsiveness over time for the Forgotten Joint Score cannot be fully characterized because of limited reporting of longitudinal effect sizes [51].

RELIABILITY AND MEASUREMENT PROPERTIES

- The two-way mixed-effect analysis of variance model with interaction for the absolute agreement between single scores is recommended to assess test-retest reliability for patient-reported outcome measures [5].
- Consensus was reached on how a comprehensive research question can be deduced from the design of a reliability study to determine how results inform the quality of the outcome measurement instrument [2].

- The Patient Outcomes of Surgery-Hand/Arm questionnaire demonstrated acceptability, reliability, validity, and responsiveness to clinical change [20].
- Shoulder questionnaires with coefficients greater than 0.91 indicate good test-retest reliability for interpreting change scores for individual patients [24].
- The DASH and Boston Questionnaire are reliable based on test-retest data [40].
- The Patient-Reported Outcomes Measurement Information System item banks demonstrated good reliability across most of the score distributions [39].
- The test-retest reliability of the Knee Injury and Osteoarthritis Outcome Score was high for all five subscales, with an interclass correlation coefficient ranging from 0.8 to 0.9 [62].
- The French translation of the Western Ontario Osteoarthritis of the Shoulder index is valid, reliable, and responsive to change [63].
- The MOS short form health survey (SF-36) scales met required internal consistency criteria with Cronbach alpha coefficients equaling or exceeding 0.70 [57].
- The assessment tool for brachial plexus regional anesthesia performance demonstrated construct validity by reliably discriminating between different levels of training [69].
- The DASH questionnaire outcomes support its construct validity when correlated to the SF-36 [79].

VALIDITY AND STANDARDIZATION

- An appropriate and validated measure suitable for the particular study population and the reason for collecting patient-reported outcome measures data should be chosen [3].
- The DASH is a useful instrument for outcome evaluation [41].
- The DASH questionnaire is widely accepted in everyday medical practice as a tool to evaluate upper limb function [76].
- The NIH PROMIS network derived a consensus-based framework for self-reported health and systematically reviewed available instruments and datasets addressing initial PROMIS domains [77].
- The outcomes of the study support the construct validity of the DASH [79].
- Standardization in the use of outcome measurement instruments is needed [8].
- No key measure was identified to capture functional status in advanced musculoskeletal physiotherapy practice, with 15 different tools utilized, highlighting the need for greater standardization [30].
- All patient-reported outcome measures for intermittent claudication require further validation studies to fill gaps in their measurement properties [38].
- Predictive validity assessment is planned for three newly developed implementation outcome measures [81].

DATA COLLECTION AND ADMINISTRATION

- The current data collection of patient-reported outcome measures is neither uniform nor complete across the world's registries, which may impact data validity and the ability to compare outcomes [7].

- Scores of tools to measure outcomes that matter to patients have been developed over the past 30 years but few are used routinely at the point of care [14].
- Outcomes assessed on numeric rating scales and reported with text-messages on mobile phones or with questionnaires completed with pen and paper provide comparable scores [13].
- For symptom severity and functional assessments, the score for each query may range from 1 to 5, and the sum of each mean score for each query was used to characterize the overall outcome score [9].
- Proxy-reported outcomes reliably assess physical and pain-related domains in older adult patients with traumatic orthopaedic injuries [83].
- Additional strategies are needed to improve accuracy in more subjective domains when using proxy-reported outcomes [83].

PHYSICAL VS. PATIENT-REPORTED MEASURES

- Physical outcome measures are being changed for the use of patient reported outcomes, and range of motion and strength are not as reliable measures as one would think [25].
- To assess pain, the clinician or the researcher must use the most appropriate measure for the given situation, considering factors such as reliability, validity, and responsiveness to change [66].

How It Is Used

- Consensus was reached on how a comprehensive research question can be deduced from the design of a reliability study to determine how study results inform the quality of an outcome measurement instrument [2].
- Standardized health-related outcome measures require evidence for change and a method to interpret change within individuals or difference between groups [4].
- Current data collection of patient-reported outcome measures is neither uniform nor complete across the world's registries, which may impact data validity and the ability to compare outcomes [7].
- Standardization in the use of outcome measurement instruments is advocated [8].
- In symptom severity and functional assessments, scores may range from 1 to 5, and the sum of each mean score for each query is used to characterize the overall outcome score [9].
- Investigators can choose thresholds to dichotomize responses on health-related quality of life based on absolute scores or change scores to facilitate interpretation [10].
- The minimal important difference is not an immutable characteristic but may vary by population and context, and no one minimal important difference may be valid for all study applications [12].
- High variability in scale choice and the use of measures not validated in pediatrics make comparative outcomes research difficult [15].
- Integrating standardized patient-reported outcomes into routine orthopaedic visits is feasible and improves practice efficiency by providing actionable objective data for shared decision-making [22].

- The validity and reliability of patient reported outcome measures can be assessed using methods reviewed in the literature [26].
- Routine use of patient reported outcome measures has the potential to help transform healthcare [32].
- A protocol for a randomized controlled trial was presented to assess the impact of a tool on decision quality, level of shared decision-making, and patient and process outcomes in total joint replacement [33].
- Clinicians should consider the quality of measures both in their own practice and when critically appraising evidence [34].
- Patients who received custom and off-the-shelf unicompartmental knee arthroplasty demonstrated comparable absolute patient-reported outcome measure scores, delta scores, and rates of achieving minimal clinically important difference across all metrics [35].
- The Disabilities of the Arm, Shoulder and Hand questionnaire is a useful instrument for outcome evaluation [41].
- The number of given questionnaires should be limited to maintain reliability when designing research trials to avoid potential misleading results [42].
- There are challenges in using patient-reported outcomes in clinical practice [43].
- There is no convincing evidence to support the routine use of patient-based outcome measures in hand surgeons' practices [44].
- Comparative effectiveness research requires accurate assessments of patient numbers, follow-up completeness, clinical outcomes, and care settings [64].
- The majority of interventional studies reporting patient-reported outcome measures do not report confidence intervals around between-group differences in outcome and do not define a clinically meaningful difference [67].
- The FDA evaluates patient-reported outcome instruments used as effectiveness endpoints in clinical trials and sponsors can use study results to support claims in approved product labeling [68].
- The Patient-Reported Outcomes Measurement Information System 20-item physical functioning short form can be useful for assessing physical functioning in clinical trials and observational studies [70].
- Patient-reported outcomes and patient-reported outcome measures are used in research and clinical practice [71].
- Limiting follow-up to automated methods may transform the way that outcome-based research is designed and conducted to provide substantially better research value in large prospective cohorts [72].
- The impact of the routine use of patient-reported outcomes in clinical practice on the process of care, patients' and professionals' experiences of care, and health outcomes is assessed [74].
- Both Patient-Reported Outcomes Measurement Information System and legacy scores are collected for tracking patient outcomes and research purposes [80].
- Patient-reported outcomes should be collected routinely, preferably via registries using computerized adaptive technology, to enable accurate comparisons and shared decision-making [82].

Interpreting the Results

INTERPRETATION FRAMEWORKS AND THRESHOLDS

- The minimum clinically important difference (MCID), standard error of measurement, and minimum detectable change are proposed as indicators for the clinical interpretation of test scores [1].
- Investigators can choose thresholds to dichotomize responses on health-related quality of life (HRQL) based on absolute scores or change scores to facilitate interpretation [10].
- The minimal clinically important difference (MCID) is useful for judging the magnitude of benefit when comparing two treatments, calculating sample size, making inferences about the percentage of patients improved by a therapeutic intervention, and making cost-effectiveness comparisons [52].
- Patient-reported outcome measures (PROMs) need to be responsive, reliable, and validated, and measures of clinical significance such as MCID, patient acceptable symptom state (PASS), and substantial clinical benefit (SCB) are essential for conveying patient satisfaction because statistically significant differences may not equate to clinically important differences [54].
- A standardized reporting of PROMs that incorporates the MCID and PASS is proposed, introducing a “clinical relevance ratio” to report the proportion of patients achieving clinical importance rather than relying solely on mean changes [18].
- The MCID is a low bar that patients do not seek when undergoing surgery; instead, they aim for substantial clinical benefit or a patient acceptable symptom state (PASS) [29].

PROPERTIES AND VARIABILITY OF MCID

- Clinicians must be cautious in accepting an MCID score at face value given the wide variability of established MCID scores available for a single outcome scale [6].
- The minimal important difference (MID) is not an immutable characteristic but may vary by population and context, and no one MID may be valid for all study applications [12].
- The MCID is a point estimate that should always be reported with its associated 95% confidence interval, as there is no basis for considering a sample-derived MCID a singular threshold to be crossed [21].
- The MCID is an imperfect solution to a complicated problem, and different methods used to calculate MCID lead to highly heterogeneous values [23].
- The calculation of the MCID needs to be correlated with changes in scores on the rating scale and external anchors [46].
- The recommended approach for estimating the MID is to use several anchor-based methods with relevant clinical or patient-based indicators, examine various distribution-based estimates (i.e., effect size, standardized response mean, standard error of measurement) as supportive information, and then triangulate on a single value or small range of values [19].
- A systematic approach to triangulate on the MCID using both distribution-based and anchor-based methods has been described [27].

RELIABILITY AND RESPONSIVENESS

- To assess test-retest reliability for patient-reported outcome measures, the two-way mixed-effect analysis of variance model with interaction for the absolute agreement between single scores is recommended [5].
- The DASH showed good sensitivity to change at 12 weeks with effect size and standardized response mean similar to the CTQ functional status scale [59].
- The Patient Evaluation Measure is more responsive to change than the DASH score, with an effect size of 0.97 compared to 0.49 for the DASH [49].
- Standardized questionnaires were more sensitive to the clinical change produced by carpal tunnel surgery than many commonly performed physical measures of outcome [65].
- The Pos-Hand/Arm questionnaire demonstrated acceptability, reliability, validity, and responsiveness to clinical change [20].
- Other shoulder questionnaires had coefficients greater than 0.91, indicating good test-retest reliability for interpreting change scores for individual patients [24].

STANDARDIZATION AND DATA COLLECTION

- The current data collection of patient-reported outcome measures (PROMs) is neither uniform nor complete across the world's registries, which may impact data validity and the ability to compare outcomes [7].
- There is a plea for more standardization in the use of outcome measurement instruments [8].
- The high variability in scale choice and the use of measures not validated in pediatrics make comparative outcomes research difficult [15].
- No key measure was identified to capture functional status, with 15 different tools utilized, highlighting the need for greater standardization of outcome measurement in musculoskeletal clinical practice, service evaluation, and research [30].
- Routine use of patient reported outcome measures (PROMs) has the potential to help transform healthcare [32].

SPECIFIC SCORE INTERPRETATIONS AND MODALITIES

- A decrease of 1.04 or more in the Carpal Tunnel Syndrome Symptom Severity Scale (SSS) score may indicate a clinically important change in a patient's state of health [58].
- Differences were noted between Visual Analog Scale (VAS) scores, with paper scores being significantly higher than electronic scores [55].
- The median SF-12 Mental Component Summary (MCS) of 50.0 was 0.9 points below the Dutch normative population score, a difference that may not be clinically important [47].
- Patients who received custom and off-the-shelf (OTS) unicompartmental knee arthroplasty (UKA) demonstrated comparable absolute PROM scores, delta scores, and rates of achieving MCID across all metrics [35].

- Scales converted to a percentage change yielded the best accuracy in predicting adequate relief, with balanced sensitivity and specificity [60].

Limitations and Pitfalls

MEASUREMENT PROPERTIES AND RELIABILITY

- Clinicians must be cautious in accepting a minimal clinically important difference (MCID) score at face value given the wide variability of established MCID scores available for a single outcome scale [6].
- The minimal clinically important difference (MCID) is an imperfect solution to a complicated problem, and different methods used to calculate MCID lead to highly heterogeneous values [23].
- The minimal clinically important difference (MCID) is a point estimate that should always be reported with its associated 95% confidence interval, as there is no basis for considering a sample-derived MCID a singular threshold to be crossed [21].
- All patient-reported outcome measures (PROMs) require further validation studies to fill the gaps in their measurement properties [38].
- The authors plea for more standardization in the use of outcome measurement instruments [8].

INTERPRETATION AND CLINICAL SIGNIFICANCE

- The minimal clinically important difference (MCID) is a low bar that patients do not seek when undergoing surgery; instead, they aim for substantial clinical benefit or a patient acceptable symptom state (PASS) [29].
- Because of its confounding effect on measuring physical function, functional demand should be assessed and included in models using PROMs before and after surgery [89].
- MCIDs expressed as effect sizes reduce bias, which mainly results from dependency on the baseline score [73].
- Estimates of reliability were based on the actual size of test-retest differences, in kilograms of grip strength, required to detect a genuine change in grip rather than chance differences due to measurement error [84].

IMPLEMENTATION AND DATA QUALITY

- The instance of missing patient-reported outcome (PRO) data and its potential to bias clinical research can be minimised by implementing thoughtful design, rigorous methodology and transparent reporting strategies [87].
- The number of given questionnaires should be limited to maintain reliability [42].
- Only 57% of primary medical providers are using patient reported outcome measures within their practice, with the information largely used for research rather than clinical decision-making [50].

Key Evidence

- [L5] The authors propose using the minimum clinically important difference, the standard error of measurement, and the minimum detectable change as indicators for the clinical interpretation of test scores. [1] ([10.1136/bjsports-2012-091704](#))
- [Paper] Consensus was reached on how a comprehensive research question can be deduced from the design of a reliability study to determine how the results of a study inform us about the quality of the outcome measurement instrument at issue. [2] ([10.1186/s12874-020-01179-5](#))
- [Paper] An appropriate and validated measure that is suitable for both the particular study population and the reason for collecting the PROMs data should be chosen. [3] ([10.1136/bmj.c186](#))
- [L4] Standardized health-related outcome measures require evidence for change and a way to interpret change within individuals or difference between groups. [4] ([10.1016/j.rdc.2018.01.011](#))
- [L5] To assess test-retest reliability for patient-reported outcome measures, the two-way mixed-effect analysis of variance model with interaction for the absolute agreement between single scores is recommended. [5] ([10.1007/s11136-018-2076-0](#))
- [L5] Clinicians must be cautious in accepting an MCID score at face value given the wide variability of established MCID scores available for a single outcome scale. [6] ([10.1179/2042618612y.0000000001](#))
- [L4] The current data collection of patient-reported outcome measures (PROMs) is neither uniform nor complete across the world's registries, which may impact data validity and the ability to compare outcomes. [7] ([10.1097/corr.0000000000001918](#))
- [L5] The authors plea for more standardization in the use of outcome measurement instruments. [8] ([10.1590/bjpt-rbf.2014.0143](#))
- [L5] For each query in the symptom severity and functional assessments the score may range from 1 to 5, and the sum of each mean score for each query was used to characterize the overall outcome score. [9] ([10.1016/j.jhsa.2004.08.002](#))
- [L5] Investigators can choose thresholds to dichotomize responses on HRQL based on absolute scores or change scores to facilitate interpretation. [10] ([10.1186/1477-7525-4-62](#))
- [L2] Successful implementation of patient-reported outcome measures should be tailored by identifying and addressing potential barriers according to setting. [11] ([10.1177/0269216313491619](#))
- [L5] The minimal important difference (MID) is not an immutable characteristic but may vary by population and context, and no one MID may be valid for all study applications. [12] ([10.1016/j.jclinepi.2007.03.012](#))
- [L4] Outcomes assessed on numeric rating scales and reported with text-messages on mobile phones or with questionnaires completed with pen and paper provide comparable scores. [13] ([10.1186/1471-2288-14-52](#))
- [L5] Scores of tools to measure outcomes that matter to patients have been developed over the past 30 years but few are used routinely at the point of care. [14] ([10.1136/bmj.g7818](#))
- [L4] The high variability in scale choice and the use of measures not validated in pediatrics make comparative outcomes research difficult. [15] ([10.1177/2325967119s00036](#))

- [L4] Recommendations for the selection of patient assessed measures of health outcome are needed. [16] ([10.1136/bmj.324.7351.1417](#))
- [L2] Further studies are needed to provide validated outcome measures to ensure accuracy of the reported results and conclusions. [17] ([10.1016/j.injury.2019.07.002](#))
- [L5] The authors propose a standardized reporting of patient-reported outcome measures (PROMs) that incorporates the minimum clinically important difference (MCID) and the patient acceptable symptom state (PASS), introducing a 'clinical relevance ratio' to report the proportion of patients achieving clinical importance rather than relying solely on mean changes. [18] ([10.2106/jbjs.21.00030](#))
- [L5] The recommended approach is to estimate the minimal important difference based on several anchor-based methods, with relevant clinical or patient-based indicators, and to examine various distribution-based estimates (i.e., effect size, standardized response mean, standard error of measurement) as supportive information, and then to triangulate on a single value or small range of values for the MID. [19] ([10.1186/1477-7525-4-70](#))
- [Paper] Findings confirmed the acceptability, reliability, validity and responsiveness to clinical change of the questionnaire. [20] ([10.1016/j.jhsb.2004.06.002](#))
- [L5] The Minimal Clinically Important Difference (MCID) is a point estimate that should always be reported with its associated 95% CI, as there is no basis for considering a sample-derived MCID a singular threshold to be crossed. [21] ([10.1177/03635465231189223](#))
- [L4] The authors conclude that integrating standardized patient-reported outcomes into routine orthopaedic visits is feasible and improves practice efficiency by providing actionable objective data for shared decision-making. [22] ([10.1007/s11999-013-3143-z](#))
- [L5] The minimal clinically important difference (MCID) is an imperfect solution to a complicated problem, and different methods used to calculate MCID lead to highly heterogeneous values. [23] ([10.1177/03635465231189222](#))
- [Paper] The other shoulder questionnaires had coefficients greater than 0.91, indicating good test-retest reliability for interpreting change scores for individual patients. [24] ([10.1016/s1058-2746\(98\)90002-7](#))
- [Paper] Physical outcome measures are being changed for the use of patient reported outcomes, and range of motion and strength are not as reliable measures as one would think. [25] ([10.1016/j.injury.2019.11.017](#))
- [L5] This paper reviews the current literature on how to assess the validity and reliability of patient reported outcome measures (PROMs). [26] ([10.1177/2050640614558345](#))
- [L5] The authors describe a systematic approach to triangulate on the Minimal Clinically Important Difference (MCID) using both distribution-based and anchor-based methods. [27] ([10.1016/j.apmr.2019.12.008](#))
- [L5] Lack of consensus in the literature has lead to confusion about which measurement properties are relevant, which concepts they represent, and how to assess these measurement properties in terms of design requirements and preferred statistical methods. [28] ([10.1016/j.jclinepi.2010.02.006](#))

- [L5] The minimal clinically important difference (MCID) is a low bar that patients do not seek when undergoing surgery; instead, they aim for substantial clinical benefit or a patient acceptable symptom state (PASS). [29] ([10.1016/j.arthro.2023.10.014](#))
- [L2] No key measure was identified to capture functional status, with 15 different tools utilized, highlighting the need for greater standardization of outcome measurement in musculoskeletal clinical practice, service evaluation and research. [30] ([10.1002/msc.1200](#))
- [L4] The instrument includes five core criteria and additional criteria for transition rating anchors. [31] ([10.1136/bmj.m1714](#))
- [L5] Routine use of patient reported outcome measures (PROMs) has the potential to help transform healthcare. [32] ([10.1136/bmj.f167](#))
- [Paper] We present the protocol for a randomized controlled trial designed to assess the impact of this tool on decision quality, level of shared decision-making, and patient and process outcomes. [33] ([10.1002/jor.24614](#))
- [Paper] Clinicians should consider the quality of measures both in their own practice and when critically appraising evidence. [34] ([10.1016/j.bjps.2017.11.015](#))
- [L3] Patients who received custom and OTS UKA demonstrated comparable absolute PROM scores, delta scores, and rates of achieving MCID across all metrics. [35] ([10.1016/j.arth.2026.09.008](#))
- [Paper] When the domain of the chosen PROM does not correspond to the domain addressed by the research question, clinically meaningful differences may go undetected, producing false-negative results. [36] ([10.1002/ksa.70620](#))
- [L5] This editorial argues that Patient Reported Outcome Measures (PROMs) are critical for capturing the patient's perspective on health status, which cannot be observed through clinical tests or imaging. [37] ([10.1136/bjsports-2014-093707](#))
- [L1] However, all PROMs require further validation studies to fill the gaps in their measurement properties. [38] ([10.1016/j.ejvs.2014.12.002](#))
- [L5] All item banks demonstrated good reliability across most of the score distributions. [39] ([10.1016/j.jclinepi.2010.04.011](#))
- [L2] Test-retest data show both questionnaires are reliable. [40] ([10.1016/j.jhsb.2003.10.010](#))
- [L4] Our findings confirm that the DASH is a useful instrument for outcome evaluation. [41] ([10.1016/j.jhsb.2004.08.008](#))
- [L2] Researchers should consider these findings when designing research trials to avoid potential misleading results, and the number of given questionnaires should be limited to maintain reliability. [42] ([10.1016/j.otsr.2024.104076](#))
- [L5] However, there are a number of challenges in using patient-reported outcomes in clinical practice. [43] ([10.1007/s11136-008-9379-5](#))
- [Paper] Currently there is no convincing evidence to support the routine use of patient-based outcome measures in hand surgeons' practices. [44] ([10.1053/jhsu.2001.29487](#))

- [L5] The calculation of the minimal clinically important difference (MCID) needs to be correlated with changes in scores on the rating scale and external anchors. [46] ([10.1177/03635465231193405](#))
- [L3] The median SF-12 MCS of 50.0 was 0.9 points below the Dutch normative population score, a difference that may not be clinically important. [47] ([10.1016/j.injury.2024.111779](#))
- [L4] It is more responsive to change than the DASH score, with an effect size of 0.97 compared to 0.49 for the DASH. [49] ([10.1016/j.jhsb.2005.03.009](#))
- [L4] Only 57% of primary medical providers are using patient reported outcome measures within their practice, with the information largely used for research rather than clinical decision-making. [50] ([10.1177/2325967119s00107](#))
- [L4] It shows moderate-to-strong correlations with established ACLR PROMs, supporting construct validity, and clinically meaningful thresholds have been reported, supporting clinical interpretability; however, the magnitude of responsiveness over time cannot be fully characterized because of limited reporting of longitudinal effect sizes. [51] ([10.1002/arj.70559](#))
- [Paper] The minimal clinically important difference (MCID) is useful in judging the magnitude of the benefit when comparing two treatments, calculating a sample size, making inferences about the percentage of patients improved by a therapeutic intervention, and making cost effectiveness comparisons. [52] ([10.1016/j.jhsa.2006.03.011](#))
- [L5] Patient-reported outcome measures need to be responsive, reliable, and validated, and measures of clinical significance such as MCID, PASS, and SCB are essential for conveying patient satisfaction, as statistically significant differences may not equate to clinically important differences. [54] ([10.1016/j.arthro.2022.08.020](#))
- [L3] Differences were noted between VAS scores, with paper scores being significantly higher than electronic scores. [55] ([10.1177/2325967119s00037](#))
- [L4] The questionnaire was well understood by the respondents, and all scales met the required internal consistency criteria with Cronbach alpha coefficients equaling or exceeding 0.70. [57] ([10.4103/0970-0218.106623](#))
- [L1] A decrease of 1.04 or more in the SSS score may indicate a clinically important change in a patient's state of health. [58] ([10.1016/j.jhsa.2006.01.012](#))
- [L4] The DASH showed good sensitivity to change at 12 weeks with effect size and SRM similar to the CTQ functional status scale. [59] ([10.1053/jhsu.2003.50043](#))
- [L2] The scales that were converted to a percentage change yielded the best accuracy in predicting adequate relief, with balanced sensitivity and specificity. [60] ([10.1016/s0304-3959\(00\)00339-0](#))
- [L3] The test-retest reliability was high for all five subscales, with an interclass correlation coefficient ranging from 0.8 to 0.9. [62] ([10.1016/j.injury.2026.113033](#))
- [L4] The WOOS-Fr is valid, reliable and responsive to change. [63] ([10.1016/j.otsr.2024.103912](#))
- [L5] Comparative effectiveness research requires accurate assessments of patient numbers, follow-up completeness, clinical outcomes, and care settings. [64] ([10.1007/s11999-013-3194-1](#))

- [L4] In this study, standardized questionnaires were more sensitive to the clinical change produced by carpal tunnel surgery than many commonly performed physical measures of outcome. [65] ([10.1016/s0363-5023\(96\)80340-6](#))
- [Paper] To assess pain, the clinician or the researcher must use the most appropriate measure for the given situation, considering factors such as reliability, validity, and responsiveness to change. [66] ([10.1016/s0894-1130\(01\)80038-7](#))
- [L1] The majority of interventional studies reporting PROMs do not report CIs around between-group differences in outcome and do not define a clinically meaningful difference. [67] ([10.2106/jbjs.20.00474](#))
- [Paper] This guidance describes how the FDA evaluates patient-reported outcome (PRO) instruments used as effectiveness endpoints in clinical trials and how sponsors can use study results to support claims in approved product labeling. [68] ([10.1186/1477-7525-4-79](#))
- [L4] The assessment tool demonstrated construct validity by reliably discriminating between different levels of training, as senior trainees performed significantly better than junior trainees on the global rating scale. [69] ([10.1016/j.rapm.2006.10.009](#))
- [L2] The measure can be useful for assessing physical functioning in clinical trials and observational studies. [70] ([10.1136/annrheumdis-2013-204053](#))
- [L5] This paper provides an overview of patient-reported outcomes (PROs) and patient-reported outcome measures (PROMs) in research and clinical practice. [71] ([10.4137/hsi.s11093](#))
- [L2] Limiting follow-up to automated methods may have the potential to transform the way that outcome-based research is designed and conducted to provide substantially better research value in large prospective cohorts. [72] ([10.2106/jbjs.19.00531](#))
- [Paper] MCIDs expressed as effect sizes reduce bias, which mainly results from dependency on the baseline score. [73] ([10.1016/j.jclinepi.2016.11.016](#))
- [Paper] The objectives are to assess the impact of the routine use of patient-reported outcomes in clinical practice on the process of care, patients' and professionals' experiences of care, and health outcomes. [74] ([10.1002/14651858.cd011589](#))
- [L4] Providing access to PROM scores without clearly understanding how and why surgeons may consider using them can result in expensive and underused systems that add little value. [75] ([10.1097/corr.0000000000002059](#))
- [L2] The DASH questionnaire is widely accepted in the everyday medical practice as a tool to evaluate upper limb function. [76] ([10.1016/j.hansur.2020.12.010](#))
- [Paper] The NIH PROMIS network derived a consensus-based framework for self-reported health and systematically reviewed available instruments and datasets that address the initial PROMIS domains. [77] ([10.1097/01.mlr.0000258615.42478.55](#))
- [L4] The reasons provided included a lack of knowledge on how to use PROMs and the perception that it is too time-consuming to add to regular clinical routine. [78] ([10.1186/s13018-020-02135-1](#))
- [L4] The outcomes of this study support the construct validity of the DASH. [79] ([10.1197/j.jht.2003.10.015](#))

- [L5] Today, both PROMIS and legacy scores are collected for tracking patient outcomes and research purposes; the authors predict that with further refinement, PROMIS will replace legacy patient-reported outcome measures. [80] ([10.1016/j.arthro.2022.08.032](https://doi.org/10.1016/j.arthro.2022.08.032))
- [L4] Predictive validity assessment is planned. [81] ([10.1186/s13012-017-0635-3](https://doi.org/10.1186/s13012-017-0635-3))
- [L5] Patient-reported outcomes should be collected routinely, preferably via registries using computerized adaptive technology, to enable accurate comparisons and shared decision-making. [82] ([10.1007/s11999-013-3224-z](https://doi.org/10.1007/s11999-013-3224-z))
- [L3] While proxies reliably assess physical and pain-related domains, additional strategies are needed to improve accuracy in more subjective domains. [83] ([10.1016/j.injury.2025.112163](https://doi.org/10.1016/j.injury.2025.112163))
- [Paper] Estimates of reliability were based on the actual size of test-retest differences, in kilograms of grip strength, required to detect a genuine change in grip rather than chance differences due to measurement error. [84] ([10.1016/s0894-1130\(99\)80030-1](https://doi.org/10.1016/s0894-1130(99)80030-1))
- [Paper] The MCID defines the smallest amount an outcome must change to be meaningful to patients. [85] ([10.1001/jama.2014.13128](https://doi.org/10.1001/jama.2014.13128))
- [L4] These limitations shed some light on why PROM use may not always improve patient outcomes and provide considerations for the design and implementation of future PROM initiatives. [86] ([10.1007/s11136-021-03003-z](https://doi.org/10.1007/s11136-021-03003-z))
- [L2] The instance of missing PRO data and its potential to bias clinical research can be minimised by implementing thoughtful design, rigorous methodology and transparent reporting strategies. [87] ([10.1136/bmjopen-2015-010938](https://doi.org/10.1136/bmjopen-2015-010938))
- [L4] PROMIS measures are efficient and precise tools, and their use is expected to continue to increase across medical and surgical specialties as health systems and payers expand their definition of healthcare quality to include patient-reported health outcomes. [88] ([10.5435/jaaos-d-24-00432](https://doi.org/10.5435/jaaos-d-24-00432))
- [L2] Because of its confounding effect on measuring physical function, functional demand should be assessed and included in models using PROMs before and after surgery. [89] ([10.5435/jaaos-d-24-00069](https://doi.org/10.5435/jaaos-d-24-00069))
- [L4] The term PROM is a relatively new designation for a range of measures that have existed since at least the 1960s. [90] ([10.1111/hex.13254](https://doi.org/10.1111/hex.13254))

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