Timed Up and Go Test (TUG/TUAG)

Measures strength, agility, mobility, dynamic balance & gait

Phases

Pre-op
Acute
Post-acute
Active living

ICF

Activity

Time

~ 3 mins to set up, complete & score

Equipment

Chair (44-46cm seat height; 65cm arm rest height) backed against wall, stopwatch, tape or other marker on floor 3m from chair, usual walking aid

Quality

Validity

Construct: Knee OA: Good to excellent correlation with Berg Balance Scale & gait speed (frail elderly) & with quadriceps strength.[2]
Criterion: Hip OA: TUG > 10 secs = 3 X more likely to have a near fall in the previous yr.[3]

Reliability

Inter-rater: Hip OA: Excellent (ICC=0.87).[4]
Test-retest: TKA: Excellent (r=0.98)[5,6]; THA: r=0.96[5,6]; Advanced hip/knee OA: Good (r=0.75). [7]
TKA: Systematic review found "positive ratings for both intra- & inter-rater reliability.[8]

Responsiveness

TKA: Systematic review: "positive ratings." [8]
Post-acute TJA: Detects initial deterioration (SRM=-1.08) & subsequent improvement (SRM=1.04).[7]
TKA/THA: SRM=0.49 & 0.69 from post-op day 1 to 2 respectively to 1.24 & 1.02 between 2 & 6-wks post-op.[9]
Knee OA: Small effect size (0.33) after physiotherapy treatment.[10]

Floor/ceiling effects

Floor effect: Acute hospitalized older adults: ~ 25% unable to perform the test.[11]
Ceiling effect: Present at 6-mos prior to TJA[7] & 9-10-wks after TKA & THA. [12]

Feasibility

Quick & simple with minimal equipment/space required

Instructions

Ask patient to stand up, walk, at usual pace, to a mark 3m away, turn around & return to sit back in chair. Usual walking aid is allowed & recorded. Use the same chair for re-testing. See 'Relevant Links' for detailed instructions.

Scoring: Total time to arise from chair, walk 3m, turn around, return to chair & sit down. Perform 2 trials & record the fastest to the nearest 0.1 sec.[1]

Interpretation

Direction: Less time (secs)=better performance
MDC_{95}: TJA: 2.27 secs (TKA)[5], 1.62 secs (THA).[6]
MDC_{90}: Hip/knee OA awaiting TJA: 2.49 secs.[7]
MCII: Older adults with hip OA: Decreases of 0.8-1.4 secs associated with a major improvement.[4]
MIC: TJA: Between post-op day 1 and week 6, MIC (AUC) = 0.51-0.52 (TKA) & 0.54-0.68 (THA).[13]
Cut points/Thresholds: Pre-THA:<9.7 secs 4X more likely to pass discharge requirements within 36 hrs post-op.[14]
Community dwelling older adults >14 secs: greater falls risk.[1, 14]
PASS: No evidence found
Normative/Reference values: See Bohannon[15] for North American reference values from a meta-analysis of 21 studies.

Other

Key messages: Recommended. Clinically feasible with acceptable validity, reliability, responsiveness, interpretability & tested for virtual administration. Do not use the TUG in-isolation for assessing risk of falls for people with a TJA - use in conjunction with other measures.[17] It can be undertaken using wearable devices & recording measurements over 3 days.[17] As the TUG is a composite measure of activity, use clinical judgement to identify which component requires therapeutic attention for rehabilitation (e.g. sit-to-stand or gait or turning balance). [18]

Virtual administration: Chronic lower limb MSK disorders (mean age=63 yrs): Virtual testing demonstrated good agreement with in-person administration (ICC=0.81), good test-retest reliability (ICC=0.86), SEM of 0.74 & MDC_{95} of 2.05.[19]
Older adults (mean age=69 yrs): Virtual testing demonstrated good reliability compared to in-person administration (ICC=0.83), SEM of 0.56 & MDC of 1.55.[20]

Relevant Links

Summary & instructions (OARSI)
Infographic (Shirley Ryan AbilityLab)
Virtual Administration (Centre for Health, Exercise and Sports Medicine, University of Melbourne)
Video (Mission Gait)

References

1. Dobson F, Hinman RS, et al. OARSI recommended performance-based tests to assess physical function in people diagnosed with hip or knee osteoarthritis. Osteoarthritis Cartilage. 2013;21(8):1042-52. Manual: www.oarsi.org/sites/default/files/docs/2013/manual.pdf
2. Coleman G, Dobson F, et al. Measures of physical performance. Arthritis Care Res. 2020; 72(S10):S452-85. PMID: 33091270
3. Arnold CM, Faulkner RA. The history of falls and the association of the timed up and go test to falls and near-falls in older adults with hip osteoarthritis. BMC Geriatrics 2007;7:17. https://bmcgeriatr.biomedcentral.com/articles/10.1186/1471-2318-7-17
4. Wright AA, Cook CE, et al. A comparison of 3 methodological approaches to defining major clinically important improvement of 4 performance measures in patients with hip osteoarthritis. J Orthop Sports Phys Ther 2011;41:319-27. https://www.jospt.org/doi/pdf/10.2519%2Fjospt.2011.3515
5. Yuksel E, Kalkan S, et al. Assessing minimal detectable changes and test-retest reliability of the Timed Up and Go Test and the 2-Minute Walk Test in patients with total knee arthroplasty. J Arthroplasty. 2017;32(2):426-30. PMID: 27639305
6. Yuksel E, Unver B, et al. Reliability and minimal detectable change of the 2-minute walk test and Timed Up and Go test in patients with total hip arthroplasty. Hip Int. 2021;31(1):43-9.https://journals.sagepub.com/doi/epub/10.1177/1120700019888614
7. Kennedy DM, Stratford PW, et al. Assessing stability and change of four performance measures: a longitudinal study evaluating outcome following total hip and knee arthroplasty. BMC Musculoskelet Disord 2005;6:3. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC549207/
8. Reynaud V, Verdilos A, et al. Core outcome measurement instruments for clinical trials of total knee arthroplasty: A systematic seview. J Clin Med. 2020;9(8):2439. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7463550/
9. Poitras S, Wood KS, et al. Assessing functional recovery shortly after knee or hip arthroplasty: a comparison of the clinimetric properties of four tools. BMC Musculoskelet Disord. 2016;17(1):478. https://pubmed.ncbi.nlm.nih.gov/27852257/
10. French HP, Fitzpatrick M, et al. Responsiveness of physical function outcomes following physiotherapy intervention for osteoarthritis of the knee: an outcome comparison study. Physiotherapy 2011;97(4):302-8. PMID: 22051586
11. De Morton NA, Keating JL, et al. Exercise for acutely hospitalised older medical patients. Cochrane Database Syst Rev 2007;1:CD005955. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8906511/pdf/CD005955.pdf
12. Kennedy DM, Stratford PW, et al. Modeling early recovery of physical function following hip and knee arthroplasty. BMC Musculoskelet Disord. 2006;7:100. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1712335/
13. Zasadzka E, Borowicz AM, et al. Assessment of the risk of falling with the use of timed up and go test in the elderly with lower extremity osteoarthritis. Clin Interv Aging. 2015;10:1289-98. https://doi.org/10.2147/CIA.S86001
14. Oosting, E, Kapitein, PJC, et al. Predicting short stay total hip arthroplasty by use of the timed up and go-test. BMC Musculoskelet Disord. 2021;22:361. https://doi.org/10.1186/s12891-021-04240-6
15. Bohannon RW. Reference values for the timed up and go test: a descriptive meta-analysis. J Geriatr Phys Ther. 2006;29(2):64-8. PMID: 16914068
16. Chow RB, Lee A, et al. Effectiveness of the "Timed Up and Go" (TUG) and the Chair test as screening tools for geriatric fall risk assessment in the ED. Am J Emerg Med. 2019: 37;3:457-460. https://doi.org/10.1016/j.ajem.2018.06.015
17. Saporito S, Brodie MA, et al. Remote timed up and go evaluation from activities of daily living reveals changing mobility after surgery. Physiol Meas. 2019;40(3):035004. PMID: 30840937
18. Gasparutto X, Gueugnon M, et al. Which functional tasks present the largest deficits for patients with total hip arthroplasty before and six months after surgery? A study of the timed up-and-go test phases. PLoS ONE. 2021;16(9):e0255037. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0255037
19. Lawford MJ, Dobson F, et al. Clinician-administered performance-based tests via telehealth in people with chronic lower-limb musculoskeletal disorders: Test-retest reliability and agreement with in-person assessment. Journal of Telemedicine and Telecare. 2022;1-20. https://doi.org/10.1177/1357633X221137387
20. Peyrusqué E, Granet J, Assessing physical performance in older adults during isolation or lockdown periods: Web-based video conferencing as a solution. J Nutr Health Aging. 2022;26(1):52-6. PMID: 35067703