

Clinical Practice Guideline: Physical Performance Testing or Measurement

Date of Implementation: November 15, 2018

Product: Specialty

Related Policies:
CPG 135: Physical Therapy Medical Policy
CPG 155: Occupational Therapy Medical Policy
CPG 278: Chiropractic Medical Policy

Under many benefit plans, coverage for Functional Capacity Evaluation (FCE) is subject to the terms, conditions and limitations of the applicable benefit plan’s Short Term Rehabilitative Therapy benefit and schedule of copayments. Coverage for return-to-work (RTW) services varies across plans. Refer to the customer’s benefit plan document for coverage details. The Functional Capacity Evaluation section of this guideline is for those benefit plans that include coverage for RTW services.

If coverage for RTW services is available, the following conditions of coverage apply.

GUIDELINES

Criteria for specific physical performance testing or measurement are detailed here:

Medically Necessary

Functional Capacity Evaluation (FCE) is considered medically necessary when ALL of the following criteria are met:

- A written referral (from physician, carrier, or employer) is forwarded to the evaluator with the purpose of the FCE explicitly stated (i.e., clearly defined goals to guide test selection in the referral document and reflects one or more of the applications of an FCE).
- The evaluation is designed to determine return to work capabilities following a defined injury or following a medically necessary rehabilitation.
- The evaluation is structured to answer a specific question or questions about the worker’s performance abilities and is addressed in the evaluation report.
- Reported results must be compared to meaningful standardized norms.
- The FCE must be performed by a qualified provider/evaluator (see requirements below).
 - Prior to the FCE, the qualified evaluator:
 - Obtains a subjective pain assessment with self-reported effect on functional abilities and activities of daily living;
 - Performs a screening examination; and
 - Obtains informed consent.

The FCE is typically not indicated prior to three months post-injury, unless there is a significant documented change in the individual’s status which justifies earlier performance. FCEs are limited to 2-4 hours per date of service and one evaluation every 12 months if necessary. If a FCE is necessary within 12 months, cases will be reviewed individually based on individual client/patient objective data compared to standardized norms. A FCE may extend beyond 4 hours or two days to further quantify the ability of the client to sustain the work tasks over a regular work schedule. The length of the FCE is dependent upon:

- The complexity of the illness or injury and the resulting impairments;
- The availability of clearly defined work-related physical demands.

Not Medically Necessary

Return to work/reintegration or vocational programs including work hardening programs are considered vocational training, rather than treatment of illness or injury, and are considered not medically necessary.

Unproven

Quantitative (e.g., isokinetic) muscle testing devices (e.g., MedX, Isostation B-200, Cybex II, Kin-Com, and Biodex) for the assessment of muscle strength are considered unproven.

CPT CODES AND DESCRIPTIONS

CPT® Codes	Description
97750	Physical performance test or measurement (e.g., musculoskeletal, functional capacity), with written report, each 15 minutes
97545*	Work hardening/conditioning; initial 2 hours
97546*	Work hardening/conditioning; each additional hour (List separately in addition to code for primary procedure)

*Considered educational or training in nature/not medically necessary

DESCRIPTION

Physical testing or measurement describes tests and measurements performed by a physician or other qualified health care professional. A physical performance test or measurement may be reasonable and necessary for patients with neurological or musculoskeletal conditions when there is a need to evaluate the ability to perform specific tasks. It may include a number of multi-varied tests and measurements of physical performance of a select area or number of areas. These services are not to be used in lieu of evaluation or re-evaluation services. Testing may be manual and/or performed using equipment. Some examples of testing that are typically reported with CPT code 97750 include: isokinetic testing for assessing the combination of strength, endurance and power while performing certain movements with the trunk or extremities, functional capacity testing, and specific test and measures related to balance such as the timed up-and-go test,

1 and 6-minute walk test, with a computerized report of the patient's oxygen saturation levels
 2 with increasing stress levels, performed under a PT or OT plan of care on pulmonary
 3 rehabilitation patients. Standardized testing batteries may be incorporated into a physical
 4 performance test. It would not be appropriate to report a code from the 95851-95852 series
 5 in addition to 97750. It is not medically reasonable and necessary to bill this service as part
 6 of a routine assessment/evaluation of rehabilitation services. Direct one-on-one patient
 7 contact is required.

8 9 **Functional Capacity Evaluation**

10 A Functional Capacity Evaluation (FCE) is a method commonly used in work
 11 rehabilitation for assessing the residual capacity of the injured worker for return to work.
 12 The conceptual basis of the FCE is an evaluation of the person's potential to perform the
 13 physical demands of work in a safe environment. The FCE is based on the observation of
 14 the performance of the physical demands of work. FCEs are used as an adjunct method of
 15 making judgments of performance potential and readiness for work following a
 16 musculoskeletal injury. The FCE portion of this guideline is to be used when care
 17 management is rendered for individuals with musculoskeletal conditions that are medically
 18 stable yet demonstrate limitation of function and disability that impairs their ability to work
 19 at full capacity.

20
 21 FCEs provide an objective measurement system to evaluate activity and activity limitations
 22 with the specific purpose of matching physical abilities with essential and critical job
 23 demands. FCEs also assist with identifying job modifications to enhance worker safety and
 24 delineating functional capacities in case of litigation, impairment and disability. The focus
 25 of the FCE is on the job demands and the performance of the job demands. Historically,
 26 return-to-work decisions were based upon diagnoses and prognoses of physicians but did
 27 not include objective work function information. Practitioners whose core competencies
 28 include functional evaluation began to develop relative functional tests. These tests
 29 examined and evaluated the ability to perform physical work functions as described in the
 30 Selected Characteristics of Occupations as Defined in the Revised Dictionary of
 31 Occupational Titles. Functional examination/evaluation, combined with diagnoses and
 32 prognoses by trained clinicians has become an accepted tool for safely returning
 33 individuals to employment.

34 35 **Quantitative Muscle Testing Devices**

36 Quantitative muscle testing devices have been used to quantify muscle strength and an
 37 individual's response to rehabilitation and therapy. Manual muscle testing is most
 38 commonly performed and is used to identify differences in strength between muscles, using
 39 qualitative grading to describe the strength of muscles. Computerized technologies have
 40 been proposed to quantify muscle strength. The MedX extension machine (MEDX Corp,
 41 Ocala, FL) and Isostation B200 (Isotechnologies, Inc., Hillsborough, NC) are two devices
 42 that have been designed for spinal muscle testing, and to improve spinal muscle strength

1 through pelvic stabilization and isolation of specific groups of lumbar muscles. However,
2 evidence in the peer-reviewed scientific literature does not show that use of these devices
3 for muscle testing demonstrates better diagnostic utility than the established method of
4 manual muscle testing. Examples of these devices are described below:

5 6 **MedX**

7 The MedX lumbar/cervical extension machine is a device that can provide both functional
8 muscle testing of the spine and spinal therapy. It provides resistance over a full range of
9 isolated lumbar motion (72 degrees) or over a preselected limited range. The machine is
10 capable of setting isometric test points every three degrees within an individual's range of
11 motion. During the test, a computer software system plots the individual's actual range of
12 motion and strength in comparison to that of age and gender-matched norms. In exercise
13 mode, the compound weight stack can provide resistance from 10–400 foot pounds in
14 increments of one foot pound. It is proposed that use of this device can specifically test the
15 strength of the lumbar spine, and, through rehabilitation, the device can strengthen muscles.
16 The rehabilitation program typically lasts 12 weeks, with computerized strength and
17 motion testing performed every four weeks.

18 19 **Isostation B-200**

20 The Isostation B-200 lumbar dynamometer is a device that can measure position, torque
21 and velocity. It allows measurement of increasing fatigue by measuring the reduction speed
22 in performance and noting increasing motion as muscle substitution becomes necessary.
23 The device has been recommended for use in the treatment of persons with low back pain.

24 25 **Isokinetic Testing Devices**

26 Other types of quantitative muscle testing and strengthening devices, referred to as
27 isokinetic testing devices, measure muscle strength by applying a constant resistance over
28 a range of motion and speed. It is a rehabilitative exercise device intended for medical
29 purposes to measure, evaluate, and increase the strength of muscles and the range of motion
30 of joints. Based on testing results, strengthening exercises may be recommended. Isokinetic
31 exercise is exercise performed using a specialized apparatus that controls the speed of
32 movement within the range of motion. The exercise device provides variable resistance to
33 movement but allows movement at a constant speed. The device registers the force applied
34 to it by the user and offers the same amount of force as resistance. Cybex, Kin-Com, and
35 Biodex are machines that provide isokinetic testing and muscle strengthening exercise.
36 Evidence in the published scientific literature demonstrating the utility of these specific
37 devices for muscle testing or strengthening therapy or standard procedures and exercise
38 was not found.

1 **GENERAL BACKGROUND**

2 **Functional Capacity Evaluation**

3 FCE is a comprehensive, objective testing of a person's abilities in work related functional
4 tasks. At times, it is used as a preliminary test to determine functional status and capabilities
5 prior to beginning a Work Hardening Program.

6
7 Work Hardening is a highly specialized rehabilitation program. It commonly begins
8 following traditional rehabilitation therapies. Its goal is to simulate workplace activities
9 and surroundings in a monitored environment to enable the patient to return to work. These
10 programs may be developed and carried out by an occupational therapist and/or a physical
11 therapist. The goal is to create an environment in which returning workers can rebuild
12 psychological self-confidence and physical reconditioning by imitating their customary
13 work routine. Work hardening programs refer to physical conditioning programs for
14 injured workers who are out of work, or who are working at less than full capacity. Work
15 hardening is a highly specialized rehabilitation program that transitions the patient from
16 standard rehabilitation to return to work by simulating workplace activities and
17 surroundings in a monitored environment. A wide range of programs conducted by a
18 number of different health disciplines have been reported in the professional and scientific
19 literature. In general, work hardening programs include a systematic program of gradually
20 progressive, work-related activities performed with proper body mechanics, with the goal
21 of physically and psychologically reconditioning the patient in order to facilitate return to
22 full employment.

23
24 An FCE may be indicated for the assessment of the worker's capacity to meet the physical
25 demands of specific duties when other sources do not provide this information. It is noted
26 that a work trial is often the most valid test of a worker's capacity.

27
28 An FCE may be used as a source of information for the development of a RTW
29 program/plan at the point of maximal medical improvement when:

- 30
- 31 • Treatment progress has reached a plateau/medically stationary;
 - 32 • Discrepancy between subjective complaints and objective findings;
 - 33 • Difficulty returning to gainful employment;
 - 34 • Physical limitations and/or functional impairments hinder performance of regular
35 work demands;
 - 36 • Vocational planning, job placement and/or medico legal case settlement.

37 The FCE should be approached on a case-by-case basis. Comprehensive functional
38 activities related to work duties should be observed and measured during the evaluation,
39 keeping in mind that isometric or isokinetic tests of extremity or trunk torque are not
40 sufficient, as these values mostly correlate poorly with performance of functional activities.

1 Safety and prevention of further injury should be a main consideration and based on the
2 following principles:

- 3 • Communicate risks and contraindications
- 4 • Professional judgment is used to determine a safe maximal level for each test
5 component and FCE should only focus on critical job demands
- 6 • Cardiovascular system monitoring with modification FCE accordingly if changes
7 in heart rate, blood pressure or respiratory rate change excessively
- 8 • Standardized criteria for ceasing a test must be established in advance, including
9 but not limited to:
 - 10 ○ Pain
 - 11 ○ Nausea
 - 12 ○ Dizziness
 - 13 ○ Blurred vision
 - 14 ○ Radicular symptoms
 - 15 ○ Continued use of unsafe body mechanics

16
17 Expected outcomes of an FCE include:

- 18 • Making recommendations about body mechanics, movements, techniques, and
19 modifications, such as safe manual handling and other actions which facilitate
20 return to work; and
- 21 • Specifying proposed return to work duties or different duties.

22
23 The FCE should be performed in settings that meet all of the following:

- 24 • The equipment represents an appropriate reflection of work duties i.e., relevant
25 tests, normative standards, acceptable reliability and validity.
- 26 • The environment and space for the equipment meet work and equipment
27 specifications.
- 28 • The evaluator understands the equipment used during the FCE (i.e., training
29 completed if necessary).
- 30 • Appropriate maintenance and calibration of the equipment is documented and
31 available for review.
- 32 • There are appropriate planning, facilities and equipment to respond to emergencies.

33 34 **Evaluator Qualifications**

35 The FCE shall be performed in its entirety by a physical or occupational therapist currently
36 holding a valid license, or other licensed provider qualified by scope of practice. The FCE
37 should be performed by evaluators who have education, training and competencies.
38 Competencies must be evident by certification, where required specific to the FCE system
39 that is being used, and by experience (having satisfactorily performed a minimum of five
40 (5) FCEs. Proof of competencies may include a review by the Credentialing and Risk
41 Management Committee of a sampling of previously completed FCE reports.

1 **Quantitative Muscle Testing Devices**

2 These devices are utilized in rehabilitation settings as a therapeutic exercise and evaluation
 3 tool. MedX and Isostation B-200 are devices used for spinal conditions. There are specific
 4 protocols that are followed for the specific machines utilized. Testing is completed to
 5 determine improvements over time. Isokinetic devices, such as the Biodex or Kin-Com,
 6 are used as a form of therapeutic exercise. Typically, these devices are used for the knee
 7 joint for strengthening of the quadriceps and hamstrings. However, other attachments are
 8 available for the upper extremity joints, and hip and ankle joints. Use of these devices for
 9 therapeutic exercise would be considered a form of therapeutic exercise and use of the CPT
 10 codes specified in this guideline would not be appropriate. Testing protocols are utilized to
 11 determine improvements and/or muscle strength ratios. Comprehensive reports are
 12 produced demonstrating torques of muscles tested at the various speeds of movement.
 13 Muscle strength ratios are also reported. CPT codes stated in this guideline refer to use of
 14 these devices for testing and evaluation. Rehabilitation facility use of these devices have
 15 dwindled over the years given the cost and space required for use. However, use within the
 16 research environment continues with focus on the knee joint. Research published focuses
 17 on the relationship of quadriceps and hamstrings strength with functional improvement,
 18 return to sport, and re-injury.

19 **DOCUMENTATION GUIDELINES**

20 As code 97750 is a time-based code, the test or measurement procedure as well as the time
 21 spent analyzing and interpreting the results in the presence of the patient are elements of
 22 the visit that must be documented. The time element determines the number of units to be
 23 reported for this procedure. The time element determines the number of units to be
 24 reported for this procedure. Three time elements must be documented to correctly report
 25 code 97750:

- 26 • Total time spent with the patient in providing the test and measurement, including
 27 the time spent preparing the patient for the test and measurement procedure;
- 28 • The time spent performing the selected protocol; and
- 29 • The time spent with the patient in providing any post-testing instructions.

30
 31 The elements of documentation that support the reporting of code 97750, include
 32 documentation of the testing elements and/or protocols, documentation of problem
 33 requiring the test and the specific test performed, separate measurement report, including
 34 any graphic reports and interpretation of the data collected, and impact on the patient's plan
 35 of care (i.e., discharge, return to sport or activities of daily living [ADL], or modification
 36 of treatment). Time spent in direct contact with the patient determines the number of units
 37 to be reported for this procedure.

38 **Functional Capacity Evaluation**

39 Prior to the FCE, a written referral (from physician, carrier, or employer) must be
 40 forwarded to the evaluator with the purpose of the FCE explicitly stated such as clearly
 41 defined goals to guide test selection in the referral document and reflects one or more of
 42

1 the applications of an FCE. The referral source and evaluator should access and review any
2 relevant medical records, work related duties, prior attempts to return to work or FCEs (if
3 occurred) and reason for failure, and identify the RTW goals and potential options in
4 advance. Consideration of any comorbidities and their influence on the FCE and return to
5 work is imperative.

6
7 Results should be relevant to and comparable with the physical demands of a job when
8 identified. Written reports are required and must be submitted with the following
9 information:

- 10 • Patient demographics including work history;
- 11 • Indication for evaluation;
- 12 • Type of evaluation performed;
- 13 • Raw and tabulated data;
- 14 • Normative data values;
 - 15 ○ Test results should be compared with normative data for the FCE employed;
- 16 • Narrative coversheet at the beginning of the document describing the results of the
17 evaluation and recommendations.

18
19 Where relevant, the detailed report should include the following additional areas:

- 20 • Results of subjective interview;
- 21 • Results of self-reported measures of disability;
- 22 • Results of physical examination/screening;
- 23 • Behavioral aspects including pain behavior and effort;
- 24 • Pace of work;
- 25 • Clinical observations including body mechanics;
- 26 • Functional abilities for the assessed physical demands.

27 28 **LITERATURE REVIEW**

29 There is limited evidence in the published peer-reviewed scientific literature evaluating the
30 use of quantitative muscle testing devices. These devices have not been shown to be equally
31 effective as other standard exercise equipment utilized in rehabilitation programs, nor is
32 there sufficient evidence to suggest that use of quantitative muscle testing devices improves
33 clinical health outcomes when compared to standard manual muscle testing.

34 35 **PRACTITIONER SCOPE AND TRAINING**

36 Practitioners should practice only in the areas in which they are competent based on their
37 education, training and experience. Levels of education, experience, and proficiency may
38 vary among individual practitioners. It is ethically and legally incumbent on a practitioner
39 to determine where they have the knowledge and skills necessary to perform such services
40 and whether the services are within their scope of practice.

1 It is best practice for the practitioner to appropriately render services to a member only if
 2 they are trained, equally skilled, and adequately competent to deliver a service compared
 3 to others trained to perform the same procedure. If the service would be most competently
 4 delivered by another health care practitioner who has more skill and training, it would be
 5 best practice to refer the member to the more expert practitioner.

6
 7 Best practice can be defined as a clinical, scientific, or professional technique, method, or
 8 process that is typically evidence-based and consensus driven and is recognized by a
 9 majority of professionals in a particular field as more effective at delivering a particular
 10 outcome than any other practice (Joint Commission International Accreditation Standards
 11 for Hospitals, 2020).

12
 13 Depending on the practitioner's scope of practice, training, and experience, a member's
 14 condition and/or symptoms during examination or the course of treatment may indicate the
 15 need for referral to another practitioner or even emergency care. In such cases it is prudent
 16 for the practitioner to refer the member for appropriate co-management (e.g., to their
 17 primary care physician) or if immediate emergency care is warranted, to contact 911 as
 18 appropriate. See the *Managing Medical Emergencies (CPG 159 – S)* policy for
 19 information.

20 21 **References**

22 American College of Occupational and Environmental Medicine. Chronic Pain. In:
 23 Occupational medicine practice guidelines: evaluation and management of common
 24 health problems and functional recovery in workers, Elk Grove Village (IL): American
 25 College of Occupational and Environmental Medicine (ACOEM); 2008. P. 73-502.
 26 Guideline Summary NGC-7160

27
 28 American Occupational Therapy Association. Work hardening guidelines (position paper).
 29 Am J Occup Ther. 1986;40(12):841-843.

30
 31 American Physical Therapy Association <http://www.apta.org>

32
 33 Anderson C and Briggs J. A study of the effectiveness of ergonomically-based functional
 34 screening tests and their relationship to reducing worker compensation injuries. Work
 35 2008;31:27-37.

36
 37 Baker P, Goodman G, Ekelman B, Bonder B. The effectiveness of a comprehensive work
 38 hardening program as measured by lifting capacity, pain scales, and depression scores.
 39 Work. 2005;24(1):21-31.

40
 41 Bohl, Ahn, Collins, et al. Functional Capacity Evaluation following spinal fusion surgery.
 42 Spine. Volume 41, number 13, pp 1104-1110.

- 1 Brewer CC, Storms BS. The final phase of rehabilitation: Work hardening. Orthop Nurs.
2 1993;12(6):9-15.
3
- 4 Bühne D, Alles T, Hetzel C, Streibelt M, Froböse I, Bethge M. Predictive validity of a
5 customized functional capacity evaluation in patients with musculoskeletal disorders.
6 Int Arch Occup Environ Health. 2020;93(5):635-643. doi:10.1007/s00420-020-01518-
7 5
8
- 9 Cancio JM, Oliver RA, Yancosek KE. Functional Capacity Evaluation-Military; Program
10 Description and Case Series. Mil Med 2017 Jan; 182(1).
11
- 12 Centers for Medicare and Medicaid Services. Local Coverage Determination (LCD):
13 Therapy and Rehabilitation Services (PT, OT) (L35036). Retrieved on February 13,
14 2023 from [https://www.cms.gov/medicare-coverage-database/details/lcd-
15 details.aspx?LCDId=33631&ver=51&NCAId=96&TAId=43&NCDId=320&ncdver=
16 1&SearchType=Advanced&CoverageSelection=Both&NCSelection=NCA%7cCAL
17 %7cNCD%7cMEDCAC%7cTA%7cMCD&ArticleType=Ed%7cKey%7cSAD%7cF
18 AQ&PolicyType=Final&s=-
19 %7c5%7c6%7c66%7c67%7c9%7c38%7c63%7c41%7c64%7c65%7c44&KeyWord=
20 Pulmonary+Rehabilitation&KeyWordLookUp=Doc&KeyWordSearchType=And&kq
21 =true&bc=IAAADAAAAAA&](https://www.cms.gov/medicare-coverage-database/details/lcd-details.aspx?LCDId=33631&ver=51&NCAId=96&TAId=43&NCDId=320&ncdver=1&SearchType=Advanced&CoverageSelection=Both&NCSelection=NCA%7cCAL%7cNCD%7cMEDCAC%7cTA%7cMCD&ArticleType=Ed%7cKey%7cSAD%7cFAQ&PolicyType=Final&s=-%7c5%7c6%7c66%7c67%7c9%7c38%7c63%7c41%7c64%7c65%7c44&KeyWord=Pulmonary+Rehabilitation&KeyWordLookUp=Doc&KeyWordSearchType=And&kq=true&bc=IAAADAAAAAA&)
22
- 23 Chen A, Cheng S. Use of Job-Specific Functional Capacity Evaluation to Predict Return
24 to Work of Patients with Distal Radius Fracture. American Journal of Occupational
25 Therapy 2011;65:445-452
26
- 27 Cole K, Kruger M, Bates D, et al. Physical demand levels in individuals completing a sports
28 performance-based work conditioning/hardening program after lumbar fusion. Spine J.
29 2009;9(1):39-46.
30
- 31 Cotton A, Schonstein E and Adams R. Use of Functional capacity Evaluations by
32 rehabilitation providers in NSW. Work 2006;26:287-295.
33
- 34 Current Procedural Terminology (CPT) Manual, Professional Edition (current year).
35 American Medical Association
36
- 37 Denniston PL, Whelan P. Official Disability Guidelines. 18th Ed. 2013; Work Loss Data
38 Institute: <https://www.mcg.com/odg/>
39
- 40 Gibson L, Strong J. A conceptual framework of functional capacity evaluation for
41 occupational therapy in work rehabilitation. Australian Occupational Therapy Journal
42 2003;50:64-7

- 1 Gibson L and Strong J. A review of functional capacity evaluation practice. *Work*
2 1997;9:3-11
3
- 4 Gross D, Asante A, Miciak M, Battie M, et al. A cluster randomized clinical trial comparing
5 FCE and functional interviewing as components of occupational rehabilitation
6 programs. *Journal of Occupational Rehabilitation* 2014 Dec;24(4):617-630
7
- 8 Gross D, Battie M Cassidy JD. The prognostic value of functional capacity evaluation in
9 patients with chronic low back pain: part 1. *Spine* 2004;29:914-919
10
- 11 Gross DP, Asante KA, Miciak M, et al. A Cluster Randomized Clinical Trial Comparing
12 Functional Capacity Evaluation and Functional Interviewing as Components of
13 Occupational Rehabilitation Programs. *J Occup Rehabil.* 2013 [Epub ahead of print]
14 DOI 10.1007/s10926-013-9491-4
15
- 16 Gross, DP and Battie, M. Factors Influencing Results of FCE in Workers' Compensation
17 Claimants with Low Back Pain. *Physical Therapy* 2005;85:315-322
18
- 19 Gross DP, Battie MC. The Prognostic Value of Functional Capacity Evaluation in Patients
20 with Chronic Low Back Pain: Part 2. *Spine* 2004; 29:920-924
21
- 22 Gross DP, Battie MC. Reliability of Safe Maximum Lifting Determinations of a Functional
23 Capacity Evaluation. *Physical Therapy* 2002; 82:364-371
24
- 25 Gross D, Beattie M. Does functional capacity evaluation predict recovery in workers'
26 compensation claimants with upper extremity disorders. *J Occup Environ Med*
27 2006;63:404-410
28
- 29 Guidelines for Functional Capacity Evaluations (FCE) 2006; WorkCover Corp, South
30 Australia Guidelines: Occupational Health Physical Therapy: Evaluating Functional
31 Capacity; Parts 1-3.
32
- 33 Hart DL, et al. Guidelines for Functional Capacity Evaluation of People With Medical
34 Conditions. *Journal of Orthopedic and Sports Physical Therapy* 1993; 18:682-686
35
- 36 Innes E, Straker L. Reliability of work-related assessments. *Work.* 1999;13(2):107-124.
37
- 38 Innes E, Straker L. Validity of work-related assessments. *Work.* 1999;13(2):125-152.
39
- 40 Innes E and Straker L. Attributes of excellence in work-related assessments. *Work*
41 2003;20:63-76

- 1 Innes E and Straker L. A clinician's guide to work-related assessments: 2 –design
2 problems. *Work* 1998;11:191-206
3
- 4 Isernhagen SJ. Functional capacity evaluation. In: Isernhagen SJ, ed. *Work Injury;
5 Management and Prevention*. Rockville, MD: Aspen; 1988:139-194
6
- 7 Isernhagen SJ. Functional capacity evaluation: rationale, procedure, utility of the
8 kinesiophysical approach. *Journal of Occupational Rehabilitation* 1992;2:157-168
9
- 10 Joint Commission International. (2020). *Joint Commission International Accreditation
11 Standards for Hospitals (7th ed.)*: Joint Commission Resources
12
- 13 King PM. Outcome analysis of work-hardening programs. *Am J Occup Ther.*
14 1993;47(7):595-603.
15
- 16 King PM, Tuckwell N and Barrett TE. A critical review of functional capacity evaluations.
17 *PHYS THER.* 1998; 78:852-866
18
- 19 Lakke SE, Soer R, et al. Construct validity of functional capacity tests in healthy workers.
20 *BMC Musculoskeletal Disord.* 2013; 14:180.
21
- 22 Lechner D, Page J, Sheffield G. Predictive validity of a functional capacity evaluation: the
23 physical work performance evaluation. *Work* 2008;31:21-25
24
- 25 Lechner DE. Work hardening and work conditioning interventions: Do they affect
26 disability? *Phys Ther.* 1994;74(5):471-493.
27
- 28 Lemstra M, Olszynski WP. The effectiveness of standard care, early intervention, and
29 occupational management in Workers' Compensation claims: Part 2. *Spine.*
30 2004;29(14):1573-1579.
31
- 32 Mahmud N, Schonstein E, Schaafsma F, et al. Functional capacity evaluations for
33 preventing re-injuries in injured workers. *Cochrane Database of Systemic Reviews*
34 2010, Issue 7. Art. No.: CD007290. DOI: 10.1002/14651858.CD007290.pub2
35
- 36 Matheson, L. The Functional Capacity Evaluation. In G. Andersson & S. Demeter & G.
37 Smith (Eds.), *Disability Evaluation*, 2nd edition 2003; Chicago, IL: Mosby Yearbook
38
- 39 Matheson L, Mooney V, Grant J, et al. Standardized evaluation of work capacity. *Journal
40 of Back and Musculoskeletal Rehabilitation* 1996;6:249-264

- 1 Niemeier LO, Jacobs K, Reynolds-Lynch K, et al. Work hardening: Past, present, and
 2 future--the work programs special interest section national work-hardening outcome
 3 study. *Am J Occup Ther.* 1994;48(4):327-339
 4
- 5 Oesch PR, Kool JP, Bachmann S and Devereaux. The influence of Functional capacity
 6 Evaluation on fitness for work certificates in patients with non-specific chronic low
 7 back pain. *Work* 2006;26:259-271
 8
- 9 Orthopedic Section of APTA. Occupational Health Physical Therapy: Evaluation FCE
 10 Guidelines. July 11, 2011
 11
- 12 Peppers D, Figoni SF, Carroll BW, et al. Influence of Functional Capacity Evaluation on
 13 Physician's Assessment of Physical Capacity of Veterans with Chronic Pain: A
 14 Retrospective Analysis. *PM R.* 2016 Oct 22.
 15
- 16 Post M, Krol B, Groothoff JW. Work-related determinants of return to work of employees
 17 on long-term sickness absence. *Disability and Rehabilitation* 2005;27:481-488
 18
- 19 Pransky GS, Dempsey, PG. Practical Aspects of Functional Capacity Evaluations. *Journal*
 20 *of Occupational Rehabilitation* 2004; 14:217-229
 21
- 22 Rehabilitation Therapy Utilization Guidelines for the Care and Treatment of Injured
 23 Workers. Wyoming Workers' Safety and Compensation Division; R02/8/08
 24
- 25 Reneman, Roelofs, Schiphorst-Preuper. Reliability and agreement of Neck Functional
 26 Capacity Evaluation tests with chronic multifactorial neck pain. *Arch Phys Med*
 27 *Rehabil.* 2016 Dec 31.
 28
- 29 Schindl M, Wassipaul S, Wagner T, Gestaltner K, Bethge M. Impact of Functional Capacity
 30 Evaluation on Patient-Reported Functional Ability: An Exploratory Diagnostic Before-
 31 After Study. *J Occup Rehabil.* 2019;29(4):711-717. doi:10.1007/s10926-019-09829-2
 32
- 33 Schindl M, Zipko H, Bethge M. Reproducibility of improvements in patient-reported
 34 functional ability following functional capacity evaluation. *BMC Musculoskelet*
 35 *Disord.* 2022;23(1):258. Published 2022 Mar 16. doi:10.1186/s12891-022-05208-w
 36
- 37 Schonstein E, Kenny DT, Keating J, Koes BW. Work conditioning, work hardening and
 38 functional restoration for workers with back and neck pain. *Cochrane Database Syst*
 39 *Rev.* 2003;(1):CD001822.

- 1 Shu-Kei Cheng A, Wai-Chee Cheng S. The Predictive Validity of Job-Specific Functional
2 capacity Evaluation on the Employment Status of patients with Nonspecific Low Back
3 Pain. *J Occup Environ Med* 2010;52:719-724
4
- 5 Soer R, Cees P, et al. Towards Consensus in occupational definitions in functional capacity
6 evaluation: a delphi survey. *J Occup Rehabil* 2008;18:389-400.
7
- 8 Soer R, van der Schans, CP, Geertzen JH, et al. Normative values for a functional capacity
9 evaluation. *Arch Phys med Rehabilitation* 2009;90:1785-94.
10
- 11 Soo Hoo ER. Evaluating Return-to-work Ability Using Functional Capacity Evaluation.
12 *Phys Med Rehabil Clin N Am.* 2019;30(3):541-559. doi:10.1016/j.pmr.2019.04.002
13
- 14 Trippolini MA, Dijkstra PU, et al. Reliability of clinician rated physical effort
15 determination during functional capacity evaluation in patients with chronic
16 musculoskeletal pain. *J Occupa Rehabil.* 2013 [Epub ahead of print]
17
- 18 Van Abbema, et al. Factors associated with functional capacity test results in patients with
19 non-specific chronic low back pain: a systematic review. *J Occup Rehabil*
20 2011;21:455-473
21
- 22 Weir R, Nielson WR. Interventions for disability management. *Clin J Pain.* 2001;17(4
23 Suppl):S128-S132.
24
- 25 Wind H, Goutteborge V, Kuijjer P, et al. Complimentary value of functional capacity
26 evaluation for physicians in assessing the physical work ability of workers with
27 musculoskeletal disorders. *Int Arch Occup Environ Health* 2009;82:435-443
28
- 29 Wunderlich GS (Editor). *Measuring Functional Capacity and Work Requirements:*
30 *Summary of a Workshop.* The National Academy of Sciences 1999: www.nap.edu
31
- 32 Wyman DO. Evaluating patients for return to work. *Am Fam Physician.* 1999;59(4):844-
33 848.