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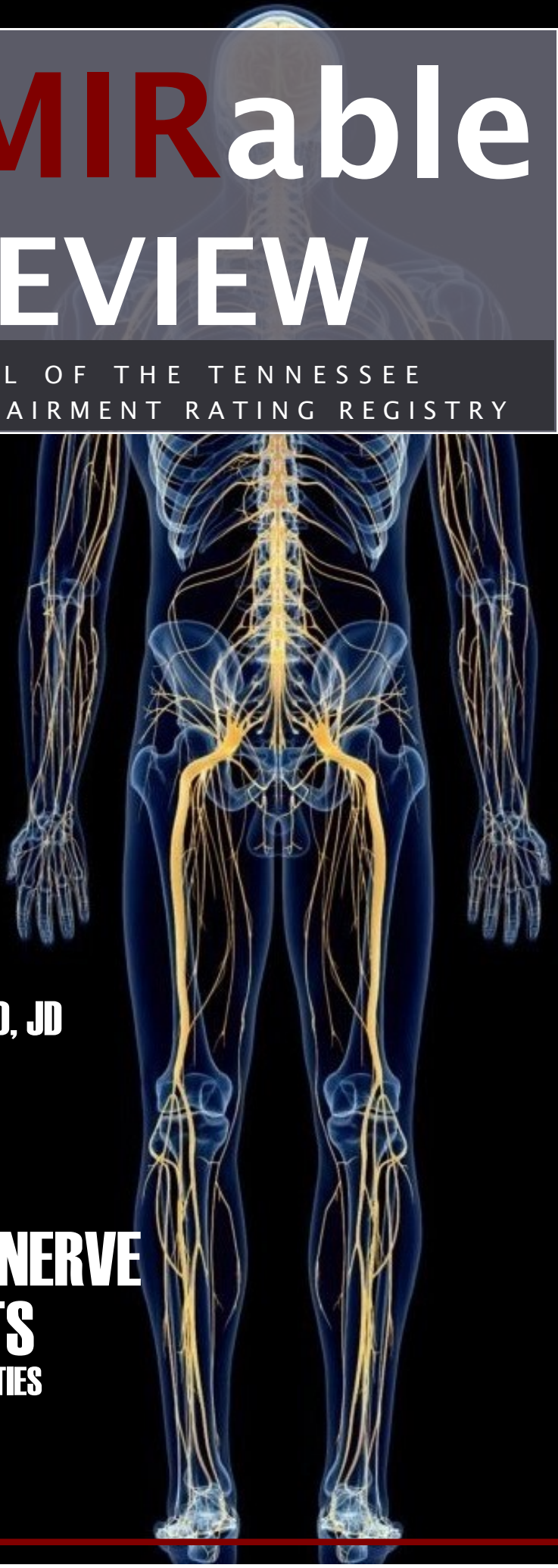

LOWER EXTREMITY PERIPHERAL NERVE CASE LAW

PHYSICIAN SPOTLIGHT: STEVEN W. KENT, MD, JD

HOW TO HELP COVID-19 PATIENTS REACH MMI

PERIPHERAL NERVE IMPAIRMENTS OF THE LOWER EXTREMITIES

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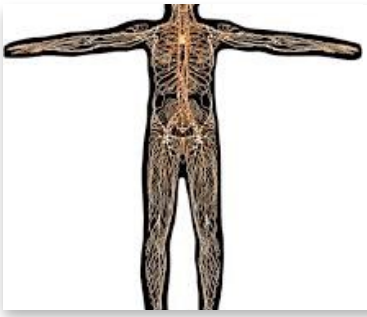

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MIR Physician Spotlight

Stephen W. Kent, MD, JD

Dr. Stephen Kent was born in a naval hospital at Cherry Point, N.C., where his father served in the U.S. Marine Corps in 1954. They moved back to Knoxville, where Dr. Kent's great-grandfather, Sydney G. Kent Sr., and grandfather, Sydney G. Kent Jr., had operated the Kent Drug Store for two generations. Dr. Kent's family then relocated to Memphis in 1962, when his father, a University of Tennessee graduate in civil engineering, took a position as the branch manager of Johnson Controls, Inc. While in Memphis, he would accompany his father and siblings to East Tennessee, Greer's Ferry, Pickwick and Tunica Cut Off, where they would enjoy hunting and fishing.

In college, he spent four years in Knoxville getting an undergraduate degree from UT in chemistry. Then he returned to Memphis, where he was accepted to the UT Center for Health Sciences Medical School. In 1982, he graduated from medical school and spent three post-graduate years in a surgery program training at UT Erlanger Hospital in Chattanooga and then at UT Memorial Hospital in Knoxville. During this time, Dr. Kent would moonlight in local emergency rooms for extra income. It was this exposure to emergency medicine that convinced him he had chosen the wrong career path.

In 1985, Dr. Kent switched his career from surgery and took a full-time position at Clarksville Memorial Hospital, staffing the emergency room. In 1991, Dr. Kent earned his Board Certification in Emergency Medicine and served as the Medical Director of the emergency room, where he worked until 2004. While practicing full-time emergency medicine, Dr. Kent developed an interest in occupational medicine and opened Clarksville Occupational Health Specialist in 1992, where he treated many work injuries/illnesses and offered occupational exams of all types, including independent medical examinations. In 1998, Dr. Kent earned his Board Certification in Occupational Medicine.

He found that much of his practice of medicine involved legal medicine issues and contract law, which he found challenging and interesting, so he enrolled in the Nashville School of Law in 2003. In 2007, he passed the Tennessee bar exam and was sworn in by the Tennessee Supreme Court as a licensed attorney.

Dr. Kent said he enjoyed his four years of legal education more than any of his previous educational pursuits. He uses his law degree in all aspects of his personal and professional life. He finds it

fascinating to research case law and statutory law in pursuing the logic and reasoning behind legal decisions.

Dr. Kent is currently the Medical Director of DoctorsCare Walk-In Medical Clinics, which provides urgent care/occupational health services to the Clarksville/Montgomery County area since 2002. He is also a Medical Review Officer, Aviation Medical Examiner, D.O.T. Medical Examiner, and U.S. Citizenship and Immigration Services Civil Surgeon. He has served as Montgomery County Medical Society President and Chief of Staff, Gateway Medical Center (now Tennova Medical Center). He is currently the Medical Examiner for Montgomery County since 2006. He is an attorney of counsel at Baker Law Firm in Charlotte, TN.

Dr. Kent is proud to be on the Tennessee Medical Impairment Rating Registry. He enjoys the challenge of assimilating the germane facts in the medical records, current history, and physical examination, and applying the AMA Guides to reach a logical and fair impairment rating.

“All of us are unique and are affected by injuries/illnesses differently,” he said. Dr. Kent went on to say that he is frequently impressed with how the human spirit and imagination can overcome and cope with physical and mental adversity.

Dr. Kent has been married to Victoria Kent (from Memphis) for 39 years. They currently live in Clarksville. They have one child, Stephen Kent Jr. (married to Molly), and two beautiful grandchildren Lucy and Clark Kent, who have greatly enriched their lives. They all enjoy the outdoors and spend countless hours at their farm or with the horses. One of their means of traveling the farm is via a 1947 Willys Jeep (CJ2A) that has been in Dr. Kent’s family since 1967.

How to Help Covid-19 Patients Reach MMI

James B. Talmage, MD, Mark H. Hyman, MD, Leslie Burton, PT

Covid-19 is the illness caused by the SARS-CoV-2 virus that has reached pandemic incidence rates. This virus is very similar in its RNA genetic sequences and physical structure to the coronaviruses that caused prior mini-epidemics: SARS in 2003 and MERS in 2012 to 2015. As of February 5, 2021, there have been 26,398,337 cases and 449,020 deaths in the U.S. [http://covid.cdc.gov/covid-data-tracker/#cases_casesper100klast7days].

Patients have suffered all degrees of illness severity from this virus. A review of published studies found a huge variance of 18% to 81% of infections were in asymptomatic people at the time of testing. Many remained asymptomatic, but all were capable of transmitting the infection to others (Nikolai, 2020).

Thus far in Tennessee, some patients with Covid-19 have been determined by insurers to have acquired the illness through a workplace exposure. This finding results in workers' compensation insurance coverage. All injuries and illnesses accepted as work compensable require the authorized treating physician to state a date of Maximum Medical Improvement (MMI).

MMI is defined in the AMA *Guides to the Evaluation of Permanent Impairment, 6th Edition* as "The point at which a condition has stabilized and is unlikely to change (improve or worsen) substantially in the next year, with or without treatment" (*Guides 6th ed.*, 612). In addition, "Only permanent impairment may be rated according to the *Guides,* and **only after** the status of 'Maximum Medical Improvement' (MMI) is determined, as explained in Section 2.5e. Impairment should not be considered permanent until a **reasonable time has passed for the healing or recovery to occur**" (*Guides, 6th ed.,* 24).

When is a Covid-19 patient at MMI, and how can the Authorized Treating Physician help patients get to MMI?

The Bureau has previously published preliminary advice on Covid-19 and MMI and rating permanent impairment in the Summer 2020 issue of *AdMIRable Review*. Those who were asymptomatic or mildly ill, and who recover fully by two to three weeks after a positive test, can be considered to be at MMI. They can be cleared for normal activity, including work, as with any other viral infection (Hyman, 2020).

Those who had severe illness with complications like myocardial infarction, stroke, acute kidney injury, etc. are usually already under the care of the appropriate specialist. Rehabilitation

treatment decisions for these patients are typically made by the cardiologist, neurologist, nephrologist, etc.

The focus of this article is for primary care, occupational medicine, or physical medicine and rehabilitation physicians. These "front-line" providers might be tasked with caring for patients recovering from illness with an accepted Covid-19 workers' compensation claim. They will encounter individuals who have no documented severe complication, but who present with persistent symptoms like fatigue, shortness of breath with exercise, cognitive impairment ("brain fog") and/or anxiety. These patients are euphemistically termed "Long Covid," or "Long-Haulers." The science on evaluation and treatment of these patients is still evolving, and this article should be considered current but preliminary advice.

This article is intended to help a general physician who becomes the Authorized Treating Physician (i.e. Panel Physician) recognize and refer those recovering Covid-19 patients who should be treated and followed by specialists. For those who do not screen out as requiring specialist care, the Authorized Treating Physician can evaluate for referral to an exercise rehabilitation program, and/or a mental health provider. After six months of time, without ongoing improvement, and after appropriate rehabilitation treatment, the patient recovering from Covid-19 with persisting symptoms can be considered to be "at Maximal Medical Improvement" (MMI).

Data from the United Kingdom Covid Symptom Study "App" indicated that by two weeks after onset, 90% of patients have recovered. Many of the remaining 10% recover fully over the next two to three months. Studies that evaluated patients with disease severe enough for hospitalization reported higher rates.

A U.S. study found only 65% of patients had returned to their pre-infection state of health after 14 to 21 days (Tenforde, 2020).

The National Institute of Health Guidelines state: "There have been an increasing number of reports of patients who experience persistent symptoms after recovering from acute COVID-19." At this time, there is limited information on the prevalence, duration, underlying causes, and effective management strategies for these lingering signs and symptoms (Marshall, 2020).

Some of the symptoms overlap with the post-intensive care syndrome that has been described in patients without COVID-19, but prolonged symptoms and disabilities after COVID-19 have also been reported in patients with milder illness, including outpatients (Rawal, 2017).

Some of the persistent symptoms that have been reported include fatigue, joint pain, chest pain, palpitations, shortness of breath, and worsened quality of life (Halpin, 2020). Additionally, psychological distress and its correlates have been reported among COVID-19 survivors during early convalescence across age groups (Cai, 2020).

One study from China found that pulmonary function was still impaired one month after hospital discharge (Huang, 2020).

A study from the United Kingdom reported that among 100 hospitalized patients (32 received care in the ICU, and 68 received care in hospital wards only), 72% of the ICU patients and 60% of the ward patients experienced fatigue and breathlessness at four to eight weeks after hospital discharge. The authors of the study suggest that post-hospital rehabilitation might be necessary for some of these patients (Halpin, Cia, & Mazza, 2020).

Neurologic and psychiatric symptoms have also been reported among patients who have recovered from acute Covid-19. High rates of anxiety and depression have been reported in some patients using self-report scales for psychiatric distress. Younger patients have been reported to experience more psychiatric symptoms than patients older than age 60 (Mazza, 2020).

Patients might continue to experience headaches, vision changes, hearing loss, loss of taste or smell, impaired mobility, numbness in extremities, tremors, myalgia, memory loss, cognitive impairment, and mood changes for up to three months after diagnosis of Covid-19 (Lu, 2020; Heneka, 2020). More research is needed to better understand the pathophysiology and clinical course of these post-infection sequelae and to identify management strategies for patients.

"For any and all persistent complaints after a Covid-19 illness, reviewing the medical records from the two to three years before this illness is necessary to establish the person's pre-Covid status, and whether the condition or symptoms present were already present before the Covid-19 illness."

One Approach to Persisting Symptoms of Fatigue and Dyspnea on Exertion

For any and all persistent complaints after a Covid-19 illness, reviewing the medical records from the two to three years before this illness is necessary to establish the person's pre-Covid status, and whether the condition or symptoms present were already present before the Covid-19 illness.

No medication that was available to those with current Covid related claims has been shown to hasten recovery in those living at home while recovering from Covid-19. While symptoms are rapidly improving after Covid-19 illness, time is the great healer. (Coppi, 2005). In those with mild

illness who recovered at home without hospitalization, by two to three weeks after resolution of fever, they should be recovered enough to resume sedentary or light work by *Dictionary of Occupational Titles* criteria.

For those with moderate illness who were hospitalized for hypoxia, but who did not require ICU admission or mechanical ventilation, four to six weeks might be required before return to sedentary or light work (Hyman, 2020). For those with persisting symptoms of fatigue or dyspnea on exertion, and for those with documented lower respiratory tract infection (pneumonia on imaging), a testing-based evaluation might be helpful.

BMJ published an open-access article, "Management of post-acute covid-19 in primary care," with a central theme that evaluation and management of these patients is a **primary care physician task** (Greenhalgh & Knight, 2020). The evaluation would screen out those patients who need referral to specific specialists (cardiologist, neurologist, etc.), and then permit the primary care physician to support the patient through recovery. Patients who should be referred include those with increasingly worsening breathlessness, chest pain possibly consistent with cardiac ischemia, and with a resting oxygen saturation less than 96% on pulse oximetry.

The primary care physician screening here would involve:

- A history and physical exam to document symptoms, severity, and baseline status. Vital signs should include pulse oximetry for oxygen saturation percentage at rest, as well as sitting and standing pulse rate and blood pressure screening for postural orthostatic tachycardia syndrome (POTS).
- Review of any medical records and testing obtained during the illness, and medical records from before the illness.
- CBC (complete blood count) screening for anemia.
- Electrolytes, serum creatinine, and urinalysis to establish normal kidney function is present.
- Liver function tests (bilirubin, AST, ALT) to establish normal liver function is present.
- C reactive protein and Ferritin to rule out persisting hyperinflammatory state.
- D-dimer to rule out persisting hypercoagulable state.
- Troponin, Brain Natriuretic Peptide (BNP), and 12 lead electrocardiogram to help rule out acute coronary artery syndrome, heart failure, and prior myocardial infarction.

If this comprehensive screening suggests the active phase of the disease is over and shows no worrisome findings requiring specialist evaluation, the recommendation is to screen for safe participation in an exercise program.

An **exertional desaturation test** should be performed as part of a baseline assessment for patients whose resting pulse oximeter reading is 96% or above but whose symptoms suggest exertional desaturation (such as light-headedness or severe breathlessness on exercise). In the absence of contraindications, such patients should be invited to repeat the oximeter reading after 40 steps on a flat surface (if self-testing remotely) and then after spending one minute doing sit-to-stand as fast as they can (if supervised on site). A fall of 3% in the saturation reading on mild exertion is abnormal and requires investigation (Greenhalgh & Javid, 2020).

An easy way to perform a screening test is to recall that 40 steps with a 30-inch (2.5 foot) step length is 100 feet. If the medical office has a hallway with 12-inch vinyl tile flooring, then if the patient walks 50 tiles (50 feet) away from the examiner, turns around, and then walks 50 feet back to the examiner while wearing a pulse oximeter on a finger, the pulse rate and oxygen saturation can be read from the pulse oximeter, first while standing and about to walk, and then again after the 100-foot walk. Respiratory rate immediately before and after the walk should also be recorded. Physicians might be familiar with this testing, as Tennessee-suggested criteria for certification for a motor vehicle disability license plate include medical conditions that "cause such person to be so ambulatory disabled that he or she cannot **walk two hundred feet (200')** without stopping to rest[.]" Doubling the 100-foot distance and asking a patient who requests a disabled license plate certification to be medically observed during a 200-foot walk would comply with this certification criterion, and it might be familiar to primary care physicians.

If no desaturation or inappropriate tachycardia (heart rate greater than 100/minute) occur during a self-paced 100-foot walk, the examiner might feel comfortable continuing the exercise test by asking the patient to continue to walk these 100-foot laps self-paced until six minutes have elapsed. The total distance covered in six minutes of walking can be recorded and compared to established norms, as this is the well-researched "six-minute walk test" (Casanova, 2020).

Post-Covid patients without other known cause (anemia, heart failure, etc.) who desaturate in the 100-foot exercise test should be evaluated further before exercise rehabilitation is safe and appropriate. A referral to a cardiologist or pulmonologist would be proper. Patients with documented cardiac disease and/or pulmonary disease might at some point be referred by the cardiologist or pulmonologist to a formal "cardiac rehabilitation program" or "pulmonary rehabilitation program." In these programs, progressive increases in exercise stress are monitored by nurses/therapists trained in exercise rehabilitation.

If the testing described below establishes mild desaturation is exclusively pulmonary with no documented cardiac complication, and if referral to a pulmonologist cannot be accomplished

quickly due to limited availability of pulmonologists, the primary care physician should consider making a direct referral to a pulmonary rehab program."

One potential cause of exertional desaturation, pulmonary and potentially permanent lung involvement, has been documented in Covid-19 patients (Schaller, 2020). This is easily evaluated by spirometry. The spirometry should be performed in a hospital respiratory therapy department or a medical office that has the equivalent capabilities. The testing should include spirometry without and then with bronchodilators, and must include measurement of the Diffusing Capacity of carbon monoxide (DL_{CO} or D_{CO}). Sending the patient with the results of a recent CBC permits the testing site to correct the DL_{CO} for anemia, if present. The DL_{CO} is the most likely spirometry test to be abnormal in a post-Covid patient and would justify a referral to a pulmonologist. This would also document the potential need for placement in a formal pulmonary rehabilitation program.

Permanent impairment can be rated from Table 5-4 (*Guides, 6th ed.,* 88). The DLco may well be the most abnormal test, and thus the basis for class assignment. Permanent impairment should not be rated based on pre-rehabilitation program spirometry, as hopefully the test numbers on spirometry improve with time and treatment. Thus, spirometry might need to be obtained twice – once to prove persisting disease and justify referral to a pulmonologist or pulmonary rehabilitation, and then a second time after rehabilitation (treatment) to assess impairment "at MMI."

Another potential group of causes of exertional desaturation is cardiac conditions. Chest pain suggestive of angina during a 100-foot walk should be evaluated by a cardiologist, as should a history of possible anginal chest pain on home activity.

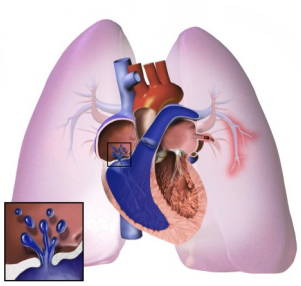
The SARS-CoV-2 virus is known to involve the heart. Diffuse myocarditis or myocardial fibrosis have been reported (Linder & Freaney, 2020). Heart involvement is assessed with the basic troponin, BNP, and EKG.

In those who desaturated during the exercise test, a transthoracic echocardiogram (ECHO) should be obtained. An ECHO can be particularly helpful to screen for left ventricular systolic dysfunction and/or diastolic dysfunction, and for pulmonary hypertension. Just as radiologists give better interpretations if given significant clinical information, when requesting an echocardiogram, it is wise to alert the interpreting cardiologist that the patient "Had Covid, desaturates with exercise" or "Had Covid, evaluate left and right heart function and for pulmonary hypertension."

Patients with an echocardiogram or stress echocardiogram with regional left ventricular wall abnormalities might have had a myocardial infarction. The echocardiogram that shows this would be objective evidence of the need for referral to a cardiologist and subsequent enrollment in a formal cardiac rehabilitation program. A subsequent exercise stress echocardiogram after completion of cardiac rehabilitation can be used in the *Guides, 6th Edition,* Table 4-6 (*6th ed.,* 55) to rate the permanent cardiac impairment.

Left ventricle systolic function is easily screened by ejection fraction on the echocardiogram, which is normally greater than 50%. Multiple indices of left ventricle diastolic function are present on transthoracic echocardiograms. The interpreting cardiologist should have a statement as to whether the left ventricle systolic function and the diastolic function are normal or abnormal.

Diffuse myocardial injury without regional wall motion (discrete infarct) can occur in Covid-19 (Freaney, Szekely, & Puntmann, 2020). The echocardiogram would be objective evidence of cardiac involvement that would justify referral to a cardiologist and subsequent placement in a formal cardiac rehabilitation program. Left ventricular systolic function would be evaluated by the ejection fraction, and this and the blood test for BNP would be the tests results used to rate permanent impairment in the *Guides, 6th Edition*, Table 4-7 (*6th ed.,* 59).



Left ventricular diastolic dysfunction is also ratable in this table by "E" and "A," which are not defined in the table except as "wave forms" on the echocardiogram. The **E/A ratio** is a marker of the function of the left ventricle of the heart. It represents the ratio of peak velocity of blood flow from left ventricular relaxation in early diastole (the E wave) to peak velocity flow in late diastole caused by atrial contraction (the A wave). There are other measurements of left ventricular diastolic function that the interpreting cardiologist will typically consider, so the cardiologist's statement about left ventricular diastolic function being normal or mildly abnormal should usually be accepted (D'Andrea, 2018).

Pulmonary hypertension from loss of lung tissue with pulmonary infarcts, or pulmonary fibrosis, is detected on echocardiogram by the estimate of peak pulmonary artery systolic pressure, and that measurement plus blood BNP level and VO_2 max on an exercise stress echocardiogram, would objectively document the need for referral to a cardiologist and would permit permanent impairment rating by the *Guides, 6th Edition,* Table 4-14 (*6th ed.*, 72).

Pulmonary hypertension from thrombi in pulmonary vessels has been reported, and the interpreting cardiologist should comment on the ECHO-estimated Pulmonary Artery Systolic Pressure. Normal pulmonary artery systolic pressure measured by right heart cardiac catheterization used to be defined as less than 35 mmHg in adults younger than 60, or less than or equal to 40 mmHg in adults older than 60. These pressures were accepted at the time of writing of

the *Guides, 6th Edition*, Table 4-14. However, lower mean pulmonary artery pressures are now recognized as abnormal. The Sixth World Task Force on Pulmonary Hypertension has recommended greater than or equal to 25 mmHg as abnormal pulmonary artery systolic pressure, or 20 to 25 mmHg with other criteria present [abnormal pulmonary arterial wedge pressure and/or pulmonary vascular resistance, and perhaps the presence of right ventricular hypertrophy] (Simonneau, 2019)

On echocardiograms, the estimated pulmonary artery systolic pressure is calculated by the Bernoulli equation (not measured) from the tricuspid valve regurgitation velocity (meters/second) and estimated right atrial pressure (Augustine, 2018). Thus, examiners should consider accepting an estimated pulmonary artery systolic pressure by echocardiogram as abnormal ("Class 1 impairment") at 25 mmHg. The interpreting cardiologist's statement about the presence or absence of mild pulmonary hypertension should usually be accepted.

"Recovery of lean body mass to the ideal BMI might be a criterion for declaring when a patient is at MMI."

Therefore, primary care screening with spirometry and a transthoracic echocardiogram can direct referral to the appropriate specialist (pulmonologist or cardiologist) or reassure the primary care physician that he/she can manage the patient, and referral is not necessary. Repeat testing at MMI would permit impairment rating. For cases that appear more difficult to interpret results, cardiopulmonary exercise testing that includes measures of the respiratory quotient is the gold standard of testing.

For those with no desaturation on the office-based exercise "100-foot walk" test, and no tachycardia (HR greater than 100 beats/minute) at this low level of workload, in the absence of anemia or explanatory systemic disease, should raise questions of Acute Illness Myopathy. Being hospitalized or bed-confined for a few weeks frequently leads to muscle catabolism (the body digesting muscle for energy when nutrition is poor). Thus, determining the patient's pre-Covid weight from medical records and current post-Covid weight might establish the need for nutritional counseling and between-meals calorie and protein/vitamin/mineral supplementation. Recovery of lean body mass to the ideal BMI might be a criterion for declaring when a patient is at MMI.

In the absence of serious detected cardiac or pulmonary disease, it should be safe to refer deconditioned post-Covid patients to a physical therapy reconditioning program (Larun, 2017). Therapists daily measure baseline function, set goals, **plan, formulate and implement** a rehabilitation program, and monitor progress toward outcome goals.

Therapists measure baseline functional ability through a variety of standardized protocols. Some of these tools potentially include:

- Patient Specific Functional Scale
- Activities Specific Balance Confidence Scale
- PHQ-9 MRC scale for muscle strength
- Timed Up and Go Test (TUG)
- Chair Rise test
- Six-minute or two-minute walk test
- Berg/Tinetti balance assessment can provide baseline measures of strength, endurance, and balance.

Each of the standard testing protocols is closely supervised for fall safety as well as O2 saturation and heart rate for medical safety. The results of the baseline measures are then incorporated into a comprehensive treatment program that improves functional ability. Monitoring vital signs (HR, BP, pulse oximetry) throughout each treatment session and use of the BORG Rating of Perceived Exertion scale provides immediate patient response to a rehabilitation program of aerobic conditioning, strengthening, balance, and work-simulation tasks.

Patient education in sleep hygiene, relaxation training, and pacing approach for Activities of Daily Living (ADLs), combined with a home exercise program of flexibility, strengthening, and conditioning activities, augment the efforts completed during a patient's "in-facility" episode of care**. Patients in a clinical therapy program** typically achieve better outcomes than do patients in unsupervised home exercise. This might be partially due to therapist-delivered cognitive behavioral therapy in the therapy setting. Physical therapists and occupational therapists who offer progressive exercise rehabilitation would also serve as a "cognitive behavioral therapist" to gradually increase workload while providing reassurance (cognitive restructuring) about the safety and value of exercise.

The primary care/occupational medicine physician might wish to check with the therapy program to verify that oxygen and an automated defibrillator are readily available on-site, although it would be very unexpected if these were actually needed during exercise in a physical therapy setting.

One Approach to Persisting Symptoms of Fatigue, Muscle Soreness, Anxiety, or Depression

Some "Long Covid" patients have mental symptoms as their primary persisting complaints. Mental factors (underlying personality, life experiences, defense mechanism(s) chosen, mental disorders, etc.) operate in symptom presentation, and thus referral for cognitive behavioral therapy might be needed.

Symptoms can be assessed with multiple, validated, public domain questionnaires that were

developed for chronic musculoskeletal complaints:

Fear avoidance belief questionnaire (or the Tampa Kinesiophobia questionnaire)

- https://www.tac.vic.gov.au/files-to-move/media/upload/fear_avoiance.pdf
- FABQ Physical Activity Scale > 14 or FABQ Work Scale > 29 are suggested "cut points." [George 2008].

Unresolved anger – Injustice Experience Questionnaire

- http://sullivan-painresearch.mcgill.ca/pdf/ieq/IEQManual.pdf
- Cut point 85th Percentile score > 34.

Somatization – Modified Somatic Perceptions Questionnaire.

- When combined with the Zung Depression Questionnaire, the name becomes Distress and Risk Assessment Method (DRAM) https://ehchiro.com.au/wp-content/uploads/2017/06/DRAM_Questionaire_FILLABLE.pdf

Depression – Beck Depression

- https://www.apa.org/pi/about/publications/caregivers/practice-settings/assessment/tools/beck-depression
- https://www.cityofmadison.com/employee-assistance-program/documents/BeckDepressionInventory.pdf

Anxiety

- General GAD-2 or GAD-7 https://www.aafp.org/afp/2009/0501/afp20090501p785.pdf.

These screening questionnaires do not prove a diagnosis or permit a permanent impairment rating. They can serve as evidence that a post-Covid-19 patient might have a mental disorder delaying or preventing recovery (MMI) and return to work. Referral for psychiatric evaluation and potential treatment is medically logical.

One Approach to Persisting Complaints of Cognitive Dysfunction [a.k.a. "Brain Fog"]

Neurological deficits have been documented to occur during Covid-19 illness. [Zubair AS 2020]. Some of the "Long-Covid" patients complain of persistent cognitive difficulties. The medical records generated during the illness should be compared to pre-Covid medical records. Gross screening for cognitive impairment can be achieved with in-office simple mental exams like:

Montreal Cognitive Assessment:

- https://www.parkinsons.va.gov/resources/MOCA-Test-English.pdf
- https://www.parkinsons.va.gov/resources/MoCA-Instructions-English.pdf

Cut point of greater than or equal to 26 out of 30 is considered normal, but age and educational achievement may suggest a higher "normal" score should be required.

If these tests are normal, but the complaints are significant with no history of improvement, referral to a neuropsychologist might be indicated for formal neuropsychological testing. Tests that include screening scales for malingered cognitive impairment (a.k.a. symptom validity tests) include:

- Minnesota Nulltiphasic Personality Inventory –2 Revised Format (MNPI-2-RF)
- Personality Assessment Inventory (PAI)
- Battery for Health Improvement 2 (BHI-2)
- Green's Symptom validity tests.

The *Guides, 6th Edition* states neuropsychological test batteries "should include instruments that include 2 symptom validity tests" (*6th ed.*, 351).

If objectively-documented cognitive impairment is present, there are programs for cognitive rehabilitation. However, the programs have published data on outcomes for traumatic brain injury and stroke, but currently there is no published data on outcomes for post-Covid-19 patients in these programs. If present, after sufficient recovery time (typically longer than six months) and treatment, permanent impairment could be rated from the *Guides, 6th Edition*, Table 13-8, page 331.

The "What If?" Option

There will be patients with believable, consistent "Long Covid" complaints, and yet using the test results and tables discussed previously, there is no objective impairment (zero percent). In many of these cases, the pre-Covid medical records will not contain the same test results, so there is no method to determine whether the heart, lung, liver, kidney, brain, etc. function was better pre-Covid than the "normal" value(s) measured post-Covid. For cases in which the complaints are both consistent and persistent, with no clear evidence of symptom exaggeration, the *Guides, 6th Edition* provides for this scenario.

In the *6th Edition*, Chapter 2, page 26:

> *In certain instances, the treatment of an illness may result in apparent total remission of the person's signs and symptoms. However, if the examiner concludes … the patient has actually not regained his or her previous function, and if the Guides has not provided specific criteria to rate such impairment, the physician may choose to increase the impairment estimate by a small percentage (e.g. 1% to 3%). Such a discretionary impairment is provided only once[.]*

The *Guides, 5th Edition,* has a similar statement on page 20. Patients with symptoms suggesting involvement of more than one organ system, yet with normal testing (no impairment) by the specific Chapter 3-17 tables and criteria, would be logically more impaired than those with symptoms suggesting impairment in only one organ system. From the permitted range of 1-3% Whole Person Impairment, the examiner would choose a percentage based on the severity of the ADL disruption and the number of symptom-suggested organ systems involved. The rationale for assigning a "non-zero" impairment should be explicitly and clearly stated in the medical record of the impairment rating physician.

Additional sources for recommendations in the evolving literature, at the time this article is being written, include:

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Conclusion

Patients with persistent symptoms after Covid-19 are unique, as this disease had not been diagnosed before late 2019. Many patients with accepted causation of this infection by workplace exposure will present for evaluation for MMI and permanent impairment. Hopefully over time, more evidence will emerge to guide physicians in evaluating and treating these patients. Until then, this advice might be helpful. This article is intended to help a general physician who becomes the Authorized Treating Physician (i.e. Panel Physician) recognize and refer those recovering Covid-19 patients who should be treated and followed by specialists. For those who don't screen out as requiring specialist care, the Authorized Treating Physician can evaluate for referral to an exercise

rehabilitation program, and/or a mental health provider. After 6 months of time, without ongoing improvement, and after appropriate rehabilitation treatment, the patient recovering from Covid-19 with persisting symptoms can be considered to be "at Maximal Medical Improvement" (MMI).

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Tests that may be used to assess permanent impairment in Covid-19 Survivors

Symptom	Tests	Potential Treatment
Any	History and Physical Exam Review of Pre-Illness Medical Records Vital signs with pulse oximetry at rest Sitting and Standing pulse rate and blood pressure CBC Electrolytes, creatinine and urinalysis Bilirubin, AST, ALT C-reactive Protein, Ferritin D-dimer Troponin, Brain Natriuretic Peptide, 12 Lead EKG	
Chest pain suggesting angina, desaturation < 96% on 100-foot walk, regional wall motion abnormality on ECHO suggesting prior infarction	Referral to cardiologist	Cardiac rehabilitation
Dyspnea on exertion, non-anginal chest pain, fatigue, NO desaturation on 100-foot walk	Full spirometry (with DL_{CO}) and echocardiogram Clinically stable No documented heart involvement or pulmonary hypertension	Exercise rehabilitation by Physical Therapy
Non-Specific Fatigue, Muscle Soreness, Anxiety, or Depression	Fear avoidance Belief Questionnaire, injustice Experience Questionnaire, Modified Somatic Perceptions Questionnaire, Beck Depression Inventory, GAD-7	Psychiatric Referral
Cognitive Dysfunction	Mental Status Exam Montreal Cognitive Assessment	Neuropsychologist Referral

Tests Results that may be used in Specific AMA *Guides* Tables.

Condition/Test	Guides 6th Edition	Guides, 5th Edition
Post Pneumonia or Post Pulmonary Embolism Dyspnea Spirometry, measured FEV_1, FVC, DL_{CO} Exercise stress test VO_2 Max	Table 5-4, p 88	Table 5-12, p 107
Myocardial Infarction Coronary angiogram, exercise stress test (METs achieved or VO_2 max) or stress ECHO or Myocardial nuclear perfusion scan	Table 4-6, p 55	Table 3-6a, p 36
Myocarditis or post-viral cardiomyopathy Systolic Dysfunction Ejection Fraction by ECHO or cardiac catheterization, blood BNP test, exercise stress test measured METs achieved, or VO_2 max	Table 4-7, p 59	Table 3-9, p 47 Note: does NOT consider many test results – uses dietary restrictions, medications, and congestive heart failure signs instead
Myocarditis or post-viral cardiomyopathy Diastolic Dysfunction-includes above plus "E" and "A" or "E/A ratio" by ECHO	Table 4-7, p 59	Tests Not specifically mentioned, use Table 3-9, p 47
Pulmonary Hypertension ECHO estimate or right heart catheterization measurement of pulmonary artery systolic pressure BNP blood test, VO_2 Max or METs achieved on exercise stress test	Table 4-14, p 72 [Note definition of "mild" has changed since 6th Ed was written]	Table 4-6, p 79 [Note definition of "mild" has changed since 5th Ed was written] Also uses peak tricuspid velocity from which Pulmonary Artery Pressure is calculated by ECHO

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Rating Peripheral Nerves of the Lower Extremities

James B. Talmage, MD, Jay Blaisdell, MA

Abstract

Nerve lesions caused by traumatic events to the peripheral nerves of the lower extremity are rated using section 16.4 of the *AMA Guides to the Evaluation of Permanent Impairment, Sixth Edition*. Results from sensory and motor nerve tests are used to assign the impairment class within Table 16-12. The default rating may be modified with the functional history and clinical studies modifiers, but not the physical examination modifier, since it is used to assign the impairment class and define the degree of neurologic severity. Impairment for both sensory and motor deficits are assigned and then combined at the lower-extremity level.

Introduction

Peripheral nerve impairments of the lower extremity are rated using section 16.4 starting on page 531 of the *Sixth Edition* and Table 16-12 starting on page 534. Since complex regional pain syndrome, type II, formally known as reflex sympathetic dystrophy, involves an "unambiguous" lesion to a specific peripheral nerve, it is also rated using this section and table (p.538). Complex regional pain syndrome, type I, formerly called "causalgia," where the "causative factor" is unknown, and there is no evidence of injury to a specific peripheral nerve is rated using section 16.5 starting on page 538. Unlike the upper-extremity section, which has a separate methodology for digital nerve impairments, the lower-extremity chapter makes no such distinction and provides one method of rating peripheral nerves for the entire lower extremity. Similarly, there is no nerve entrapment section in the lower-extremity chapter coinciding with that of the upper-extremity chapter. A strong knowledge of peripheral nerve anatomy is essential in both chapters. The MIR physician should be wary of preexisting diseases that "can lead to erroneous conclusions about impairment after a nerve injury" (p.531). A detailed history of the injured worker should note "diabetes mellitus, chronic alcohol abuse, systemic neurologic disorders, hypothyroidism, and other systemic diseases" that might affect evaluation results (p. 531).

Overview

The MIR physician first identifies the injured nerve and then grades the resulting sensory and motor deficits, ranging from none or normal, to "very severe or complete loss" (p.533). Definitions for the words "mild," "severe," etc. for the degree of neurologic deficit severity are in Table 16-11 (p.533). Using the grid of Table 16-12, the MIR physician then finds the name of the injured nerve in the far-left column and starts with the default impairment value based on the severity of the motor and sensory deficit. Note that the sensory loss is on physical examination and does not

consider pain complaints. A potential impairment value is assigned for both motor loss and sensory loss. The MIR physician then assigns grade modifiers for functional history (GMFH) and clinical studies (GMCS) using Tables 16-6 and 16-8. These grade modifiers are used to adjust the default impairment value within its class for both the motor and nerve deficit ratings. The physical examination modifier (GMPE) is not used to modify the impairment rating, since the result of the physical examination is used to assign the impairment class and the severity of neurologic deficit. Finally, the motor and sensory impairment values are combined for the final lower-extremity impairment value.

Lower-Extremity Peripheral Nerve Rating Process (p.533)

Step 1 Identify the injured nerve.

Step 2 Using Table 16-11 (p. 533), grade sensory and motor deficits.

Step 3 Using Table 16-12 (p. 534), start with the default impairment rating first for the sensory loss and then again for the motor loss.

Step 4 Using Table 16-6 (p.516) and Table 16-8 (p.519), assign the GMCS and GMFH.

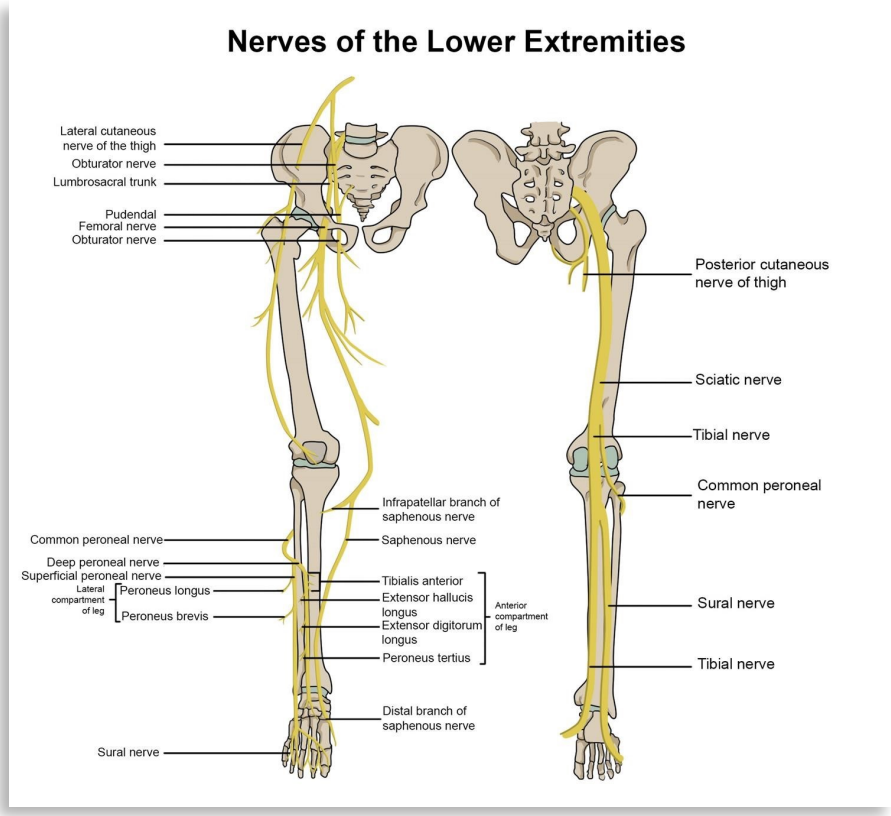
Step 5 Using the Net Adjustment Formula (p.521), modify the impairment rating first for the sensory loss and then for the motor loss.

Step 6 Using the Combined Values Chart (p.605), combine the motor and sensory impairment ratings.

Step 1: Identify the Injured Nerve.

The MIR physician should have "precise knowledge of the anatomy and physiology of the nervous system" (p.531). The results should also be consistent with the distribution of the injured nerve in question.

It may help for physician to review Figure 16-3, Sensory Nerves of the Lower Extremity (p.537), and Figure 16-4, Motor Nerves of the Lower Extremity (p.537) and additional medical references, with the caveat that these resources are usually, but not always, correct due to anomalous nerve innervation. The most recent references should be

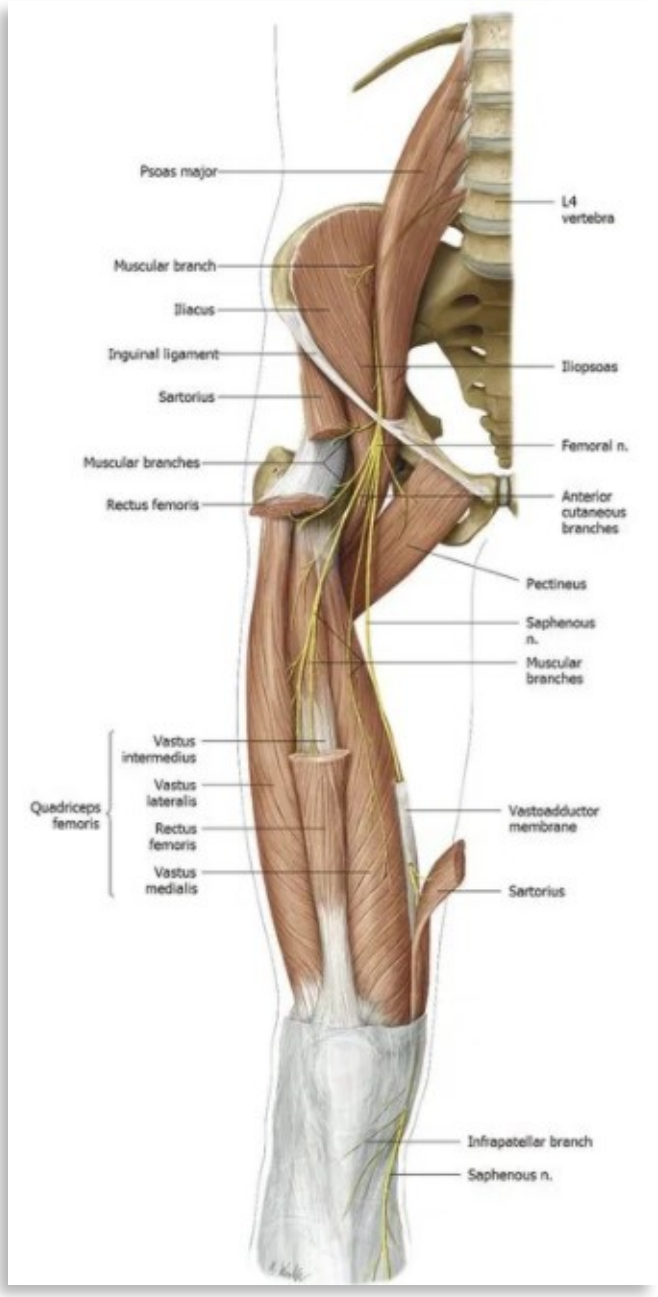


used to reveal documented instances of these irregularities. Operation reports may be helpful in identifying the nerve injured and the level of injury (which muscles have lost innervation and sensory loss distal to the nerve injury and not proximal).
It is important to note that these physical exam tests should be administered on the day of the MIR evaluation to capture the most recent results.

Step 2: Grade Sensory and Motor Deficits.

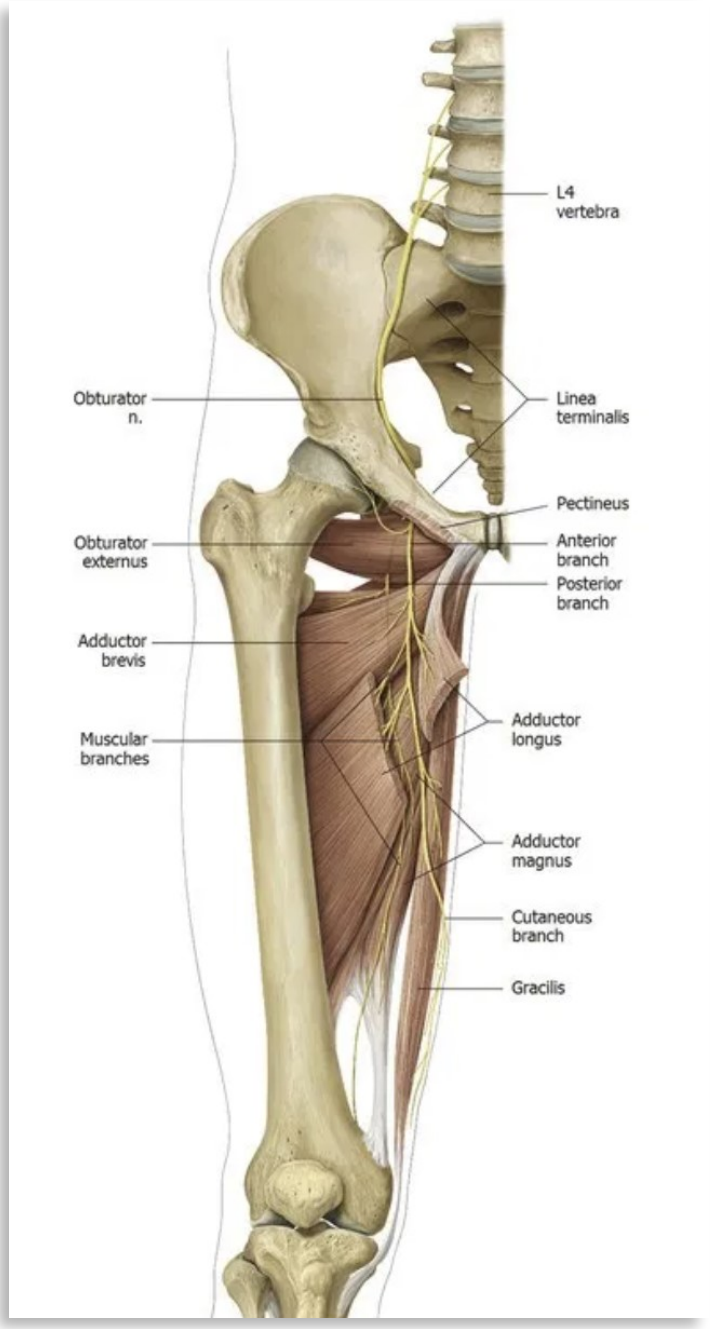
The *6th Edition* has somewhat similar sections for rating traumatic injury of specific nerves in the Upper-Extremity and Lower-Extremity chapters. The upper-limb chapter has considerable text about assessing sensation in the hand by two-point discrimination and the use of monofilaments. Those tests are incorporated into the severity definitions in Table 15-14. However, in the lower limb, there is almost no published literature on using two-point discrimination or monofilament testing in traumatic nerve injuries.

The upper-limb table on sensory and motor severity grading was reproduced as text and Table 16-11 in the FIRST PRINTING of the Lower-Extremity chapter. The published Errata and additional printings of the 6th Edition corrected this oversight. The Lower-Extremity chapter text on page 532 and Table 16-11 of the second and subsequent printings discusses light touch perception and sharp versus dull discrimination, and not two-point or monofilament testing.
A search of the National Library of Medicine on two-point discrimination in the lower limb found one article on testing young adults without disease or injury. This 1983 study found an average two point of 7 millimeters on the tip of the great toe, and 44 millimeters on the medial leg, showing why this is not a clinically useful test in the lower limb (Nolan, 1983).



Monofilament testing of primarily the toes has some utility in assessing the risk of future diabetic foot ulceration in those having, or suspected of having, diabetic peripheral neuropathy. A systematic review of eight studies with comparison to electrodiagnostic nerve conduction testing

found variation in the amount of force exerted by the filament used in the study from the #4.17 filament (one gram) to the #6.1 filament (75 grams, with the most common filament chosen to define abnormal being the #5.07 filament (10 gram force), and in the part(s) of the foot tested. The pooled sensitivity of detecting diabetic neuropathy was 0.53 [95% CI = 0.32 to 0.74], and the pooled specificity was 0.88 [95% CI = 0.78 to 0.94] (Wang, 2017). There is no published review of sensory testing by monofilaments in lower-limb traumatic nerve injury.



Thus, since these tests were referenced in ONLY the FIRST PRINTING of the lower-limb chapter table (Table 16-11), it is recommended that examining physicians follow the corrected text on page 532 and grade sensory severity by light touch perception and sharp versus dull discrimination.

Examiners familiar with the Spine chapter may remember that, in rating spinal impairments, the Grade Modifier for Physical Exam, Table 17-7, includes both the degree of neurologic sensory loss and the effect of any accompanying pain on function, which really belongs in the table for the Grade Modifier Functional History. There is NO such consideration of pain in the Lower-Extremity Sensory Loss section of Table 16-11 or the text on page 532.

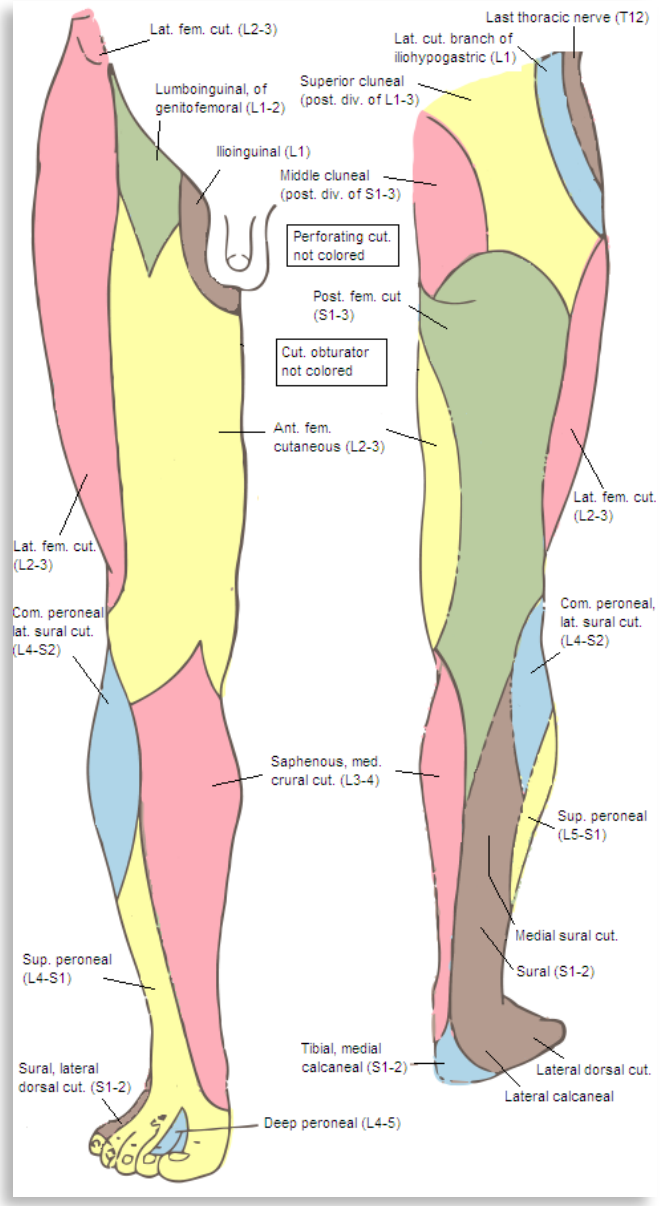
The two tests that are used to measure sensory deficits are the light touch and sharp versus dull discrimination. The examiner's fingertip or a cotton tipped applicator can be used to assess light touch (p. 532). A pinprick test can used "to determine whether protective sensation" is present (p.533). A pin with sharp and dull ends may also be used to help determine sharp/dull discrimination. These are readily available in sewing stores or the fabric/sewing sections of stores. Needles designed to draw blood frequently "draw blood" if used for sharp versus dull testing, and they should not be used because they are too sharp. Testing both legs for sensation with the person's eyes closed permits the best exam results.

Using a wisp of cotton for light touch perception, show the patient what you will be doing: "When I touch your leg with this cotton, I want you to tell me you felt that touch by saying one word, 'Left' or 'Right,' depending on which leg felt the touch. Now close your eyes, and we will begin." For sharp versus dull discrimination, instruct the person: "When you feel a touch, I want you to tell me you felt that touch by saying just two words. For example, 'Sharp, Left' if you felt the pin on your left leg, or 'Right, Dull' if you felt the plastic blunt tip on your right leg. Now close your eyes, and we will begin."

Note that in the text on page 532 and Table 16-11 on page 533, "Mild" or "Severity 1" corresponds to paresthesia or to when the person registers every stimulus but says, "It feels odd when you touch me there." If light touch is perceived as pain, this is allodynia. Regardless, as long as each stimulus is perceived, this is "Severity 1" or "Mild."

"Moderate" or "Severity 2" is present when the person fails to perceive most or all of the light-touch stimuli in a specific area of the lower limb. Sharp versus dull perception is intact in this area.

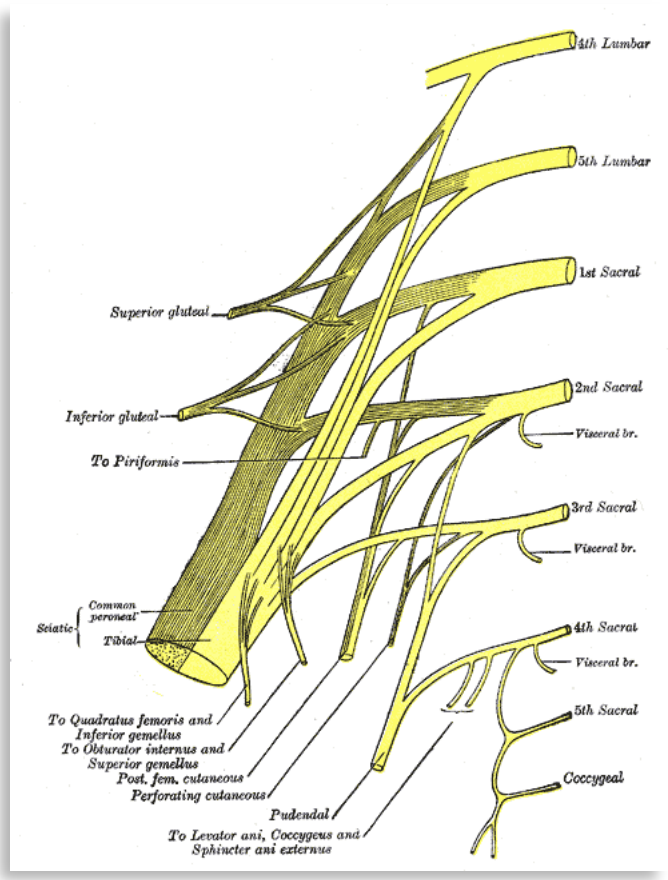
"Severe" or "Severity 3" is present when the person fails to correctly identify whether the sharp or the dull side of the sewing pin is being used. Note that this is a "forced choice test" with 2 alternatives, like flipping a coin for "heads" or "tails." Those who have no ability to tell "sharp" from "dull" may guess and average somewhere about 50% correct answers, again like flipping a coin. Incorrectly "guessing" (every answer incorrect) for eight consecutive stimuli would be like incorrectly guessing eight consecutive coin flips. This would occur by chance once in every 256 series of coin flips. Incorrectly "guessing" consecutive coin flips would occur by chance once every 1,024 series of ten coin-flips. At some point in a sequence of sensory stimuli, with every "sharp" stimulus reported as "dull" and every "dull" stimulus reported as "sharp," the examiner should choose to stop testing and disqualify sensory loss from the impairment rating process. Forced-choice testing is well researched as verifying or disqualifying cognitive and memory complaints in neuropsychological testing (p. 351).



"Very Severe or Complete Loss" or "Severity 4" is no protective sensation. This means the sharp side of

the pin is not perceived at all. Trophic changes in the skin and/or ulcers, if present, should be documented.

Sensory deficits due to peripheral nerve injury should have relatively distinct borders that fit with the distribution of a peripheral nerve, or a branch thereof. The area of sensory deficit is not migratory and should be consistent between exams on different dates and by different examiners. If the legal standard for impairment rating is "more likely than not, or within reasonable medical probability," the IASP Special Interest Group on Neuropathic Pain defines pain from nerve injury with "probable" as opposed to "possible" by the presence of **reproducible** areas of sensory loss, i.e. negative sensory signs (Finnerup, 2016). Reproducible means consistent on different dates and by different examiners.



The text points out that if grade-three sensory loss is present on physical exam, if that same nerve has been tested with nerve conduction testing (NCT), there should be at least major conduction block by NCT. If grade-four sensory loss is present on physical exam, there should be axon loss (axon death) or no recordable sensory nerve action potential (SNAP) on electrodiagnostic testing.

On motor testing, the examiner should rate only neurologically-based weakness. Even muscles with only partial function due to nerve injury can exert that function for at least five, if not ten, seconds. Otherwise, isometric exercise, and lifting, pushing, and pulling objects would not be possible. "Give-way weakness," with the examinee's muscle contraction stopping in clearly less than five seconds, is not typically neurologically-based.

Muscle atrophy is the most objective indicator of motor dysfunction and should be used to corroborate subjective manual grading of muscle strength (p.533). Atrophy should be measured in comparison to the contralateral limb. The British Medical Research Council Manual Muscle Testing scale was developed to evaluate surgical nerve repair after bayonet wounds in British soldiers. Also known simply as Manual Muscle Testing (MMT), it is the most accepted method for quantifying muscles strength (Naqvi, 2020). Its values are captured in the severity levels at the top of Table 16-11.

Medical Research Council Manual Muscle Testing Scale

0 No muscle activation.
1 Trace muscle activation, such as a twitch, without achieving full range of motion.
2 Muscle activation with gravity eliminated, achieving full range of motion.
3 Muscle activation against gravity, full range of motion.
4 Muscle activation against some resistance, full range of motion.
5 Muscle activation against examiner's full resistance, full range of motion.

Many physical therapists seem to use different and undefined grades for strength testing in their records, so a therapist's assessments of strength should not be used in the impairment rating. This is a physician process, and the above scale is to be used.

Each muscle innervated by the injured nerve should be tested (see figure 16-4). If the injury occurred at a definite level (e.g. laceration or crush) and the operative note and resulting scar clearly localize the level of injury, the muscles both proximal and distal to the known level of injury should be tested, and muscles innervated by non-injured nerves distal to the known level of injury should be tested. Muscles innervated by the injured nerve that are clearly proximal to the level of injury should have normal strength. Muscles that are distal to the level of injury, but not innervated by the nerve known to be injured, should also be normal. In either circumstance, the examiner needs to explain apparent weakness. There might be an additional injury, or the medically unexplainable weakness may reflect suboptimal effort on strength testing, making manual muscle-testing results unreliable.

These cases require a detailed listing of all the muscles tested and the strength present. In medical records, occasionally individuals with logical injury to one peripheral nerve or one nerve root in the spine have strength recorded as a single number (e.g. "right lower extremity strength 4/5"), which would literally mean every muscle in the limb was tested and had this strength. This global limb weakness could occur with brain or spinal cord disease or injury, but not from injury to a single peripheral nerve or nerve root. This should be considered invalid testing.
In occasional cases, all the muscles in a single lower limb are rated "3/5," meaning every muscle can barely move the limb against gravity with no added resistance. Yet in these same cases, the individual is described as able to ambulate but without the use of braces or crutches. Absent these external supports, with every muscle in the limb at this severe degree of weakness, the limb would not permit weight-bearing, and the individual would fall on attempting gait. When manual muscle-testing results are inconsistent with observed function, the physical exam testing is unreliable.

Step 3: Start with the Default Impairment Rating.

Using Table 16-12 on page 534, the MIR physician finds the injured nerve in the left column of the grid and notes the default impairment value for both sensory and motor deficits based on the

results of Step 2. There are five grades in each impairment class: A, B, C, D, and E. The default impairment value is found in the appropriate impairment class under grade C, which is in the middle of the five grades. A mild-to-moderate sensory deficit of the sciatic nerve, for example, would have a default impairment value of 4% to the lower extremity. A mild motor deficit of the sciatic nerve would result in a lower extremity impairment of 9%.

Step 4: Assign the Functional History and Clinical Studies Grade Modifiers.

Using Table 16-8 on page 519, the MIR physician then assigns the GMCS based on available nerve conduction delay or electrodiagnostic testing results. The GMCS table (Table 16-8) has different criteria for nerve conduction testing and for needle EMG. Needle EMG criteria would apply only to motor impairment rating, while the nerve conduction testing report could contain data that would apply to both sensory impairment and to motor impairment.

Using Table 16-6 on page 516, the MIR physician then assigns the GMFH based on the severity of gait derangement and the use of assistive devices when ambulating. Please note that if multiple pathologies are being rated in a lower extremity, the GMFH should be assigned only once and only to the diagnosis with the highest impairment. This may mean GMFH is not used in rating a nerve injury in a multiple injury diagnosis case. Additionally, if the GMFH differs from the GMCS by two or more grades, it should be assumed to be unreliable and should therefore be excluded from the nerve injury rating process (p. 516). While motor nerve injury can commonly affect gait (function), sensory loss does not typically affect gait. The *Guides* instructions do not specify whether GMFH is assessed once, and the same integer is used for both motor and for sensory loss ratings, or whether the GMFH is assessed independently for motor loss, and then again for sensory loss (with the potential for GMFH to be different for motor loss than for sensory loss). Thus, the decision to use a single GMFH, or to use two separate GMFHs, is the physician's judgment.

Step 5: Modify the Impairment Rating from its Default Value.

The default impairment found under grade C is then modified using the GMFH and GMCS and the Net Adjustment Formula, as explained on page 521. In essence, the impairment class integer is subtracted from each grade modifier integer, and their differences are then summated for the net adjustment integer. A positive net adjustment moves the impairment value to the right of the default impairment, increasing it to that found in grades D or E. A negative net adjustment moves the impairment value to the left of the impairment value, decreasing it to that found in A or B. Bear in mind that this adjustment process will be applied twice: once for the sensory deficit impairment rating, and once for the motor nerve impairment rating.

Net Adjustment Formula

(Functional History ____) – (Impairment Class ____) = (Adjustment ____)

\+ (Clinical Studies _____) - (Impairment Class ____) = (Adjustment ____)

_____

Net adjustment = _____

Step 6: Combine the Motor and Sensory Impairment Ratings.

Once the sensory and motor impairment ratings are modified, they are combined using the Combined Values Chart on page 605. This is the final lower extremity impairment rating for the injured nerve. The process is repeated if multiple nerves were injured. The final impairment values of multiple nerves are combined at the lower extremity level as well. With the exception of instances of CRPS II, which is a stand-alone rating, peripheral nerve impairments of the lower extremity may be combined with other impairments obtained using other methodologies, provided that they have not already incorporated the impairment for the injured nerve(s) in question. Lower-extremity impairment ratings are converted to whole-body impairments using Table 16-10 on page 530.

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Opinion Offers Guidance on Lower-Extremity Nerve Injuries

Jane Salem, Esquire

A fairly recent decision from the Tennessee Supreme Court Special Workers' Compensation Panel involving a lower-extremity nerve impairment is significant in two ways. In *Williams v. Ajax Turner Co.,* No. M2016-00638-SC-R3-WC, 2017 Tenn. LEXIS 204 (Tenn. Workers' Comp. Panel Apr. 12, 2017), the Panel held that either the employee or employer may use the Medical Impairment Rating Registry, and the opinion is instructive to physicians and lawyers regarding how to rate this type of injury.

Facts

Kelcey Williams was working at Ajax Turner when a co-worker drove a forklift truck over his foot. Immediately afterward, Dr. William Mayfield, an orthopedic surgeon, surgically repaired the injury.

Dr. Mayfield later testified that Williams injured his sural and saphenous nerves in the foot. Applying Table 16-12, entitled "Peripheral Nerve Impairments" in the *AMA Guides*, Sixth Edition, he assigned a three-percent impairment to the left leg for both nerve injuries. Due to residual stiffness in the foot and a fifteen-degree flexion contracture, Dr. Mayfield assigned an additional 15-percent impairment. Using the range-of-motion method, Dr. Mayfield assigned a 21-percent impairment.

Ajax Turner hired Dr. David Gaw, an orthopedic surgeon, to perform a record review. Dr. Gaw testified that the *Guides* direct physicians to use the diagnosis-based method when calculating impairment ratings for lower-extremity injuries. He acknowledged the *Guides* indicate "in certain conditions such as tendon injuries, burns, and severe scarring, or crush injuries to the joint that it would be appropriate . . . to use [the] range[-]of[-] motion [method]." However, because Dr. Gaw concluded that the injury wasn't one that justified use of the range-of-motion method, he applied the diagnosis-based method—specifically, he used the "soft tissue injury due to a contusion or crush injury" diagnosis. Dr. Gaw determined that Williams had a "plus one" modifier, resulting in a two-percent impairment of the lower extremity. He assigned an additional three-percent for the sural nerve injury, but he found no impairment for the saphenous nerve because Dr. Mayfield hadn't mentioned the injury in his notes until his final evaluation. He also pointed out that Dr. Mayfield's range-of-motion measurements conflicted with those from the physical therapists.

During cross-examination, Dr. Gaw agreed that, if the range-of-motion method were applicable, Dr. Mayfield had correctly applied it. However, Dr. Gaw reiterated that the range-of-motion method wasn't appropriate in this case because the *Guides* permit use of the range-of-motion method only for a direct crush injury to the ankle joint, which he said wasn't present here.

Ajax Turner sought an MIR evaluation. Dr. Suneetha Nuthalapaty, who treats various types of musculoskeletal injuries, was the MIR physician. She examined Williams and reviewed his records.

She found a healed scar on the left foot, tenderness at the scar site, a healthy-appearing heel pad, and no muscular atrophy. Williams's ranges of motion were 50 degrees of flexion and 15 degrees of dorsiflexion. Dr. Nuthalapaty found mild weakness of the dorsiflexor, which she graded as 4/5. Williams demonstrated a sensory deficit in the sural nerve distribution but no other sensory or motor deficits.

Dr. Nuthalapaty diagnosed a heel-crush injury. She assigned a two-percent impairment rating for the crush injury and a three-percent rating for the sural nerve injury, for a total impairment of five-percent. Dr. Nuthalapaty assigned a two-percent whole-person impairment rating. Dr. Nuthalapaty testified that, although the *Guides* contain a range-of-motion method for assigning impairment, the diagnosis-based method is preferred. Like Dr. Gaw, she concluded that Williams hadn't sustained an injury to which the *Guides* suggest using the range-of-motion method, emphasizing that he had a crush injury to his heel not his ankle joint. Although Dr. Mayfield had assigned impairment for the saphenous nerve, Dr. Nuthalapaty's examination revealed no dysfunction of the nerve, so she didn't rate it. Dr. Gaw reviewed Dr. Nuthalapaty's report and said that she correctly applied the *Guides.*

Dr. Mayfield disagreed with their ratings, testifying that the "injury was much more significant than a simple foot contusion." He stated that the diagnosis-based method doesn't provide an impairment rating for heel-degloving injuries. Dr. Mayfield believed that, as the doctor "there from the beginning," he was best able to assess Williams's permanent impairment rating.

During cross-exam, Dr. Mayfield acknowledged that the diagnosis-based method is the preferred method for assessing impairment under the *Guides.* He agreed that Williams's range of motion improved at each appointment and that the range-of-motion measurements could've improved after he released him. When asked how he measured range of motion, Dr. Mayfield stated, "You could use a protractor," but he couldn't recall whether he had used a goniometer, although he said he uses it "[s]ometimes when [the measurement] is doubtful."
Rutherford County Chancellor Howard Wilson found that Williams rebutted Dr. Nuthalapaty's opinion by clear and convincing evidence and adopted Dr. Mayfield's rating.

The Panel Reverses Impairment Rating Determination

The Panel first addressed Williams's argument that the trial court erred by denying a motion in limine to exclude the MIR physician's opinion.

The Panel disagreed, pointing out that Tennessee Code Annotated section 50-6-204(d)(5) states that when the parties dispute medical impairment, "either party" may request an IME from the MIR. Also, the Supreme Court held previously that "either the employee or the employer" may seek an MIR opinion.

As to the rating, Ajax Turner argued the trial court incorrectly found that Dr. Mayfield's opinion rebutted Dr. Nuthalapaty's. The Panel agreed. Judge Don Ash wrote that Dr. Mayfield's assertion that Dr. Nuthalapaty didn't examine Williams was incorrect. Dr. Mayfield based his impairment rating on dysfunction of the sural and saphenous nerves, but Dr. Nuthalapaty assigned no impairment for the saphenous nerve, finding none. Dr. Mayfield conceded that, because nerve injuries can regenerate and improve over time, Williams's saphenous nerve function could've improved in the six months between his last visit and Dr. Nuthalapaty's examination.

Judge Ash wrote that Dr. Mayfield acknowledged the *Guides'* preference for the diagnosis-based method, but he didn't use it because "he believed it did not address Employee's conditions or properly reflect the seriousness of his injury." In contrast, Drs. Nuthalapaty and Gaw testified that the crush injury fell within the conditions for which the diagnosis-based method is appropriate, and none of the exceptions for which the range-of-motion method is preferred applied.

Judge Ash continued that, while Dr. Mayfield's "disagreement with the *Guides* may be sincere, it does not affirmatively show Dr. Nuthalapaty erred in utilizing the diagnosis-based method." Because Dr. Mayfield's testimony failed to raise "serious or substantial doubt" about the accuracy of Dr. Nuthalapaty's evaluation, which is necessary to overcome the statutory presumption of correctness, the Panel adopted her rating.

Jane Salem, Esquire

Jane Salem is a staff attorney with the Court of Workers' Compensation Claims in Nashville. She administers the Court's blog and is a former legal reporter and editor. She has run more than forty marathons.

The Stanford Hall Consensus Statement for Post Covid-19 Rehabilitation

The highly infectious and pathogenic novel coronavirus (CoV), severe acute respiratory syndrome (SARS)-CoV-2, has emerged causing a global pandemic. Although COVID-19 predominantly affects the respiratory system, evidence indicates a multisystem disease which is frequently severe and often results in death. Long-term sequelae of COVID-19 are unknown, but evidence from previous CoV outbreaks demonstrates impaired pulmonary and physical function, reduced quality of life and emotional distress. Many COVID-19 survivors who require critical care may develop psychological, physical and cognitive impairments. There is a clear need for guidance on the rehabilitation of COVID-19 survivors. This consensus statement was developed by an expert panel in the fields of rehabilitation, sport and exercise medicine (SEM), rheumatology, psychiatry, general practice, psychology and specialist pain, working at the Defence Medical Rehabilitation Centre, Stanford Hall, UK. Seven teams appraised evidence for the following domains relating to COVID-19 rehabilitation requirements: pulmonary, cardiac, SEM, psychological, musculoskeletal, neurorehabilitation and general medical. A chair combined recommendations generated within teams. A writing committee prepared the consensus statement in accordance with the appraisal of guidelines research and evaluation criteria, grading all recommendations with levels of evidence. Authors scored their level of agreement with each recommendation on a scale of 0-10. Substantial agreement (range 7.5-10) was reached for 36 recommendations following a chaired agreement meeting that was attended by all authors. This consensus statement provides an overarching framework assimilating evidence and likely requirements of multidisciplinary rehabilitation post COVID-19 illness, for a target population of active individuals, including military personnel and athlete.

Barker-Davies, R. M., O'Sullivan, O., Senaratne, K., Baker, P., Cranley, M., Dharm-Datta, S., Ellis, H., Goodall, D., Gough, M., Lewis, S., Norman, J., Papadopoulou, T., Roscoe, D., Sherwood, D., Turner, P., Walker, T., Mistlin, A., Phillip, R., Nicol, A. M., Bennett, A. N., ... Bahadur, S. (2020). The Stanford Hall consensus statement for post-COVID-19 rehabilitation. British journal of sports medicine, 54(16), 949–959. https://doi.org/10.1136/bjsports-2020-102596

The Management of Post-Acute Covid-19 in Primary Care

What you need to know:

- Management of Covid-19 after the first three weeks is currently based on limited evidence
- Approximately 10% of people experience prolonged illness after Covid-19
- Many such patients recover spontaneously (if slowly) with holistic support, rest, symptomatic treatment, and gradual increase in activity.
- Home pulse oximetry can be helpful in monitoring breathlessness.
- Indications for specialist assessment include clinical concern along with respiratory, cardiac, or neurological symptoms that are new, persistent, or progressive.

Post-acute covid-19 ("long covid") seems to be a multisystem disease, sometimes occurring after a relatively mild acute illness. Clinical management requires a whole-patient perspective. This article, intended for primary care clinicians, relates to the patient who has a delayed recovery from an episode of covid-19 that was managed in the community or in a standard hospital ward. Broadly, such patients can be divided into those who may have serious sequelae (such as thromboembolic complications) and those with a non-specific clinical picture, often dominated by fatigue and breathlessness. The specialist rehabilitation needs of a third group, covid-19 patients whose acute illness required intensive care, have been covered elsewhere.

Greenhalgh T, Knight M, A'Court C, Buxton M, Husain L. Management of post-acute covid-19 in primary care. BMJ. 2020 Aug 11;370:m3026. doi: 10.1136/bmj.m3026. PMID: 32784198.

Rehabilitation after Covid-19: an Evidence -Based Approach

After severe COVID-19 disease, many patients will experience a variety of problems with normal functioning and will require rehabilitation services to overcome these problems. The principles of and evidence on rehabilitation will allow an effective response. These include a simple screening process; use of a multidisciplinary expert team; four evidence-based classes of intervention (exercise, practice, psychosocial support, and education particularly about self-management); and a range of tailored interventions for other problems. The large number of COVID-19 patients needing rehabilitation coupled with the backlog remaining from the crisis will challenge existing services. The principles underpinning vital service reconfigurations needed are discussed.

Wade DT. Rehabilitation after COVID-19: an evidence-based approach. Clin Med m (Lond). 2020;20(4):359-365.
doi:10.7861/clinmed.2020-0353

Association between SARS-CoV-2 infection, exposure risk and mental health among a cohort of essential retail workers in the USA

Objectives:

To investigate SARS-CoV-2 (the virus causing COVID-19) infection and exposure risks among grocery retail workers, and to investigate their mental health state during the pandemic.

Methods:

This cross-sectional study was conducted in May 2020 in a single grocery retail store in Massachusetts, USA. We assessed workers' personal/occupational history and perception of COVID-19 by questionnaire. The health outcomes were measured by nasopharyngeal SARS-CoV-2 reverse transcriptase PCR (RT-PCR) results, General Anxiety Disorder-7 (GAD-7) and Patient Health Questionnaire-9 (PHQ-9).

Results:

Among 104 workers tested, 21 (20%) had positive viral assays. Seventy-six per cent positive cases were asymptomatic. Employees with direct customer exposure had an odds of 5.1 (95% CI 1.1 to 24.8) being tested positive for SARS-CoV-2 after adjustments. As to mental health, the prevalence of anxiety and depression (ie, GAD-7 score >4 or PHQ-9 score >4) was 24% and 8%, respectively. After adjusting for potential confounders, those able to practice social distancing consistently at work had odds of 0.3 (95% CI 0.1 to 0.9) and 0.2 (95% CI 0.03 to 0.99) screening positive for anxiety and depression, respectively. Workers commuting by foot, bike or private cars were less likely to screen positive for depression (OR 0.1, 95% CI 0.02 to 0.7).

Conclusions:

In this single store sample, we found a considerable asymptomatic SARS-CoV-2 infection rate among grocery workers. Employees with direct customer exposure were five times more likely to test positive for SARS-CoV-2. Those able to practice social distancing consistently at work had significantly lower risk of anxiety or depression.

Lan, F. Y., Suharlim, C., Kales, S. N., & Yang, J. (2020). Association between SARS-CoV-2 infection, exposure risk and mental health among a cohort of essential retail workers in the USA. Occupational and environmental medicine, oemed-2020-106774. Advance online publication. https://doi.org/10.1136/oemed-2020-106774

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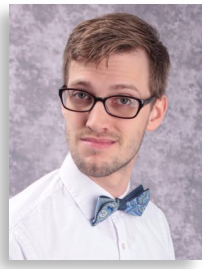

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Sarah Byrne, Esquire

Sarah Byrne is a staff attorney for the Court of Workers' Compensation Claims. She has a bachelors' degree in journalism from Belmont University and a masters' degree in English from Simmons College in Boston. After working in religious publishing and then state government, she earned a law degree from Nashville School of Law in 2010. She first joined the Bureau of Workers' Compensation in 2010 as a mediator.

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AdMIRable Review accepts electronic submission for medicolegal articles related to Tennessee Workers' Compensation. Manuscripts prepared in accordance with the American Psychological Association (APA) guidelines are preferred and must not exceed 20 typewritten, double-spaced pages. A summary of approximately 100 words as well as a biographical paragraph describing the author's affiliation, research interest, and recent publications is appreciated. Submission of a manuscript implies permission and commitment to publish in AdMIRable Review. Authors submitting manuscript to AdMIRable Review should not simultaneously submit them to another public-administration journal. Submission and inquires should be directed to AdMIRable Review, Editorial Staff, at Jay.Blaisdell@tn.gov.

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