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Rating Survivors of COVID-19 for Permanent Impairment

James B. Talmage MD, Mark H. Hyman MD, Robert B. Snyder MD

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Abstract

The current pandemic of COVID-19 cases includes cases identified in emergency medical technicians, nurses, physicians, and others with occupational exposure to the SARS-CoV-2 virus. Many of these health care professionals have filed workers' compensation claims that have been accepted. Each accepted claim will eventually need a physician to declare the individual "at maximal medical improvement" or the equivalent phrase in the jurisdiction involved. The next step is for the physician to rate permanent impairment, if present, so the case can be administratively closed. The *AMA Guides to the Evaluation of Permanent Impairment (AMA Guides)* is used by many jurisdictions, but the *AMA Guides* do not mention COVID-19 or have guidance on how to assess individuals for impairment after recovery from this illness. This article provides preliminary guidance on rating permanent impairment within the respiratory, cardiac, vascular, neurologic, renal, gastrointestinal, and/or mental systems in COVID-19 survivors. Current references on the manifestations of COVID-19 illness in these body systems are included, which can be used as references to support documented impairment related to this illness.

KEYWORDS: COVID-19; Coronavirus; Impairment rating; MMI; Outcome; PPI; SARS-CoV-2

Introduction

Almost everyone is aware of the presence of coronavirus 2019 (COVID-19) illness, caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Classifying COVID-19 as an occupational illness is controversial, with several US states passing legislation granting the rebuttable presumption of causation by workplace exposure to some occupations (healthcare workers, first responders, etc). This area of law is changing rapidly, and physicians will have to check the current status of such law in the applicable jurisdiction to a case before them.

Administrative requests for impairment ratings before literature is published on the long-term outcomes in COVID-19 survivors will be seen in the near future. Because many journals use a two-year outcome assessment as a criterion for "long-term" outcomes, the information in this article should be considered as "interim advice."

Individuals who claim to have had COVID-19 but who tested negative for the virus by polymerase chain reaction (PCR), and individuals who state they were ill and were not permitted to be tested, will likely have to have the causation question formally adjudicated before physicians are asked to assess for maximal medical improvement (MMI) and permanent physical impairment (PPI).

For those cases either accepted by a workers' compensation insurer or administratively adjudicated as work compensable, these questions will need to be answered: When is the person at MMI? How should PPI be rated? We offer several clinical scenarios to consider for administratively accepted cases for which an MMI date and PPI rating are requested.

Clinical Scenarios

Scenario 1: Individuals who are tested when asymptomatic only because they are known contacts of a person who tested positive. An example would be a healthcare worker in a hospital or nursing home with known cases who is tested despite the absence of any symptoms. If this individual remains asymptomatic but did test positive on PCR for having the live virus, there are no known long-term complications in those with subclinical infection. These individuals can be considered to be at MMI a few weeks after the positive test, and there is no permanent impairment.

Scenario 2: For those who are pre-symptomatic, ie, have not yet become symptomatic at the time of testing but do later become symptomatic, the average onset of illness is about 2 to 5 days later.[1, 2] These individuals would be rated similar to the following scenarios 3 and 4.

Scenario 3: Individuals who test positive and who have mild disease. They are not hospitalized, and they recover at home, never having been significantly dyspneic. Once recovered, they are asymptomatic. When they can return to normal activity without symptoms, they can be declared to be at MMI and with no PPI (0%). There are currently no case reports of individuals with mild disease, who recover at home, and yet who have persisting symptoms suggesting permanent consequences. If necessary, to support this opinion, symptom validity can be verified by stress echocardiography (eg, stress echocardiogram) and pulmonary function testing (PFT) (eg, spirometry).

Scenario 4: Individuals who have moderate disease, ie, test positive, hospitalized, and treated with supplemental oxygen but are not placed in the intensive care unit (ICU) or on a ventilator. They usually have abnormal chest computed tomography (CT) scans and may have abnormal chest X rays. Some are more seriously ill and required an

ICU stay, or were placed on a ventilator, or both. In these cases, review of hospital records is required to objectively document the organ systems with objective pathology.

The most common concern in these cases will be residual pulmonary or cardiac pathology either from the virus or from the ventilator. There may also be cases in which significant pulmonary involvement was documented by outpatient or emergency room imaging, and the person convalesced at home. Psychological illness may also be present, which is discussed later in the article.

History

If these individuals have persisting complaints of dyspnea on exertion or fatigue, the first assessment should be face-to-face in an office setting (*not* via telemedicine). Using release-of-information forms to obtain records from the primary care physician before the onset of COVID-19 and from healthcare providers and hospitals related to the treatment of COVID-19 will provide objective evidence of illness and help with questions about pre-existing status. Records should include evidence of a positive PCR test for the presence of the virus. Chest X ray or chest CT scan results would confirm pulmonary involvement occurred, as would physician-measured oxygen saturation below 95%.

Physical Examination

The physical examination should include traditional pulmonary and cardiac assessments and pulse oximetry. An additional and simple in-office screening test is the 6-minute walk test while the patient is wearing a pulse oximeter. Norms for distance walked by age are available,[3] but the most important information would be change in pulse from sitting to walking, and whether desaturation (oxygen level on pulse oximeter) occurs during walking. Tachycardia (pulse >100) and less than normal distance walked with preserved oxygen saturation would suggest deconditioning and not permanent impairment.

Guidelines

The American College of Occupational and Environmental Medicine (ACOEM) guidelines on COVID-19 (April 24, 2020 update)[4] contains a section on disability and return to work. They state that based on prior experience with other similar viral illnesses, patients who recovered without hospitalization will generally be adequately recovered from post-infection fatigue and ready to return to work after 2 to 3 weeks. This is about the time when some patients may be retested to see if they are still shedding the virus. The clinical significance of a recovered patient still having viral shedding is unclear and may not be a barrier to returning to work. For patients with documented pneumonia or who required supplemental oxygen therapy, recovery would be estimated to be 4 to 8 weeks after hospitalization or clinical recovery.

For patients who required mechanical ventilation for an acute respiratory distress syndrome (ARDS) illness, past experience has been that 50% of survivors may not have returned to work by 1 year from hospital discharge.[5-9] They also point out that on spirometry, lung volumes show about a 20% reduction that frequently resolves in 6 months. Thus, it would be logical to wait until hospitalized survivors are 6 months from discharge before evaluating for MMI and PPI.

Laboratory Testing

Blood testing for complete blood count and comprehensive metabolic panel should be obtained unless results from prior convalescent testing are available and normal.

If residual pulmonary impairment is plausible, then full spirometry (including measurement of diffusion capacity of carbon monoxide [DLCO], impendence testing, or nitrogen washout) should be obtained. The test results should be evaluated to verify that they meet the American Thoracic Society (ATS) criteria for full effort and reliability.[10-12]

Pulmonary impairment can be rated using Table 5-4, Criteria for Rating Permanent Impairment due to Pulmonary Dysfunction (6th ed, p 88), in the *AMA Guides to the Evaluation of Permanent Impairment (AMA Guides).* In jurisdictions using the Fifth Edition of the *AMA Guides,* ratings come from Table 5-12, Impairment Classification for Respiratory Disorders, Using Pulmonary Function and Exercise Test Results (5th ed, p 107). Many of the Sixth Edition internal medicine chapters have a footnote in the relevant table that identifies the "key factor" to be used for class assignment. Although Table 5-4 does not have such a footnote, on page 87, it does indicate , "The examiner should note that throughout this chapter the objective test results are used as the primary or 'key factor'."[13] To be class 0, each of the spirometry results for which tests are available must be normal, as defined by the numbers in the table. For class 1 to class 4 impairment, the worst of the tests determines class placement. Thus, if the DLCO results in a higher-class assignment than the forced vital capacity (FVC) or the forced expiratory volume in 1 second (FEV_1), the class would be determined by the DLCO result. ACOEM points out that lung diffusion abnormalities, if present, may take 5 years to resolve after ARDS. On spirometry, the DLCO is the test that best reflects diffusion abnormalities. There are no published studies of spirometry results in COVID-19 survivors, but the pathophysiology so far appears to be predominantly diffuse alveolar damage, hyaline membranes, and microangiopathic processes.[14] The DLCO may be the most impaired pulmonary function on spirometry.

Cardiovascular injuries that are seen in ARDS and could occur in COVID-19 include the following conditions:

Condition	*AMA Guides,* Fifth Edition	*AMA Guides,* Sixth Edition
Cardiomyopathy	Table 3-9, page 47	Table 4-7, page 59
Arrhythmia	Table 3-11, page 56	Table 4-9, page 64
Cardiac muscle injury	Table 3-6a, page 36	Table 4-6, page 55
Pulmonary emboli	Table 4-6, page 79	Table 4-14, page 72
Carotid occlusion	Chapter 13 or possibly by analogy, Table 4-3, page 70	Chapter 13
Deep vein thrombosis	Table 4-5, page 76	Table 4-12, page 69

Desaturation during exercise with normal spirometry would suggest impaired cardiac output (left ventricle ejection fraction (LVEF) by echocardiogram) or interstitial lung disease for which full metabolic stress echocardiogram would be needed. If the echocardiogram is normal, then other systemic illness such as anemia or lung abnormalities are most likely. If the spirometry was normal, but stress testing showed the individual crossed the aerobic threshold (first ventilatory threshold on cardiopulmonary stress exercise testing ([CPX])[15] or metabolic stress echocardiogram) and the subsequent maximum oxygen (VO_2 max) consumption was abnormal, the VO_2 max measurement mentioned in either edition of the *AMA Guides* can be used for class assignment (6th ed, Table 5-4; 5th ed, Table 5-12). The formal interpretation for the test may provide evidence as to the pathophysiology of the individual (lung diffusion abnormality, pulmonary hypertension, reduced cardiac output, deconditioning or lack of effort on testing, etc).

COVID-19 patients can have cardiac complications. Some COVID-19 patients have ST-segment elevation on electrocardiogram (EKG) and have corresponding clots in major epicardial coronary arteries from the hypercoagulable state many of these patients experience.[16] These patients can be rated as any other myocardial infraction patient. Some have viral myocarditis without large artery induced infarcts.[17] These patients can be rated as any other cardiomyopathy patient. LVEF by echocardiogram or cardiac catheterization); brain natriuretic peptide (BNP) level, METs of exertion achieved on a treadmill test, or VO_2 max on CPX or metabolic stress echocardiogram (if performed) are the test results discussed in the Sixth Edition, that are used as key factors to assign a class.

Pulmonary emboli may occur due to a hypercoagulable state[18] or prolonged inactivity.[19] Impairment would be evaluated by spirometry (infarction-reduced FVC) and by echocardiogram or metabolic stress echocardiogram showing pulmonary hypertension.

There are patients having large-vessel strokes, presumably due to the hypercoagulable state known to occur in some patients with COVID-19.[20] These would be rated like any other large-vessel stroke, and if cranial nerve or visual impairment is present, they would be rated according to Chapters 11 and 12 in either *AMA Guides* edition.

Some severely ill patients with COVID-19-related ARDS have neurologic deficits while in the ICU, and some still have mental status alteration in short-term follow up.[21] The *AMA Guides* point out that the more subtle the persisting mental status deficit is, the more likely formal neuropsychological testing is to formally verify and document the deficit (6th ed, Section 13.3d, 330; 5th ed, Section 13.3d, 319).

An unusual symptom being reported in some individuals with COVID-19 is anosmia, or loss of sense of smell. It is not clear from early reports whether this is just loss of sense of smell, or whether there is also loss of taste. Most of our sense of what food tastes like is determined by our sense of smell. Subjective loss of sense of smell is not always validated on testing. Loss of sense of smell from upper respiratory tract infections (URTIs) is known to recover in 32 to 66% of cases,[22] so olfaction should be tested with the University of Pennsylvania smell identification test (UPSIT) or the Burghardt Sniffin' Sticks.

Guillain-Barré syndrome and its variants have been reported during and just after COVID-19 illness, [23, 24] and these are ratable using the chapter on the central and peripheral nervous system in both the *AMA Guides,* Fifth and Sixth Editions. This diagnosis should not be used for subjective complaints of weakness and fatigue with no objective documentation of Guillain-Barré actually been present, by accepted criteria.[25] The residual respiratory and limb consequences of objectively documented disease are ratable.

Note that the central and peripheral nervous system chapter also has a rating methodology for myopathy[26] or for generalized peripheral neuropathy (Section 13-9 in either edition) that could be used in cases of these problems after objective documentation with electrodiagnostic tests and/or muscle ultrasound or magnetic resonance imaging (MRI) during the acute illness.[27, 28]

While COVID-19 patients may have a hypercoagulable state (elevated D-dimer, etc) there are no current reports of persistent hypercoagulable state after recovery. Individuals with a persisting or permanent hypercoagulable state (6th ed, Table 9-12, or 5th ed, Table 9-4) may be rated, but this will probably not be used in COVID-19 survivors. If thrombosis of a vessel(s) resulted in extremity complications, these would be rated using the extremity chapters. Similarly, if thrombosis in abdominal vessels

occurred, it would be rated from the gastrointestinal (GI) or genitourinary (GU) chapter(s).

Acute hepatic injury and acute kidney injury, when they occur in patients with COVID-19, are usually markers of impending death, and survival with impairments in these organs is not common.[29] If an individual did survive these complications, they are ratable from the GI and GU chapters, like any other liver or kidney disease patient.

Providing care to COVID-19 patients can be stressful;[30, 31] some individuals may present with post-traumatic stress disorder (PTSD) symptoms. Some had actual COVID-19, some were first responders or healthcare workers who witnessed first-hand illness or deaths,[32-34] and some had both of these experiences. Several states have created a legal presumption (sometimes rebuttable) that PTSD in these situations is presumed to have been caused by COVID-19.

The mental and behavioral disorders chapter uses the now antiquated DSM-IV-TR criteria for PTSD diagnosis, and most mental health professionals are now using the more liberal diagnostic criteria in DSM-V. If the diagnosis is administratively accepted, and the MMI and PPI questions are asked, there are some caveats. Chapter 14 in either edition of the *AMA Guides* is largely silent about how MMI and permanency are to be objectively established in mental disorders. Modern systematic reviews indicate cognitive behavioral therapy (CBT) has better outcomes compared to medications[35-37] and, therefore, 12 to 18 sessions of CBT should logically have occurred before MMI is established. A further consideration is the stability of employment. If the individual is still in a "temporary" off-work status, the outcome of PTSD with a change in employment is not known. Thus, if a healthcare worker is still unwilling to return to work after CBT, an alternate career choice may need to be made, and PPI should logically be assessed after re-employment.

For jurisdictions that apportion, the mental and behavioral disorders chapter recommends that the rating be performed twice, once using three assessment tools based on symptoms and function before the inciting workplace exposure, and then using the same tools to describe the current symptoms and function. Subtracting the pre-existing impairment from the current impairment yields the impairment because of the current mental disorder of interest.

Conclusion

The information provided in this article is preliminary advice for those who are asked to rate permanent consequences of COVID-19 illness in those administratively accepted or adjudicated cases. With further clinical experience, the approach to rating may need to be modified slightly. However, the suggestions outlined should remain applicable for most of the foreseeable future.

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Medical Aspects of Causation for COVID-19

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Abstract

The decision about whether a case of documented COVID-19 illness is accepted as occupationally acquired and thus work compensable is made by insurers, or if contested, by judges or administrative bureaus. Causation for COVID-19 may be difficult to show because of the lack of accurate information and difficulty in meeting some of the criteria established by Bradford Hill. Nevertheless, physicians will be asked for medical records and documentation of illness. This article provides preliminary guidance to assist physicians in responding to insurers or workers compensation agencies' requests for information on the medial aspects of COVID-19.

KEYWORDS: COPD; COVID-19; Causation; Coronavirus; Impairment Rating; Occupation; SARS; SARS-CoV-2; Underlying Condition

Introduction

Physicians may be asked whether a coronavirus 2019 (COVID-19) infection was work-related or meets jurisdictional requirements for coverage under workers' compensation. The current pandemic of COVID-19 cases includes cases identified in emergency medical technicians, nurses, physicians, and others with occupational exposure to the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Many of these health care professionals have filed workers' compensation claims. Much is still unknown at this time about the epidemiology, transmission, contagiousness, pathophysiology, and residual permanent organ damage associated with a COVID-19 infection, whether the patient has any recognized initial symptoms, or symptoms that might have required medical treatment. The information in this article should be considered preliminary and might change as the scientific knowledge surrounding COVID-19 evolves. If COVID-19 causes an aggravation of an underlying condition that causes additional permanent organ damage, in many jurisdictions the damage must be more likely that than not (>50%) due to the occupational exposure; however, causation may be difficult to show because of the lack of accurate information and difficulty in meeting some of the criteria established by Bradford Hill. Two assessment examples are provided in the article to highlight some examples of known facts and formation of a medical opinion that is supported by reasonable explanations. This article will discuss how physicians can respond to requests for a causation opinion from workers' compensation insurers, or from administrative agencies.

Critical Information

The decision on whether a case is accepted for workers' compensation benefits is the responsibility of an insurance adjuster based on proper review of pertinent medical information. For certain conditions, including COVID-19, presumptions may apply in which it is assumed that a condition is related to an individual's occupation.

It is helpful to provide the decision makers the following information:

- Documentation of the employee's description of workplace exposure(s) to known COVID-19 cases
- Documentation of known sources of exposure at home or outside the workplace
- Current epidemiologic literature on the incidence and prevalence of COVID-19 in specific occupations or the employee's specific workplace

It is the role of the medical practitioner to accurately and completely document the medical information necessary for all parties to make an informed decision.

Should COVID-19 cause an aggravation of an underlying condition that causes permanent organ damage, that damage must be more likely that than not (>50%) due to the occupational exposure. It is the job of the physician to document the medical information based upon the information available or that can be obtained. Some of the references in the article on rating COVID-19 cases for permanent impairment (in this issue) may be useful to send to the insurer's adjuster about known consequences of COVID-19. If a condition has not been reported in medical studies to accompany an infection or be a complication of COVID-19, then that condition would not be medically supported as caused by COVID-19, even in those who test positive for the virus. For example, currently there are no reports of permanent worsening neck or low-back disorders from COVID-19, so a claim for low-back pain or exacerbation of a previous low-back disorder due to having had a positive

test for COVID-19 would not be medically supportable. However, that decision would be case specific and dependent on the individual facts.

Causation may be difficult, and in this circumstance harder, because of the lack of accurate information concerning meeting some of the criteria established by Bradford Hill, as illustrated in Box 1. Accurate information concerning COVID-19 infections is not yet known for the criteria of consistency, specificity, and temporality. Because of the nature of transmission from asymptomatic individuals, these three criteria have not been supported by accurate data at present.

BOX 1. Bradford Hill Criteria

In 1965, the English statistician Sir Austin Bradford Hill proposed a set of nine criteria to provide epidemiologic evidence of a causal relationship between a presumed cause and an observed effect. (For example, he demonstrated the connection between cigarette smoking and lung cancer.) The list of the criteria[1] is as follows:

1. **Strength** (effect size): A small association does not mean that there is not a causal effect, though the larger the association, the more likely that it is causal.
2. **Consistency** (reproducibility): Consistent findings observed by different persons in different places with different samples strengthens the likelihood of an effect.
3. **Specificity:** Causation is likely if there is a very specific population at a specific site and disease with no other likely explanation. The more specific an association between a factor and an effect is, the bigger the probability of a causal relationship.
4. **Temporality:** The effect has to occur after the cause (and if there is an expected delay between the cause and expected effect, then the effect must occur after that delay).
5. **Biological gradient** (dose-response relationship): Greater exposure should generally lead to greater incidence of the effect. However, in some cases, the mere presence of the factor can trigger the effect. In other cases, an inverse proportion is observed: greater exposure leads to lower incidence
6. **Plausibility:** A plausible mechanism between cause and effect is helpful (but Hill noted that knowledge of the mechanism is limited by current knowledge).
7. **Coherence:** Coherence between epidemiological and laboratory findings increases the likelihood of an effect. However, Hill noted that "... lack of such [laboratory] evidence cannot nullify the epidemiological effect on associations."
8. **Experiment:** "Occasionally it is possible to appeal to experimental evidence."
9. **Analogy:** The use of analogies or similarities between the observed association and any other associations.
10. Some authors also consider **reversibility**: If the cause is deleted, then the effect should disappear as well.

Figure 1 is a checklist of the basic information to obtain. A "yes" or "no" answer to any one of these questions does not necessarily make a final opinion. For example, even a negative reverse transcription polymerase chain reaction (RT-PCR) test does not automatically make the causation opinion negative.[2-4] Each case must be taken in its entirety.

Opinions must be given with consideration of the following:

1. A description of the diagnosis(es), both in medical and lay terms.
2. A complete and detailed description of the reported exposure(s), from the information provided, including the mechanism, time, place, number, duration, or frequency of exposure(s).
3. If there were symptoms, pre-existing conditions, comorbidities, or prior or concurrent events unrelated to employment, these might be important contributing factors. If those factors existed without a present or ongoing need for treatment except for ("but for") the work exposure, an appropriate medical opinion might be that the work exposure is more than 50% responsible for the need for treatment.
4. Whether the need for treatment was an aggravation, a permanent and documented deleterious change of function, or advancement of an underlying condition. For example, even though the injured worker tested positive for COVID-19, the need for treatment was due to complications

FIGURE 1. Examinee COVID-19 Information

YES	NO	
☐	☐	Have you had a positive test for the COVID-19 virus? If "Yes," please attach your positive test result.
☐	☐	What is your job title?_____
☐	☐	Have you had a specific exposure incident at work where you were within 6 feet for 10 minutes or longer of a co-worker who tested positive for COVID-19? If "Yes," how many co-workers who tested positive for COVID-19 have you had this close contact with?
☐	☐	Has a person you live with tested positive for COVID-19? If "Yes," date positive _____ Provide details. _____
☐	☐	Has the Department of Health told you that you must quarantine at home due to your positive test for COVID-19? If "Yes," date positive _____ Please attach a copy of the Department of Health order or communication.
☐	☐	Has a doctor told you to "self-isolate" at home due to a confirmed specific exposure to a person with a positive test for COVID-19? If "Yes," date positive _____ Who is that doctor? _____ Please attach a copy of the doctor's office note that states you should self-isolate.
☐	☐	Have you been directed by your employer to leave work or self-isolate? If "Yes," provide a copy of the directions with dates.
☐	☐	Were you hospitalized for symptoms related to COVID-19? If "Yes," provide a copy of the medical record.
☐	☐	Have you had an antibody test? If "Yes," provide a copy of the results.

Documents to be attached to authorized treating physician's office note on causation:

1. A copy of COVID-19 viral RNA PCR (RT-CPR) test results (positive or negative), with a legible date and result.
2. Employer-supplied job description and work attendance record.
3. Employee statement of details on potential workplace exposure to SARS CoV-2 virus and/or COVID-19 patients.
4. Results of any other tests results given to persons the employee lives with or is consistently exposed to (positive or negative).
5. Any written communication from the Department of Health or a physician that directed or suggested home isolation.
6. Any direction from your employer to leave work or self-isolate because of COVID-19 exposure(s) or symptoms.
7. If hospitalized, a copy of the medical records.
8. A copy of any antibody test results.
9. Other documents that support or refute a potential claim.

of pre-existing chronic obstructive lung disease (COPD). Decide then whether this aggravation was (or was not) the cause of the need for medical treatment and was (or was not) medically caused by the exposure at work.

5. When all this information is taken together, is it more likely than not, to a reasonable degree of medical certainty, that this described exposure or series of exposures was the cause of the need for treatment, death, or disablement (time away from work or limited work capacity)?

Accurately recording the known facts and then forming a medical opinion must be supported by a reasonable explanation of the process of correlation supported by citing the available facts. We offer the following examples of assessments:

A 45-year-old nursing technician at a nursing home worked normal 12-hour shifts 4 days a week from March 1, 2020, through March 23, 2020, when she developed a fever of 101.5° F with profound fatigue. She did not go to work and reported her illness to her supervisor. She was tested by the county health department and notified that she was positive for the coronavirus. She was seen and treated by her family physician with supportive antibiotics and additional inhalers for her pre-existing asthma. Her fever subsided but returned 5 days later for 3 days, necessitating an additional period of convalescence. She provided records from her family physician confirming the extra length of leave. She states no one living in her home had suggestive symptoms of COVID-19, and no one was tested for the virus. Her nursing home had greater than 10 cases of COVID-19, including two of the patients she regularly cared for during March. After recovery she felt she was back to baseline, and there were no changes in her medications or spirometry from her pre-illness status. With clear and repetitive exposure to COVID-19 patients at work, and with no known exposure outside the workplace, most physicians would feel this was a work-related case.

A 25-year-old healthy grocery store clerk worked extra shifts from March 15 through April 21 because several co-workers chose not to come to work out of fear of the coronavirus. Despite being asymptomatic, he was able to get a viral RT-PCR test at a drive-through testing center on April 21. It was reported as negative and he returned to work the following day. On April 27, he reported a fever, shortness of breath, and loss of sense of smell and taste. When tested again on April 28, he was negative. He was told to stay home for 2 weeks by his supervisor. No one else in his household was sick. When his shortness of breath worsened, he was seen in the emergency room (ER) and discharged with an inhaler and precautions. He was not tested for the coronavirus in the ER. His fever and lung symptoms subsided, and he reported back to work on May 11. He states that the loss of smell and taste have not returned as of June 25. With no proof he was ill with COVID-19, and with just occupational exposure to the general public (not to proven COVID-19 cases), most physicians would not feel this case had reached the ">50% threshold" for causation. The reported loss of sense of smell is a subjective symptom that has not been confirmed by the University of Pennsylvania smell identification test (UPSIT) or the Burghardt Sniffin' Sticks test. Loss of sense of smell occurs in several known upper respiratory tract infections (URTIs) but recovers with time in 32 to 66% of cases.[5]

Conclusion

Physicians will be asked to make complex determinations regarding the work-relatedness of the employee's condition in COVID-19 claims. The more thorough the medical analysis, the more likely a claims adjuster and, ultimately, a judge is to accept the physician's opinion.

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Q&A Cervical Facet Arthropathy

Charles N. Brooks, MD, Christopher R. Brigham, MD, Marjorie Eskay-Auerbach, MD, James B. Talmage, MD

QUESTION: My question pertains to the rating of impairment for reported facet arthropathy with callus formation and whether this would meet the criteria for alteration of motion segment integrity. A colleague of mine saw a patient at the request of the patient's attorney and opined that bone formation at the C5-C6 facet was an "inherent attempt at arthrodesis" and, therefore per the *AMA Guides,* Fifth Edition, would be rated as "alteration of motion segment integrity," ie, diagnosis-related estimate (DRE) category IV at 25% to 28% whole person impairment. He suggested the patient met the criteria in Table 15-5, Criteria for Rating Impairment Due to Cervical Disorders (5th ed, 392), "due to a developmental fusion or successful or unsuccessful attempt at surgical arthrodesis." Three months following the patient's evaluation, a cervical magnetic resonance image (MRI) revealed normal findings at the C5-C6 level, including normal facet joints. This same physician said that there is a C6 radiculopathy on the basis of slight thumb extension weakness and decreased grip strength; however, the patient has normal sensory examination and reflexes. No other physician has determined the patient has radiculopathy, and no electrodiagnostic studies have been performed. On examination, there were not ratable findings per Box 15-1, Definitions of Clinical Findings Used to Place an Individual in a DRE Category (5th ed, 382-383).

Would you share some guidance on providing an accurate assessment?

ANSWER: Equating degenerative changes of facets with an "inherent attempt at arthrodesis" is creative but inconsistent with definitions in both Fifth and Sixth Editions of the *AMA Guides.* Degenerative changes of facet joints are neither a developmental fusion nor a surgical attempt at arthrodesis.

Facet arthropathy (ie, osteo- or degenerative arthritis or arthrosis of facet joints) occurs over time, and to a greater or lesser extent, in all persons due to a combination of genetic determinants,[1, 2] and aging.[3] However, facet arthropathy may be accelerated by other factors including trauma (eg, cervical injury sustained in a high-speed motor vehicle collision); abnormal spinal alignment (eg, moderate to severe anterolisthesis or scoliosis); or fusion of an adjacent motion segment, usually iatrogenic but sometimes spontaneous, with resultant adjacent segment degeneration.

In medicine, callus refers to the thickening of skin in response to repeated pressure or friction, or the initially cartilaginous and subsequently bony bridge connecting fracture fragments. Absent any mention of a fracture in this case, the "callus formation" presumably means a marginal osteophyte (bone spur), one of the cardinal manifestations of joint degeneration, along with joint space narrowing, subchondral sclerosis, and in more severe cases, subchondral cyst formation.

Most middle aged to elderly persons have at least some marginal osteophytosis of cervical uncovertebral and/or facet joints. Spur formation begins with dysregulated chondrogenesis in the periosteum at the junction of cartilage and bone in diarthrodial joints, initially forming a chondrophyte which eventually ossifies into an osteophyte.[4-6] Small osteophytes may be advantageous in degenerated joints, increasing joint stability and possibly widening the area upon which loads are distributed, thereby protecting remaining articular cartilage. Large osteophytes may limit joint motion, and occasionally grow big enough to fuse with a spur projecting from the apposing joint surface, creating a bony bridge across the articulation.[7] However, it is incorrect to state any marginal osteophyte is an "inherent attempt at arthrodesis." Even if this were true, it does not meet any of the criteria listed for DRE for cervical category IV. Specifically, it is not a developmental fusion or successful or unsuccessful attempt at surgical arthrodesis. Developmental refers to something that occurred during embryonic, fetal, or childhood development. An "inherent [or perhaps more accurately stated spontaneous] attempt at arthrodesis" is not a successful or unsuccessful attempt at surgical arthrodesis.

Based on the information provided, there is no evidence of a C6 radiculopathy. As noted in Table 15-2, Common Radicular Syndromes (5th ed, 376), and Table 17-8, Common Radicular Syndromes (6th ed, 578), a C5 radiculopathy often results in deltoid and/or biceps weakness; C6 radiculopathy radial wrist extensor and/or biceps weakness; C7 radiculopathy wrist flexors, triceps, finger extensors, and/or ulnar wrist extensor weakness; and C8 radiculopathy weakness of finger flexion and hand intrinsic muscles. The case scenario says thumb extensor weakness but does not isolate the weakness to the extensor pollicis longus (thumb interphalangeal joint extension) or to the extensor pollicis brevis (thumb metacarpophalangeal joint extension). Both muscles are typically supplied by the C7 and the C8 nerve roots, not by the C6 nerve root. Hence this patient does not have weakness consistent with C6 radiculopathy. In addition, there is no sensory loss in C6 dermatome (lateral forearm, wrist, hand, and digits [thumb and index finger]), or diminution in or absence of brachioradialis deep tendon reflex, both of which would be expected with a C6 radiculopathy. Given the absence

of motor, sensory, and reflex abnormalities consistent with C6 radiculopathy, almost certainly the patient does not have this condition.

However, your colleague reportedly found weakness of grip strength and thumb extension, both of which could be explained by a C8 radiculopathy. Deep tendon reflexes are usually normal with an isolated C8 radiculopathy. However, if there is C8 nerve root impingement, one would expect accompanying sensory loss in C8 dermatome, ie, medial forearm, wrist, hand, and digits (ring and little fingers). Absent this, and especially given the apparent inter-examiner unreliability since no "other physician has determined that he has radiculopathy," it would be imprudent to conclude the patient has a C8 radiculopathy without corroborating electromyogram findings.

Therefore, based on the clinical information provided, the patient should not be rated for alteration of motion segment integrity or radiculopathy. Impairment ratings must be based on valid and reliable clinical findings, causally related to the subject injury or illness; and the evaluator must follow the processes specified in the *AMA Guides.*

Using the *AMA Guides,* Fifth Edition, the patient would be rated using the DRE method. The rating of a cervical (neck) injury is performed according to Section 15.6, DRE: Cervical Spine (5th ed, 392-395), and Table15.5, Criteria for Rating Impairment Due to Cervical Disorders (5th ed, 392). Although not supported by the cervical MRI scan, if asked to assume there is minimal or mild C5-C6 facet arthropathy, but no cervical fracture and none of the findings listed in Box 15-1, Definitions of Clinical Findings Used to Place an Individual in a DRE category (5th ed, 382), the classification would be DRE cervical category I in Table 15-5, with 0% whole person impairment, since there are "No significant clinical findings, no muscle guarding, no documentable neurologic impairment, no significant loss of motion segment integrity, and no other indication of impairment related to injury or illness; no fractures" (5th ed, 392).

Using the *AMA Guides,* Sixth Edition, evaluation of impairment due to cervical strain is based on Section 17.2, Diagnosis-Based Impairment (6th ed, 560), and Section 17.2a, Cervical Spine (6th ed, 563). In Table 17-2, Cervical Spine Regional Grid: Spine Impairments (6th ed, 564-566), for the diagnosis "Non-specific chronic or chronic, recurrent cervical spine pain, (also known as chronic sprain/strain, symptomatic degenerative disc disease, facet joint pain [emphasis added], chronic whiplash, etc." Class 1 would be warranted assuming there is a "history of sprain/strain-type injury, with continued complaints of axial and/or non-verifiable radicular complaints." The default impairment value is 2% whole person.

For non-specific spinal pain, adjustments are made for functional history, but not physical examination or clinical studies. In Section 17.3a, Adjustment Grid: Functional History (6th ed, 569), and Table 17-6, Functional History Adjustment: Spine (6th ed, 575), if the patient has "pain, symptoms with normal activity," grade modifier 2 would be warranted. Using the net adjustment formula: (GMFH–CDX) = (2–1) = 1. Hence the final grade is D, which constitutes 3% whole person impairment.

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Q&A The Role of the QuickDASH in Carpal Tunnel Syndrome

Douglas W. Martin, MD, J. Mark Melhorn, MD, James B. Talmage, MD

QUESTION: When performing an impairment rating for carpal tunnel syndrome (CTS), cubital tunnel, etc, I have always disregarded *Quick*DASH scores higher than 80 because Table 15-23, Entrapment/Compression Neuropathy Impairment, in the *AMA Guides,* Sixth Edition, (6th ed, 449) does not list the functional scale options of anything other than normal, mild, moderate, or severe depending on which level is designated by averaging the three scores for test findings, history, and physical findings. The ranges listed for *Quick*DASH scores are normal 0-20; mild 21-40; moderate 41-60; and Severe 61-80. I assume that *Quick*DASH scores >80 are not included because a *Quick*DASH score that would equate to a "very severe" or level four functional scale would be akin to the grade modifier for functional history (GMFH) that is two levels higher than grade modifier for physical examination (GMPE) or grade modifier for clinical studies (GMCS) and that allows it to be "thrown out" for diagnosis-based impairments.

However, on page 445, under Functional Score, the *AMA Guides* provides this insight, which states, "A functional score greater than 60 is not consistent with mild impairment and suggests that either the presenting diagnosis is incorrect, or that a second diagnosis, including symptom magnification, has been overlooked."[1] This comment applies if you are treating a patient with a grade 1 impairment as cited in Table 15-23. You can specifically cite that sentence to support your diagnosis; however, the *AMA Guides* does not go on to specify the same thing for grade 2 or grade 3 impairments. In fact, I find it odd in grade 3 impairments in Table 15-23 that the "very severe" functional scale is not listed as an option, because it would be only one level higher than the grade. I recognize that grade 3 for entrapment neuropathy is very rare.

ANSWER: The *AMA Guides,* Sixth Edition, does indicate that a *Quick*DASH2 score of > 60 for grade 1 (or mild) CTS (median nerve entrapment at the wrist) does not make medical sense. Table 15-23 does indicate that a *Quick*DASH score of 61-80 for grade 2 would qualify for the highest rating (6% upper extremity impairment [UEI], or 4% whole person impairment [WPI]). It also indicates that for grade 3, the same severe *Quick*DASH score would qualify for the highest rating (9% UEI, or 5% WPI). In other words, regardless of whether the UE impairment is at a grade 2 or grade 3, the functional scale options of mild, moderate, and severe and their corresponding *Quick*DASH values are applied similarly when determining whether the final impairment rating (IR) is moved lower, higher, or remains the same. None of the grades listed in Table 15-23 considers a *Quick*DASH score of >80. What should the examiner do with a *Quick*DASH score of >80?

First, the examiner should discuss the *Quick*DASH score with the examinee. Many of the *Quick*DASH questions involve bilateral hand activity. Questions about opening a tight jar, doing heavy household tasks, or cutting food, for example, could be "inflated" by the examinee with bilateral CTS thinking about difficulty with two-handed activity, when the rating is being issued for one single upper limb. After discussion, the examiner may choose to decrease the *Quick*DASH score and explain the rationale for the decrease. The *Quick*DASH survey consists of 11 questions, each of which is scored from 1 to 5 on a Likert-like scale. The sum of the 11 questions is used in a formula[3] for deriving a 0-100 final score. For examinees, whose raw total score is 45 points out of the possible 55, the final *Quick*DASH score is 77, while for those whose questionnaire raw total score is 46 or above, the final *Quick*DASH score is 80 or above. Thus, to score 80 or above on the *Quick*DASH questionnaire would require 11 responses averaging 4.2 points out of a possible 5.

The *Quick*DASH was shown to have reliability and construct reliability[4] and thus was adopted by the Sixth Edition for use in impairment rating.

By consensus of the *AMA Guides* authors and editors, a *Quick*DASH score of >80 was determined to be very unusual and thus to likely represent symptom magnification and not true impairment or disability. However, when considering an individual who has a grade 3 level of impairment (albeit rare and advanced) due to entrapment or compression neuropathy, there could be an examinee who legitimately presents with a functional scale assessment in the "very severe" category that would correspond to a *Quick*DASH score of >80. In this scenario, if the impairment evaluator considers this level of function to be reliable and consistent with examination findings, the final impairment rating would also be 9% UE, and this should be explained in the context of the IR report. In summary, a *Quick*DASH score of >80 in an individual with a grade 3 level of impairment should not always "automatically" be considered unreliable, based on the circumstances of the condition.

The *AMA Guides,* Sixth Edition, was written in 2007, and in 2008, Fan et al published the mean *Quick*DASH scores of 231 examinees with a confirmed diagnosis of an upper limb disorder (23.0) versus the mean score of 175 workers with symptoms but no findings or diagnosis (14.3), confirming that scores of >80 rarely "make medical sense."[5]

Southam et al published a retrospective cohort of 481 examinees

with five types of acute hand injuries, assessed when the person started hand therapy, and at the time of final outcome assessment.[6] These examinees had flexor tendon injury, extensor tendon injury, distal radius fracture, metacarpal fracture, or complex trauma. A total of 481 examinees were studied. Thirty examinees out of 481 had a *Quick*DASH score of >80 at the start of hand therapy, and none of the 481 had a *Quick*DASH of >80 at the completion of hand therapy. One of the 481 had a final *Quick*DASH score of 70-79 and none had a score of 60-69. Thus, a score of >80 is most unusual. Resnick[7] published a study on the validity and reliability of the *Quick*DASH questionnaire in 44 upper limb amputees, with 30 of the 44 examinees prosthesis wearers. The mean (and standard deviation) *Quick*DASH scores for shoulder disarticulations were 42.0 ± 20.9; for transhumeral amputees 40.1 ± 18.6; and for transradial amputees 27.2 ± 13.2. This would verify that *Quick*DASH scores, even with very proximal upper limb amputations, are rarely 80. Smith-Forbes et al[8] published a 2018 study of three types of upper limb conditions, including CTS, which is the condition relevant to this answer. Twenty-eight of the 118 carpal tunnel release examinees (24%) had a preoperative *Quick*DASH greater than 75.6. It is interesting that they found no examinee out of 118 who had a postoperative *Quick*DASH score of >60, making a *Quick*DASH score of >80 at MMI most unusual.

These data would support the concept of considering an examinee with CTS at MMI with a *Quick*DASH score of >80 as displaying symptom magnification sufficient to disqualify the *Quick*DASH and thus the impairment adjustment published in *AMA Guides,* Sixth Edition, Table 15-23. The default or middle number for the grade should be accepted. Exceptions to this advice should have a clearly stated rationale in the discussion as to why this score is considered valid.

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