Practical Guidance for Managing EMG Requests and Testing during the COVID-19 Pandemic

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Abstract

The COVID-19 pandemic has necessitated cancelation of elective or non-urgent contact with the healthcare system, including non-urgent nerve conduction studies and electromyography (electrodiagnostic [EDX] studies). The definitions of elective and non-urgent are physician judgments, and often are not straightforward. Clinical care must be provided to help our patients in a timely manner, while keeping them, health care personnel and the community safe. Benefit/risk stratification is an important part of this process. We have stratified EDX studies into 3 categories: Urgent, Non-urgent and Possibly Urgent, in an effort to help clinicians triage these referrals. For each category, we provide a rationale and some examples. However, each referral must be reviewed on a case-by-case basis, and the clinical situation will evolve over time, necessitating flexibility in managing EDX triaging. Engaging the referring clinician and, at times, the patient, may be useful in the triage process.

1. Introduction

The coronavirus infectious disease-2019 (COVID-19) pandemic has necessitated major changes to the manner in which we deliver and organize health care. The Centers for Disease Control and Prevention (CDC) and the Centers for Medicare and Medicaid Services (CMMS) recommend prioritizing urgent and emergent visits and procedures.[1, 2] Thus, in-person visits with a clinician have all but stopped, leading to a shift towards virtual care (telephone and video visits).[3, 4] Many healthcare systems across the US and around the world recommend cessation of all elective and "non-urgent" procedures including imaging, surgeries and neurophysiologic tests.[2, 5, 6] However, the definition of "elective" or "non-urgent" are subjective, and left to the judgment of the clinician. These definitions certainly vary by specialty, and perhaps by procedure.

Postponing non-essential care is critical to preserve staffing, maintain stocks of personal protective equipment (PPE) and patient care supplies and ensure the safety of patients, the community, and health care personnel. However, despite the COVID-19

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pandemic and its dangers, patient care should also be provided in a timely and safe manner to avoid delays in diagnosis and treatment initiation that may in turn lead to poorer health related outcomes. It is challenging to negotiate this delicate balance between avoiding an increase in exposure to SARS-CoV-2 (the virus associated with COVID-19), and providing care that is immediately necessary. In some circumstances, as in acute life-threatening illnesses, the choice is clear. In others, especially in the case of procedures such as nerve conduction studies and needle electromyography (electrodiagnostic [EDX] studies), the choice is less clear. To help define what is elective or "non-urgent", some professional organizations have developed guidelines for their membership.

EDX studies are commonly used and useful diagnostic procedures for disorders of the peripheral nervous system. Only a small subset of indications for EDX testing is genuinely urgent, but in most situations, the EDX testing cannot be postponed indefinitely. The clinician performing the EDX testing often has only limited referral information beyond the presumed diagnosis when trying to determine the urgency, or lack thereof, for assessment of a particular patient. In the situation of limited availability of EDX testing, this raises the question of how to triage EDX referrals in order to continue to offer necessary testing during the pandemic, balancing patient and clinician risk.[7]

The AANEM has been receiving multiple queries from its members regarding the issue of postponing EDX studies. In order to assist clinicians in triaging EDX referrals at this time, we have developed a tiered framework and guidance document to stratify EDX referrals by acuity and indication.

2. Methods

The Quality and Patient Safety Committee (QPSC) of the AANEM was tasked with finding methods to help address member concerns regarding postponing EDX studies as a result of the limited availability of clinical services during the COVID-19 pandemic. A document was created and refined by CDK, UD, and PN to guide stratification of referrals for EDX studies into those that are clearly urgent, those that are clearly non-urgent, and the most challenging category, "possibly urgent". We developed explanations for and examples of each category to clarify the applicability of these categories in clinical practice. We addressed inpatient EDX separately to reflect the unique nature of inpatient EDX requests and briefly addressed issues pertaining to equipment and hygiene. Since this is a highly time-sensitive issue, we created an intentionally short and simple document, with the premise that it would be of most value to clinicians. A video-call of the QPSC members, AANEM staff and AANEM executive director was held on March 28, 2020 to provide input, after which we revised and finalized the document. This was approved by the AANEM Board of Directors on March 31, 2020 and posted on the AANEM website on April 1, 2020.

3. Results

3.1 Outpatient EDX studies:

Table 1 outlines the 3 categories of EDX referrals, Urgent, Non-urgent and Possibly Urgent, along with descriptions, examples and recommended actions.

Urgent EDX testing requests are those in which there is concern for an acute or rapidly evolving (over days to a week or two at most) peripheral neurological syndrome, where EDX testing would be confirmatively diagnostic and lead to specific and definitive management, and where not performing

EDX studies would likely be detrimental because of delayed diagnosis and therefore, delayed treatment. These are relatively uncommon and include symptoms such as generalized weakness, respiratory insufficiency suspected to be due to a neuromuscular condition, gait dysfunction, or bulbar dysfunction. Examples of such conditions include suspected Guillain-Barré Syndrome (GBS) or new onset myasthenia gravis (MG) (seronegative or while awaiting antibody results), since the management of these conditions would be appreciably altered by an accurate EDX diagnosis. In these situations, performing EDX studies is appropriate, while taking care to use the appropriate PPE and other infection control precautions per institutional guidelines.

Non-urgent EDX study requests are those that may be defined by the severity of the symptoms, the timeline of symptom evolution, or both. Delaying EDX testing would not be likely to cause harm. Mild, focal symptoms such as numbness in the fingers of one hand, very longstanding (months to years) of non-progressive or slowly progressive weakness or sensory symptoms or in situations in which the diagnosis is clinically relatively certain, and management can be instituted without immediate EDX testing, fall into this category. Examples include entrapment neuropathies (e.g. clinical carpal tunnel syndrome), typical chronic length-dependent polyneuropathy, clinical features strongly suggestive of an inherited condition such as myotonic dystrophy type 1, or for prognosis of Bell's palsy. In these situations, EDX studies should be postponed until the benefit of the testing outweighs risks due to the COVID-19 pandemic.

The most challenging category is the "possibly urgent" category, which requires review on a case-by-case basis. "Urgency" is dependent on many factors, including severity of deficits, rate of progression, level of pain, and whether a potentially treatable condition may be found. These referrals usually are for symptoms that evolve sub-acutely (over a few weeks to a few months). The role of the EDX testing in this scenario is often to confirm a clinical diagnosis before starting treatment, or to exclude treatable "mimics" that arise in the differential diagnosis of a disorder that does not have a specific treatment. There is overlap between this category and the "urgent" category. Some examples include suspected chronic inflammatory demyelinating polyneuropathy and other inflammatory peripheral neuropathies, inflammatory myopathies, or evaluation of potentially serious symptoms like respiratory insufficiency that are suspected to be due to a neuromuscular disorder. Referrals with a high clinical suspicion of amyotrophic lateral sclerosis (ALS) fall into this category, since waiting months for an EDX to help confirm the diagnosis could delay important medical and non-medical therapy and impact patients emotionally.

3.2 Inpatient EDX studies:

Inpatient EDX studies should only be performed in urgent situations, in patients with severe deficits, and in whom EDX testing is likely to appreciably alter management by establishing a diagnosis or leading to a specific treatment. Examples of these conditions are GBS, MG, or cauda equina syndrome. Inpatient EDX study requests for chronic conditions to expedite the work-up when the patient is admitted for some other clinical condition, or for confirmation of a clinical diagnosis that is fairly certain, and where the EDX study is unlikely to alter management, are best deferred at the present time. Examples include compressive neuropathies, radiculopathies due to degenerative disc disease or critical illness neuromyopathy. However, it should be noted that a recent report of GBS in association with COVID-19 highlights the usefulness of EDX studies in differentiating causes of acute weakness in a critically ill patient, including potentially treatable conditions.[8]

3.3 Equipment

It is good practice to be extra vigilant about hand and equipment cleaning during the pandemic period. Performing good hand hygiene, including proper hand washing and hand sanitizer use, limiting the amount of unnecessary equipment that is on the EDX machine or in the EMG laboratory, and disinfecting the EMG machine and laboratory in strict adherence to institutional policies are critical. In addition, maintaining physical distancing is very important even in the challenging situation of a clinical care setting. The number of people in the room should be limited to essential personnel. Personal protective equipment (PPE) as recommended in institutional guidelines should be used. The AANEM has recently developed a separate guidance document in this regard.[9]

4. Conclusions

In trying to limit the spread of SARS-CoV-2 infection and "flatten the curve" of the pandemic, clinicians must make difficult decisions about the urgency of EDX studies, and limit availability to patients in whom the test is absolutely essential to diagnose and appropriately treat serious neuromuscular disorders. The clinician must balance the risks and benefits of each EDX study, and ensure that appropriate precautions are taken. Having a test postponed or canceled is upsetting for patients and clinicians alike, and it helps to have all staff speak with a common message, reinforcing CDC guidelines, while empathizing with patient concerns.

Involving the referring clinician in the decision-making process is important for patient safety for many reasons. Firstly, the initial decision regarding the urgency for EDX studies may not be clear from the information provided on the referral. In this situation, a conversation with the referring clinician helps to clarify symptoms and clinical course, and evaluate potential clinical scenarios to make a decision. This also helps to allay the referring clinician's concerns that their patients will not be abandoned and that EDX studies will be available for those who need it. Secondly, the clinical scenarios provided here are not mutually exclusive or exhaustive. A patient's clinical presentation could evolve such that a referral that may have seemed non-urgent or possibly urgent develops into an urgent problem. Close follow-up is therefore essential. If the clinician performing the EDX testing has not previously evaluated the patient, the referring clinician is an excellent resource to "upregulate" the decision regarding the urgency of EDX in a timely manner. Finally, in selected cases, a virtual (telephone or video) consultation with the patient may assist decision making and reassure the patient.

A limitation of this document is that not all clinical scenarios can be reasonably captured. However, our goal is to provide broad recommendations to guide clinicians so that patients who require EDX studies continue to receive it in the safest possible manner. The COVID-19 pandemic is rapidly evolving and increasing infection rates may necessitate more stringent restrictions on EDX testing. In the interests of best serving patients and referring clinicians, electrodiagnostic medicine specialists should make all possible efforts to schedule patients for appropriate EDX testing as promptly as this can be safely accomplished once the pandemic subsides.

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Table 1: Categorization of Electrodiagnostic referrals by level of urgency

	Urgent	Non-urgent	Possibly urgent
Description	The clinical presentation is acute, there are significant or rapidly evolving neurological deficits over days to a few weeks, and the electrodiagnostic studies are believed to be necessary for immediate management.	The clinical presentation is chronic (months to years) or improving, there are mild symptoms/signs, or the electrodiagnostic studies are not required for diagnosis or management. Delaying the study is unlikely to result in patient harm.	The presentation may not be acute or severe, but progressive over several weeks to a few months, where a prolonged delay in the electrodiagnostic studies could lead to delayed diagnosis and/or treatment, and may result in poorer outcomes.
Possible action	Performing electrodiagnostic studies are appropriate in this situation. Use appropriate precautions as per local institutional guidelines. Must balance risks and benefits/impact of the study.	These electrodiagnostic studies should be postponed.	These electrodiagnostic studies should be triaged on a case-by- case basis, taking into account patient and institutional factors. Speaking directly to the referring physician and reviewing medical records may be necessary. A virtual visit with the patient may assist in decision making.
Examples (not exhaustive or complete)	A patient with rapidly progressive deficits (e.g. generalized weakness, respiratory failure and/or bulbar weakness), where the diagnosis is unclear. In this situation, the electrodiagnostic studies could confirm an unclear diagnosis and lead to specific management.	Mild, focal or regional pain, sensory symptoms or weakness; chronic , non-progressive or slowly progressive weakness or sensory symptoms; genetic or acquired disorders where the diagnosis is clinically apparent and electrodiagnostic studies would not alter immediate management.	Subacute progressive weakness, gait dysfunction, sensory symptoms, or respiratory insufficiency where the electrodiagnostic studies may distinguish mimics or identify potentially treatable diseases. There may be overlap between this category and the urgent category.
Clinical suspicion	Guillain-Barré syndrome; new onset myasthenia gravis where delays in obtaining antibody results are judged to be detrimental or dangerous (e.g., severe bulbar weakness, severe generalized weakness, Seronegative myasthenia); botulism	Carpal tunnel syndrome; radiculopathies; typical length-dependent polyneuropathy; genetically confirmed disorders (e.g. myotonic dystrophy, Charcot-Marie-Tooth disease); Bell's palsy for prognostication	Amyotrophic lateral sclerosis (if clinically unclear and need to exclude treatable conditions); inflammatory neuropathies (e.g. chronic inflammatory demyelinating polyneuropathy, mononeuropathy multiplex); plexopathies/ radiculoplexoneuropathies;; Inflammatory myopathies