Weakness Scenario:
A 47-year-old male has come to the emergency room in with weakness. (Although most patients will give more details about weakness, such as location, pattern, and duration, this information is not provided here to be able to apply the clinical mind map more fully)
Using the Epi-logical approach, what should be the probable diagnoses?
Since the clinician does not have much information, all the differentials on the mind map should be considered, with the exception of inherited conditions, such as metabolic dysfunction, Limb Girdle, Becker because of the patient's age. Conditions such as CVA [acronym] (infarction and hemorrhage) are also rare in this young age group.
How should a clinician address urgent/emergent situations?
The patient's BP is 155/85, HR 87, T 98 F and O2sat 98%, his BMI is 23, he appears to be in mild distress, but he is mentally alert. Looking at the patient, his face seems symmetrical, speech coherent, and the clinician has not examined his arms yet. The patient did not walk into the ER, instead, his friends had to help him in a wheelchair. Based upon this, the clinician is dealing with an urgent/emergent situation and must take quick action. The top differentials would be CVA (hemorrhagic more than infarction, due to relatively high blood pressure), spinal cord lesions, GBS, first attack of MS (although less likely due to his gender), and acute toxicity (substances which cause generalized muscle involvement organophosphate). Additional diagnoses which are not necessarily acutely life-threatening, but which can lead to lower extremity paralysis and the inability to walk (such as ALS and polymyositis), are also to be considered. When asked about the location, duration, and pattern of his weakness, the patient just says that he has been feeling weak for a while, and could still do his activities, but today he is feeling particularly bad. The patient seems comfortable, but he is tearful.

Weighing and Removing Anchor Bias:

The Clinician's Questions	**The Patient's Responses**	**How does this information help with the weighing process?**
I am sorry to see that you have not been feeling well for a long time. Let me ask you a few questions.	OK	
Where exactly do you feel weak? In particular, what activities can you not do because of your weakness? Is it more difficult getting out of a bed or a chair, or to keep walking?	I can't walk. I stumble and often fall if I don't use a cane. This morning, I couldn't walk, even with my cane and a push walker. It is hard to get out of a chair, but it is even harder to continue walking. I feel that my legs can't support my weight.	The patient has weakness in his lower extremity. Several diagnoses such as (going clockwise on the map) MS, spinal cord lesion, ALS, peripheral neuropathies, muscular dystrophies and myositis are likely. SOL is somewhat likely, but it is rare for an intracranial lesion to affect only bilateral lower extremities. Relatively acute lesions such as CVA,

		mononeuropathies, radiculopathies, and lesions with young onset of age, such as inherited metabolic/genetic disorders, drugs, and infections are less likely.
Do you mind telling me when did you first notice any weakness? Or when was the last time you felt normal as far as your strength is concerned?	I haven't felt normal since my daughter's graduation last May. (This was 8 months ago)	Chronic conditions are more likely, assuming the patient means being not normal in terms of lower extremity weakness
At this point, the clinician has determined that while dealing with an unfortunate situation, there is no urgent/emergent situation.		
So, normal was when you were able to walk independently or are there additional things as well?	I used to run half marathons with my wife and daughter, and the last I ran was a year ago.	Confirms motor weakness of bilateral lower extremities.
Do you feel that your weakness has been progressively worse over time, or it has fluctuated and at times gotten better and then worse again?	It has only gotten worse over the last 6 months. I haven't seen any good days.	MS is unlikely. The rest of the diagnoses under consideration so far are likely.
Do you have weakness in any other part of your body, such as arms, shoulders, hands, eating, swallowing, or speaking?	Sometimes I feel that my speech is slow, and I can't eat easily, but I am not sure. I don't have any weakness in my arms. I can use them fine.	Neutral.
How about any numbness or tingling in any part of your body?	I can feel everything ok.	ALS is more likely than others. Peripheral neuropathies and spinal cord lesions are less likely. There is no change in the likelihood of the other diagnoses.
Do you have any problems with memory, recall, or doing cognitive tasks which you were perhaps able to do before?	I don't think so. I am a real estate developer, and I still can do my work. I just can't go to work easily.	Of diagnoses under consideration, muscular dystrophies and myositis are more likely than ALS.
Do you notice any pain in your muscles or anywhere in your body?	I don't have any pain.	ALS is more likely than myositis. Muscular dystrophy is still likely, although it

		should have involved upper extremity proximal muscles as well in a prototypical case.
At this point, the clinician is strongly considering ALS, myopathies, and myositis, such as poly and dermatomyositis. The clinician should ask additional questions, review risk factors, and remove any anchor bias.		
So far, it looks like either a neurological or muscular condition is causing these problems. Although not as common in men as in women, progressive multiple sclerosis is a possibility as well. So, I need to know if you have had any weakness, vision loss, numbness, or any such problem prior to developing this weakness.	No. I have not had any other issues.	MS is unlikely.
May I ask why you did not seek any medical advice until now, or did you? And do you have any medical other conditions?	I have been busy with work and spend most of my time flying back and forth overseas. I thought it was a part of getting old because my father also developed neuropathy in his 50s. So, I thought I just had to deal with it. I have high blood pressure and take an ACE inhibitor for it.	Neutral. It is possible that this patient's father had a familial condition which he is not aware of.
How is your father doing now? Is he well? Are there other medical conditions that run in the family?	He passed away from lung cancer a few years ago. My mom is alive and healthy, and no other problems.	The patient's father might have had paraneoplastic features of lung cancer (although it is a long shot)
Sorry to hear that. Did he smoke? Do you smoke or drink? At what age did he develop lung cancer?	He smoked really heavy until he got cancer at age 68, and he was also exposed to asbestos. I never smoked, and I really didn't live with him. So, I don't think I am at risk. I drink socially.	Lung cancer is not very likely.
The clinician has sufficient evidence to continue considering ALS and myositis. The physical exam will provide additional information.		
Neuromuscular exam	Alert, oriented X 3. Cranial nerves intact 2-12. Bilateral lower extremity weakness more pronounced in distal 2/5	ALS is most likely.

	than proximal groups of muscles 3/5. Muscular atrophy around shoulders. No fasiculations/fibrillations. Tone and Reflexes decreased in bilateral lower extremities. Sensory exam normal. No cerebellar ataxia. No muscular tenderness or rash.	

The clinician has a clinical diagnosis of ALS. Imaging in the form of an MRI can be ordered, although it does not confirm the diagnosis, but it can rule out other diagnoses. An EMG provides evidence for weakness, and a muscle biopsy can rule out inflammatory myositis. DTI (diffuse tensor imaging) of the brain has emerged as a diagnostic tool for ALS. Genetic testing can also be performed to look for potentially helpful treatments.