Evidence-based work up and management of non-specific neck pain in the emergency department

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Abstract

Neck pain has become a commonly encountered complaint in the emergency department and primary care office. A large proportion of the population, ranging from a fifth (⅕) to a third (⅓) of the total, will experience non-specific neck pain in their lifetime. Because of the difficulty to quickly parse out the differential and the severity of several of these diagnoses, it is imperative for physicians in the emergency department to establish a systematic and effective approach for evaluating nonspecific neck pain. This article will present a standardized case of a patient presenting with nonspecific neck pain, critically analyze current evidence and guidelines from major ruling bodies in internal medicine, neurology, neurosurgery, and radiology, examine major statements released by the Choosing Wisely Campaign and the American College of Radiology, and propose a new diagnostic decision tree for the management of nonspecific neck pain.

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Introduction

Roughly a fifth (⅕) to a third (⅓) of the population will experience non-specific neck pain in their lifetime.[1,2] Neck pain can quickly progress into a debilitating presence for many individuals and has become a commonly encountered complaint in the emergency department and primary care office.[1-3] Management of nonspecific neck pain in the emergency setting can often be challenging because of the wide range of potential diagnosis and their significance in becoming a life-threatening outcome for patients. Therefore, it is imperative for physicians in the emergency department to establish a systematic and effective approach for evaluating nonspecific neck pain.

Patients with non-specific neck pain frequently receive imaging studies as part of the initial work-up to narrow down the differential diagnosis. However, in the rush to obtain imaging results, the financial costs and contraindications to the patient are often neglected in the clinical decision-making process of utilizing imaging modalities. The potential systemic harm to the patient and added costs of medical treatment through imaging studies run counterintuitive to providing value-based care.[4] Physicians maintain a duty to strike a balance between the diagnostic benefits, financial burdens, and emotional needs of patients. Thus, physicians should strive to intentionally act toward the benefit of the patient throughout the clinical decision-making process.[4] This article will present a standardized case of a patient presenting with nonspecific neck pain, critically analyze current evidence and guidelines from major ruling bodies in internal medicine, neurology, neurosurgery, and radiology, examine major statements released by the Choosing Wisely Campaign and the American College of Radiology, and propose a new diagnostic decision tree for the management of nonspecific neck pain.

Generic neck pain case presentation

This particular hypothetical case presentation is based on a

number of factors present in a typical non-specific neck pain patient who presents to the emergency department.[5] The different portions here demonstrate what a proper history and physical examination might include from a neurological, neurosurgical, and internal medicine work up of a patient with non-specific back pain.[5] This patient will be utilized later in the document as an example of the utility of the diagnostic table and decision tree.

Hypothetical standardized non-specific neck pain patient case presentation

Patient is a 45-year-old right-handed Caucasian female with no pertinent past medical history who presents to the emergency department for worsening non-specific neck pain. She states that the pain began upon waking roughly two days ago and has been getting worse since it started. She can recall no specific inciting incidents or sick contacts. She states that for the last week or so she has also been experiencing general malaise, some fatigue, and a slight headache, but cannot point to where the headache is. She states that the pain was worse when she shook her head, flexed her neck, or extended her neck, but that it improves when she rests (Figure 1). She states that nothing has helped the pain and that it is about a 5/10. When asked why she came to the ER today she states that she has come in before because of her migraine headaches and was hoping that the team might be able to help with this different headache also.

On physical examination the patient demonstrates limited range of motion with passive flexion and limited active range of motion. She states that it hurts which is why she is not moving her head all the way "up". Her Kernig and Brudzinski signs (see Figures 2 and 3) are both negative. The remainder of the physical examination is within normal limits.

Non-specific neck pain differential for the emergency department

The differential for non-specific neck pain is quite broad and encompasses a number of different diagnoses ranging from the incredibly benign-like musculoskeletal complaints to more severe cases such as meningitis and encephalitis. When working up the major cause of the non-specific neck pain complaint, the first and most important of the recommended steps is to take a full history and physical to rule out severe trauma or infection. The history encompassing all pertinent causative portions, a complete review of systems, and a full physical examination with attention to detail on the neurological examination can provide a wealth of information.

The history

When an expert clinician takes the history, they can easily begin to identify any major "red flag" symptoms, necessitating emergent further work up.[6] The, aforementioned red flag symptoms include: anticoagulant use, immunocompromised state (chronic liver disease, chronic kidney disease, or medically induced immunosuppression), symptoms of spinal cord compression (saddle anesthesia, urinary or bowel incontinence or retention, perineal sensory loss, or anal sphincter laxity), minor trauma in older patients (>50 years of age), history of recent intravenous drug use, major trauma in children or young adults, rheumatologic disease, history of cancer, any systemic symptoms (fever, rigors, or weight loss), and finally severe or progressive neurological deficits.[6] Because of the serious and life-threatening nature of meningitis, encephalitis, spinal abscess, and other spinal pathologies which become more likely in these clinical condition, if the patient falls within one of the aforementioned bio-pathophysiological categories as listed above, further evaluation with imaging is recommended.[6] Notabene, there is currently no consensus on which of these red flags states have the most utility in identifying serious spinal pathology. Thus, it is the authorial team's highest recommendation to use the medical history, physical examination, and the patient's social determinants of health when making diagnostic decisions.

The differential of non-specific neck pain

Non-specific neck pain is defined as pain with an underlying

Figure 2. Kernig Sign is demonstrated above in which the patient's leg is lifted and there is resistance and/or pain with this passive extension of the knee joint.

Figure 3. Brudzinski's sign is demonstrated above in which severe neck stiffness secondary to inflammation or infection causes a patient's hips and knees to flex when the neck is flexed.

postural or mechanical basis. It excludes fibromyalgia or pain that is specifically stated following sudden injury to the neck (*i.e.* whiplash). In general, non-specific neck pain can be split into three major categories: musculoskeletal pain (the vast majority), referred pain, and neurological pain. These three can further be broken down into a number of other diagnoses (see Table 1) which are associated with a broad range of causative etiologies and treatments. While the vast majority of the different diseases are benign and self-resolving within a few days, about 10% of cases become intractable and progress into chronic neck pain and can occur with radiculopathy or myelopathy. Chronic neck pain, often discussed in the context of spondylosis, has a mechanical and degenerative basis.

To test or not to test: The ESR and CRP laboratory tests

One of the other areas of importance in the work up and treatment of non-specific neck pain in a patient presenting to the emergency department is the question of providing laboratory testing to the patient. The mainstays being ESR and CRP. Both of these tests are not highly sensitive or specific for any particular disease state but do raise the specter of inflammatory processes which could necessitate imaging studies.[11-14] In those patients who present to the Emergency Department with Musculoskeletal sounding pain, it is key that certain risk factors such as age and history of cancer be taken into consideration. If these are found to be pertinent for that specific patient, then ordering the ESR or CRP is indicated.

One other caveat of importance is the realization that ESR and CRP should not be ordered together because both tests aim to measure the same base underlying issue – inflammation. According to some estimates, if concurrent ordering was eliminated, this would save a singular hospital in the United States $250,000 to $400,000 without changing the current management of patients.[14] Therefore, when ordering a test to screen whether a patient is in need of plain film radiographs, the team recommends that the provider order only the ESR or CRP – Whichever is cheaper for the patient at the provider's specific center.

Choosing wisely campaign

Choosing Wisely is a national organization focused on reducing unnecessary testing within clinical decision making. The use of any imaging modality, without findings of aforementioned red flag, is strongly discouraged. When it comes to assessing acute neck injury, they dissuade the use of imaging modalities on the cervical spine following trauma in an awake and alert patient.[11,12] Instead, the use of clinical decision-making tools that incorporate 3 or more variables from history taking, physical examination, or simple clinical tests should be considered prior to the use of any imaging. Choosing Wisely also advises against the use of Electromyography (EMG) after a high-velocity traumatic injury unless signs of pain, tingling, weakness, or numbness in arm or leg are present. If a pinched nerve is suspected, dermatomal Somatosensory-Evoked Potentials (SEP) should be avoided as it has not yielded accurate results. Instead, a Nerve Conduction Study (NCS) with EMG should be used to assess potential nerve damage. A NCS without EMG often leads to the wrong diagnosis secondary to the lack of clinical contextual information surrounding the NCS.[11,12]

American college radiology appropriateness criteria for cervical neck pain

Another resource of recommendations from another ruling body within the field of radiology is the American College Radiology (ACR) Appropriateness Criteria.[13] This guide contains consensus thought process from a number of radiologists and includes information for making imaging study decisions based on the appropriateness of the diagnosis under consideration.[13] According to the ACR appropriateness criteria for cervical neck pain that is non-traumatic and does not demonstrate "red flag" symptoms, Radiographs are deemed to be "Usually Appropriate", with the vast majority of other testing that is often performed as first line being deemed to be "Usually Not Appropriate".[13] This guide, while not prescriptive provides guidance to the clinician on the go to ensure that they are properly making decisions based on scientific consensus. Through employing this guideline, providers enhance the overall quality of care and ensure that the patient receives the most efficacious use of radiological testing.

Table 1. Types of Non-specific neck pain and recommended imaging, laboratory testing, or therapy.

Major group	Common etiologies	Imaging, laboratory testing, or therapy
Musculoskeletal pain[7] (common)	Neck strain, occupational injury, sport injury, spine fracture	No imaging within the first six weeks. Provide NSAID therapy. After six weeks consider X-ray imaging. (May consider ESR and/or CRP if the patient is older than 50 and there is history of cancer or neurological complaints, if elevated then plain film X-rays are indicated before a six week waiting period.)
Meningitis or encephalitis[7] (common)	Viral, bacteria, fungal infection	CT or MRI coupled with lumbar puncture. Treatment with antibiotic, antiviral, and/or antifungal agents.
Neurological pain[8] (rare)	Infection, cervical myelopathy, or radiculopathy (degenerative disc diseases, herniated disc, rheumatoid arthritis, osteoarthritis, tumor stenosis)	CT or MRI. Short course of Corticosteroids for degenerative diseases. Surgical decompression for cancer or intractable degenerative disc disease.
Referred pain (rare)[9,10]	Secondary hyperalgesia: underlying gastrointestinal, biliary, renal, hepatic, heart, and pulmonary disorders	Diagnosis based on history, no imaging required, symptomatic treatment or treatment of underlying disease.

Clinical decision making

Since many of these conditions can be hard to differentiate and the need for quick logical decisions to be made, the team has created a novel diagnostic decision tree based on the information currently available. As a reminder, the goal of the use of these charts are not to replace clinical gestalt, but instead to provide a new schema to ensure that the best thought processes can be utilized to minimize unnecessary imaging while improving the value ("bang for buck") that can be provided to the patient - the heart of Value-Based Care.[4] Included here is the novel diagnostic tree for the benefit of the readership (Figure 4).

Based on the diagnostic tree, the hypothetical case presents with signs and symptoms worrisome for the development of meningitis. As a result, this patient needs emergent imaging utilizing either CT or MRI. However, this decision would have been different if there were no signs of acute infection. If the patient had presented with musculoskeletal pain sounding symptoms instead, appropriate treatment would have indicated the use of 6 weeks of NSAIDs to block the pain and allow for normal ambulation while the patient healed from the actual injury.

Pearls of treatment

For those suffering from musculoskeletal injury, there are several mainstays of treatment which can and should be utilized simultaneously for coverage of pain. These treatments include the use of Non-steroidal Anti-inflammatory Drugs or NSAIDs, acetaminophen, lidocaine patches 5% (see Figure 5), heat or cold compresses, and home exercises which can be taught by outpatient physical therapy referrals. Much of the time, when these approach-

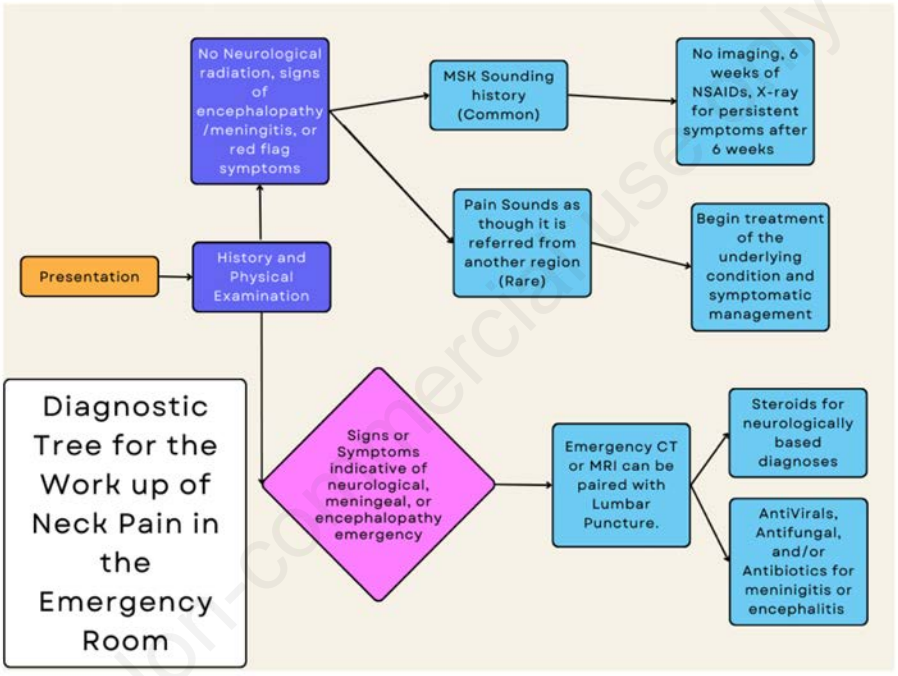

Figure 4. Included here is a novel diagnostic tree based on the information collected from several references in the diagnostic work up and imaging of non-specific neck pain.7-12 CT - Computerized Tomography, MRI - Magnetic Resonance Imaging.

Figure 5. This image demonstrates some of the pharmacotherapies available for the treatment of non-specific neck pain from left to right, lidocaine patches, ibuprofen tablets, and acetaminophen tablets.

es are utilized in tandem, they work to decrease the overall burden of pain for the patient and provide them enough room to heal with time.

Of note, one key reminder to experienced clinicians and trainees alike - NSAIDS in and of themselves are not curative or treatments per say. Instead, the mechanism of this particular drug blocks the major creation of prostaglandins which signal pain to the body. This is beneficial to the patient as it prevents gait abnormalities and other changes in biomechanics which can exacerbate outcomes as they heal from the acute musculoskeletal injury.

Other methods for improving the patient's pain syndrome associated with acute musculoskeletal injury include massage, acupuncture, myofascial therapies, and cognitive behavioral therapy. Most importantly, and often the most missed key therapeutic step is the reminder from the clinician that the patient needs to remain physically active so as to not further worsen the overall clinical condition. Through simple deconditioning, musculoskeletal injuries can become worsened. Therefore, it is important to stress the importance of avoiding bed rest and encourage the patient to continue maintaining an active lifestyle.

Clinical pearls for the emergency department

When working up patients suffering from acute neck pain, one of the best methods for both increasing patient adherence to treatment modality which also improves their levels of trust with the provider is the use of sitting down in the exam room and performing a full history and physical examination. While it may appear that these steps can take up large swathes of time, the actual time sink into this key step, when performed efficiently can take as little as 15 to 20 minutes. Through demonstrations of care with the patient, the therapeutic rapport can quickly and easily be built to such an extent that the patient will be willing to be compliant with the treatment plan. This leads to better outcomes for the patient and a decreased chance of the patient re-presenting to the emergency room for the same problem. Finally, this type of action is patient centered care by definition, as by spending the time with the patient and demonstrating concern for their needs, the patient is likely to experience better outcomes than just by imaging the patient blindly.

Secondarily, educating the patient on the rationale of the treatment plan from the physician and care team improves both the trust in the team and the patient's planned care. This can be bolstered through the use of patient-centered documents such as educational pamphlets on the subject of neck pain which can also include acute worsening symptoms for which the patient will need to follow up for further care. Once again, this action is patient-centered in nature, and improves the patient's overall outcomes. While there is a need for rapid diagnostics in the emergency department, the hope is that through the use of improved quality in history gathering, focused physical examination skills, and time specifically with the patient, the diagnostic tests ordered will improve in value, leading to overall better patient outcomes.

Conclusions

Neck pain can quickly progress into a debilitating presence for many individuals and management of nonspecific neck pain in the emergency setting can often be challenging because of the wide range of potential diagnosis and their significance in becoming a life-threatening outcome for patients. Concerns for meningitis and encephalitis require immediate imaging workup and LP. Otherwise, symptom and pain control remain the best line of management.

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