Diagnostic Screening and Clinical Reasoning in Physical Therapy

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References


• Physical therapist as a PRIMARY CARE provider
• Primary care
  – The provision of integrated, accessible health care services by clinicians who are accountable for addressing a large majority of personal health care needs, developing a sustained partnership with patients, and practicing within the context of family and community.
  – A level of health service delivery that serves as the foundation of any health care system and provides both the initial and the majority of health care services for a person or population.
American Physical Therapy Association’s
Version 2020

• Central tenet: DIRECT ACCESS
  – Physical therapist serves as the point of entry into the health care system
  – Physical therapists must be able to engage in the Diagnostic Process as part of their overall evaluation, in order to develop a well-reasoned intervention plan for addressing the patient’s problem.
Reasons for diagnostic screening

- Direct access
- Quicker and sicker patient/client base
- Signed prescription
- Medical specialization
- Disease progression
- Patient/client disclosure
- Client does not report symptoms to the physician
- Presence of one or more yellow (caution) or red (warning) flag

◆ PT needs to determine whether the client is an appropriate candidate for PT or not
However........

• Is there a need for PT to function as a primary care provider?
• Does PT have an appropriate level of knowledge and skill in screening and managing patients in the primary care setting?
• What are the potential benefits and risks of this practice model?
Common PT referral script

- Primary care physician’s diagnosis
  - Right shoulder pain
  - Left knee pain
  - Low back pain

- A typical medical doctor’s referral to PT
  - PT Evaluation and Treat

- Neuromusculoskeletal complaints account for 35% of visit to primary care provider

- Most primary care residents reported low confidence and preparation in evaluating and managing neuromusculoskeletal conditions
Diagnostic ability and accuracy of PT


Clinical diagnostic accuracy and magnetic resonance imaging of patients referred by physical therapists, orthopaedic surgeons, and nonorthopaedic providers.

Moore JH1, Goss DL, Baxter RE, DeBerardino TM, Mansfield LT, Fellows DW, Taylor DG.

Abstract

STUDY DESIGN: Nonexperimental, retrospective design.

OBJECTIVES: This study was designed to compare clinical diagnostic accuracy (CDA) between physical therapists (PTs), orthopaedic surgeons (OSs), and nonorthopaedic providers (NOPs) at Keller Army Community Hospital on patients with musculoskeletal injuries (MSI) referred for magnetic resonance imaging (MRI).

BACKGROUND: US Army PTs are frequently the first credentialed providers privileged to examine and diagnose patients with musculoskeletal injuries. Physical therapists assigned at Keller Army Community Hospital have also been credentialed with privileges to order MRI studies for several years.

METHODS AND MEASURES: To reduce provider bias, a retrospective analysis was performed on 560 patients referred for MRI over an 18-month period. An electronic review of each patient's radiological profile was performed to assess agreement between clinical diagnosis and MRI findings. Data analyses were performed through descriptive statistics and contingency tables.

RESULTS: Analysis on agreement between clinical diagnosis and MRI findings produced a CDA of 74.5% (108/145) for PTs, 80.8% (139/172) for OSs, and 35.4% (86/243) for NOPs. There was a significant difference in CDA between PTs and NOPs (P<.001), and between OSs and NOPs (P<.001). There was no difference in CDA between PTs and OSs (P>.05).

CONCLUSIONS: Clinical diagnostic accuracy by PTs and OSs on patients with musculoskeletal injuries was significantly greater than for NOPs, with no difference noted between PTs and OSs.
Benefits of PT direct access

- Reduction in waiting time
- Lower financial costs
- Reduction of health service cost
- Better patient satisfaction
- Reduction of pressure on outpatient clinics and primary care physicians

- PT can also play a role in preventive care of musculoskeletal wellness
Risks of PT direct access

• Missed significant re/yellow flags of systemic diseases
• Delay medical management or diagnosis of medically urgent cases, such as fracture, internal bleeding, cancer, deep vein thrombosis, spinal cord compression........
Essential knowledge and skills for a PT in a primary care setting

• Medical screening to identify medical red or yellow flags
• Advanced knowledge and skills
• Imaging
• Pharmacology
• .............
Direct Access to Physical Therapy Services Is Safe in a University Student Health Center Setting.

Mintken PE, Pascoe SC, Barsch AK, Cleland JA.

Abstract

OBJECTIVES: The purpose of this retrospective descriptive study was to determine if direct access to physical therapy (PT) in a university health center placed patients at risk for adverse events.

BACKGROUND: Direct access to PT is underutilized, even though it has been reported to reduce medical costs; however, there is a paucity of evidence on the clinical risks related to this practice.

METHODS: The University of Colorado at Boulder instituted a direct access musculoskeletal injury clinic in 2000. A retrospective analysis was performed on patient visits to Wardenburg Student Health Center from January 1, 2001 to December 31, 2011. Descriptive statistics were analyzed for the number of new patients examined with and without a referral, documented patient adverse events, and any disciplinary or legal action against a physical therapist.

RESULTS: During the 10-year data collection period, 12,976 patients accessed PT without a referral. There were no reported unidentified cases of serious medical pathology or adverse events and none of the PTs had their credentials or licenses modified or revoked for disciplinary action.

CONCLUSIONS: Patients managed through direct access are at minimal to no risk for negligent care when evaluated and treated by PTs in a university student health center setting.
Models of clinical reasoning

**DIAGNOSIS**
Both the process and the end result of evaluating examination data, which the physical therapist organizes into defined clusters, syndromes, or categories to help determine the prognosis (including the plan of care) and the most appropriate intervention strategies.

**PROGNOSIS**
(Including Plan of Care)
Determination of the level of optimal improvement that may be attained through intervention and the amount of time required to reach that level. The plan of care specifies the interventions to be used and their timing and frequency.

**EVALUATION**
A dynamic process in which the physical therapist makes clinical judgments based on data gathered during the examination. This process also may identify possible problems that require consultation with or referral to another provider.

**EXAMINATION**
The process of obtaining a history, performing a systems review, and selecting and administering tests and measures to gather data about the patient/client. The initial examination is a comprehensive screening and specific testing process that leads to a diagnostic classification. The examination process also may identify possible problems that require consultation with or referral to another provider.

**OUTCOMES**
Results of patient/client management, which include the impact of physical therapy interventions in the following domains: pathology/pathophysiology (disease, disorder, or condition); impairments, functional limitations, and disabilities; risk reduction/prevention; health, wellness, and fitness; societal resources; and patient/client satisfaction.

**INTERVENTION**
Purposeful and skilled interaction of the physical therapist with the patient/client and, if appropriate, with other individuals involved in care of the patient/client, using various physical therapy procedures and techniques to produce changes in the condition that are consistent with the diagnosis and prognosis. The physical therapist conducts a reexamination to determine changes in patient/client status and to modify or redirect intervention. The decision to reexamine may be based on new clinical findings or on lack of patient/client progress. The process of reexamination also may identify the need for consultation with or referral to another provider.
Some clinical cases

• A 58-yr gentleman with chief complaint of left shoulder pain
• A 19-yr girl with chief complaint of posterior calf pain
• A 68-yr gentleman under shortwave treatment
Modification to the CMM

Purpose of medical screening

• Practice according to the diagnostic evidence
• PT needs to determine whether the client is an appropriate candidate for PT or not
  – IF YES--- TREAT
  – IF NO---- REFER to primary care physician or other professionals
  – Third option--- TREAT and REFER
• What are we looking for during medical screening
• Red Flag
  – Warning signs that suggest PT referral may not be warranted
  – Serious medical diseases may present as a special complaint
Constitutional symptoms

- Fever
- Diaphoresis (unexplained perspiration)
- Sweats (can occur anytime night or day)
- Nausea
- Vomiting
- Diarrhea
- Pallor
- Dizziness/syncope (fainting)
- Fatigue
- Weight loss
Special concerns

- A nonspecific diagnosis from a referring physician
- Changes in symptoms
- Unusual pain patterns
- Night pain that is felt as a deep ache and not affected by positional change
- Unrelenting pain/migratory pains
- Nonanatomical distribution of pains
- Recent unintended weight loss
- Genitourinary problems
- Rapid onset of limited coordination, impaired special senses, or other neurological signs
Special concerns

• **Acute changes**
  – With increased body temperature
  – Sudden weakness
  – Suddenly inability to bear weight

• **Signs of ischemia**
  – Decreased pulses in the extremities
  – Smooth, shiny skin
  – Loss of hair over extremities

• **Sensory changes**
  – Paresthesia
  – Sensory loss
  – Radiation pain
Immediate medical attention

- Angina not relieved in 20 min with NTG; angina at rest; angina has nausea, vomiting, profuse sweating
- Palpable pulsating abdominal mass
- Incontinence
- Anaphylactic shock
- Symptoms of inadequate ventilation or CO₂ retention
- Diabetes appears confused or lethargic or changes in mental function
- Positive McBurney’s point or rebound tenderness
- Sudden worsening of intermittent claudication
- Changes in size, shape, tenderness, and consistency of lymph nodes
A clinical case

• A patient has
  – Left shoulder pain
  – Cough
  – Paresthesia in the left hand
  – A constricted pupil in the left eye

What is likely cause?
It is a LONG list for possible diagnosis
How can we reduce the list?

• More information on history and symptoms will help to rule in and out potential diagnosis

• NEXT STEP will need
  – Medical screening to rule out red/yellow flags
  – Pain diagram
  – Find out what movement reproduced to relieves her symptoms
  – ....................
Goodman screening model
(system-based approach)

• Past medical history
• Personal and family history
• Risk factor assessment
• Clinical presentation
• Associated sign and symptoms of systemic diseases
• Aggravating/relieving factor
• Review of system
## Symptom-based approach

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Identify the patient’s chief concern.</th>
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</thead>
<tbody>
<tr>
<td>Step 2</td>
<td>Identify <em>barriers to communication</em>.</td>
</tr>
<tr>
<td>Step 3</td>
<td>Identify <em>special concerns</em>.</td>
</tr>
<tr>
<td>Step 4</td>
<td>Create a symptom timeline and sketch the anatomy (if needed).</td>
</tr>
<tr>
<td>Step 5</td>
<td>Create a diagnostic hypothesis list considering all possible forms of <em>remote</em> and <em>local</em> pathology that could cause the patient’s chief concern.</td>
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<tr>
<td>Step 6</td>
<td>Sort the diagnostic hypothesis list by epidemiology and specific case characteristics.</td>
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<tr>
<td>Step 7</td>
<td>Ask specific questions to rule specific conditions or pathological categories less likely.</td>
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<tr>
<td>Step 8</td>
<td>Re-sort the diagnostic hypothesis list based on the patient’s responses to specific questioning.</td>
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<tr>
<td>Step 9</td>
<td>Perform tests to differentiate among the remaining diagnostic hypotheses.</td>
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<tr>
<td>Step 10</td>
<td>Re-sort the diagnostic hypothesis list based on the patient’s responses to specific tests.</td>
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<tr>
<td>Step 11</td>
<td>Decide on a diagnostic impression.</td>
</tr>
<tr>
<td>Step 12</td>
<td>Determine the appropriate patient disposition.</td>
</tr>
</tbody>
</table>

Symptom timeline

Create a diagnostic hypothesis list

• May be variable and arbitrary
• A database of possible categories include:
  – Trauma
  – Inflammation
  – Metabolic
  – Vascular
  – Degenerative
  – Tumor
  – Congenital
  – Neurologic/psychologic
Trauma

• Rupture of a tendon or muscle
• Strain
• Sprain
• Fracture
• Dislocation
• Mechanical includes the obvious causes above but we have also included nerve entrapment and nerve instability
Inflammation

• Aseptic (noninfectious)
  – Autoimmune diseases
  – Reactive arthritis
  – Postsurgical capsulitis tendinitis when tendon inflammation is truly present

• Septic (infectious)
  – Acute
  – Chronic
Metabolic

- Diabetes, gout, hyperparathyroidism, endocrine disorders, and issues related to pregnancy
- Toxic
- Envenomation
- Ethanol-induced polyneuropathy
- Chronic drug use
- Pulmonary insufficiency causes
Vascular

• Cardiac
• Arterial
  – Ischemia, chronic insufficiency, avascular necrosis
  – Bleeding, hematoma
• Venous: thrombosis
• Lymphatic: lymphedema
Degenerative

• Tendinoses
• Arthroses

Tumor

• Malignant primary
• Malignant metastatic
• Benign
Congenital

• Congenital anomalies
• Developmental conditions, such as developmental dislocation of hip
• Hereditary diseases
Neurologic/Psychologic

• Neuroses and psychoses and malingering conditions such as amyotrophic lateral sclerosis or spinal muscular atrophy
Process of differential diagnosis

• Diagnosis is obtained after considering a number of competitive etiologies and progressively eliminating them
• Rational and intuitive skills
• The essence of cost-effective health care
• An orderly approach is necessary
  – Data acquisition, analysis with ranking of positive findings, construction of the diff dx, narrowing of diff dx by testing strategy
• After diagnosis, therapeutic intervention is designed and implemented
Case Study  (Beirman R, et al. 2012)

Mrs. Wang is a 55-yr-old accountant who complains of sternal pain and soreness which has been present for the past 7 days. The pain is a nagging ache that feels like a pressure over the front of her chest, on her "breast bone". The pain can get sharp at times and is will well localized; however, it can also radiate out from the sternum bilaterally. The pain severity on a VAS ranges from 6/10 to 9/10 at worst, following a waxing-waning type pattern. It is aggravated by certain movements, such as checking her blind-spot while driving, but particularly with deep inspiration and sneezing. Exertion does not affect the pain, and the pain is lessened by quiet breathing, decreasing trunk movement, or changing position. There is no neck or shoulder pain associated with it, nor any motor or sensory phenomenon. Mrs. Wang is not short of breath, but feels as if her breathing is inhibited due to the pain. She has noticed that the painful area is also tender to touch.

Mrs. Wang informs you that 8 days ago she moved house, and was involved in some of the removal and installation of her furniture. She did not feel any pain at the time, but 2 days later the chest wall pain began for no apparent reason and gradually worsened. It has remained constant since then, following its present pattern. She has never experienced this pain before. She does not have a recent history of a respiratory tract infection.
Mrs. Wang is an otherwise well and healthy individual, who does not smoke, eats a healthy diet and participates in regular exercise. She has never been involved in any accidents, and her only hospital visits were for the births of her two daughters, who were both now adults and do not live at home. Her past medical history is unremarkable. She currently sees a doctor every 3 months for moderate hypertension which was diagnosed 5 years ago, and for which she is prescribed Norten 100 mg and Karvezide 150 mg daily. Her most recent extensive medical checkup was 1 month ago; her blood test and ECG were as normal. There is nothing significant in the family history. A systems enquiry is unremarkable. She does not suffer SOB, swelling of the ankles, palpitations, dizziness or cough, and does not have a history of breast pain or breast cancer. She is not depressed, nor does she suffer from anxiety.
History indicates suspicion of ?

<table>
<thead>
<tr>
<th>Possible diagnosis</th>
<th>Factors supporting diagnosis</th>
<th>Factors not supporting diagnosis</th>
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<tbody>
<tr>
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<tr>
<td>Musculoskeletal</td>
<td>Exacerbation of pain with deep inspiration, sneezing and trunk movement</td>
<td>Chest pain</td>
</tr>
<tr>
<td></td>
<td>History of unaccustomed activity</td>
<td>Pain on deep inspiration</td>
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<tr>
<td></td>
<td>Tenderness over local sternal region</td>
<td>GERD can present as chest pain</td>
</tr>
<tr>
<td></td>
<td>Nature of pain; sharp with movement</td>
<td>Needs to be excluded</td>
</tr>
<tr>
<td>Cardiac</td>
<td>Must be ruled out</td>
<td>Needs to be excluded</td>
</tr>
<tr>
<td></td>
<td>Chest pain</td>
<td>Needs to be excluded</td>
</tr>
<tr>
<td></td>
<td>Pressure-like pain over sternum</td>
<td>Maybe minor trauma associated with unaccustomed activity</td>
</tr>
<tr>
<td></td>
<td>History of moderate hypertension</td>
<td>Possible</td>
</tr>
<tr>
<td>Herpes zoster</td>
<td>Maybe insidious</td>
<td>Chest is a common site</td>
</tr>
<tr>
<td></td>
<td>Pain precedes skin lesions</td>
<td></td>
</tr>
<tr>
<td>Possible diagnosis</td>
<td>Factors supporting diagnosis</td>
<td>Factors not supporting diagnosis</td>
</tr>
<tr>
<td>---------------------</td>
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<tr>
<td>Musculoskeletal</td>
<td>• Exacerbation of pain with deep inspiration, sneezing and trunk movement</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>• Nature of pain; sharp with movement</td>
<td></td>
</tr>
<tr>
<td>Cardiac</td>
<td>• Must be ruled out</td>
<td>• No other cardiac symptoms</td>
</tr>
<tr>
<td></td>
<td>• Chest pain</td>
<td>• Pain is local, and tender to touch</td>
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<tr>
<td></td>
<td>• Pressure-like pain over sternum</td>
<td>• Recent tests were normal</td>
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<tr>
<td></td>
<td>• History of moderate hypertension</td>
<td></td>
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<tr>
<td>Respiratory</td>
<td>• Chest pain</td>
<td>• No dyspnea or cough</td>
</tr>
<tr>
<td></td>
<td>• Pain on deep inspiration</td>
<td>• No recent history of URI</td>
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<tr>
<td>Gastrointestinal</td>
<td>• GERD can present as chest pain</td>
<td>• No previous history of GERD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Systems review unremarkable</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>Clinical Features</td>
<td>Relevant History</td>
</tr>
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<td>---------------</td>
<td>--------------------------------------------------------</td>
<td>------------------------------------------</td>
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<tr>
<td>Infection</td>
<td>• Needs to be excluded</td>
<td>• No fever</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• No other constitutional symptoms</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• No history of infection, recent URI</td>
</tr>
<tr>
<td>Neoplasm</td>
<td>• Needs to be excluded</td>
<td>• No constitutional symptoms</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• History of unaccustomed activity</td>
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<tr>
<td></td>
<td></td>
<td>• No previous history and currently well</td>
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<td></td>
<td></td>
<td>• No worsening or unremitting pain</td>
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<td></td>
<td></td>
<td>• Pain relieved by rest, change in position</td>
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<tr>
<td>Trauma</td>
<td>• Maybe minor trauma associated with unaccustomed activity</td>
<td>• No history of obvious trauma</td>
</tr>
<tr>
<td>Psychogenic</td>
<td>• Possible</td>
<td>• No previous or current history of anxiety</td>
</tr>
<tr>
<td>Herpes zoster</td>
<td>• Maybe insidious</td>
<td>• Usually unilateral</td>
</tr>
<tr>
<td></td>
<td>• Chest is a common site</td>
<td></td>
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<tr>
<td></td>
<td>• Pain precedes skin lesions</td>
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</tbody>
</table>
Physical examination

<table>
<thead>
<tr>
<th>Examination</th>
<th>Justification</th>
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</thead>
<tbody>
<tr>
<td>Inspection</td>
<td>General appearance, pale or sweating</td>
</tr>
<tr>
<td>Vitals</td>
<td>VP, HR, RR, temperature</td>
</tr>
<tr>
<td>CV system</td>
<td>Auscultation</td>
</tr>
<tr>
<td></td>
<td>Assess for friction rub</td>
</tr>
<tr>
<td>Chest wall</td>
<td>For localized tenderness, swelling or masses, herpes zoster,</td>
</tr>
<tr>
<td></td>
<td>cervical and thoracic spinal joint dysfunction</td>
</tr>
<tr>
<td>Respiratory</td>
<td>Auscultate for breath sounds and fremitus</td>
</tr>
<tr>
<td>system</td>
<td></td>
</tr>
<tr>
<td>PV system</td>
<td>For evidence of peripheral edema, peripheral pulse patency</td>
</tr>
</tbody>
</table>
### Physical Examination

<table>
<thead>
<tr>
<th>General</th>
<th>Mrs. Wang is a healthy looking woman of average height. She is a little overweight. She looks mildly uncomfortable but is able to move into the positions you request and can still converse appropriately. She is not pale or sweating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitals</td>
<td>Pulse rate 76  &lt;br&gt; Respiratory rate 18  &lt;br&gt; Blood pressure 130/88  &lt;br&gt; Height 163  &lt;br&gt; Weight 78  &lt;br&gt; BMI 29.3  &lt;br&gt; Temperature 37</td>
</tr>
<tr>
<td>Chest</td>
<td>● No redness or edema at costochondral joints  &lt;br&gt; ● No pus, exudate or rash present  &lt;br&gt; ● Heart sounds normal, no murmurs, no cardiomegaly  &lt;br&gt; ● Lung pericardial friction rub  &lt;br&gt; ● Lung fields clear, respiratory effort normal  &lt;br&gt; ● Significant tenderness to palpation bilaterally at ribs 4-6 over the costochondral junctions</td>
</tr>
</tbody>
</table>
Questions

• What information can you obtain from these findings? Can you narrow your differential diagnosis?

• Do you believe that Mrs. Wang needs to be referred to a medical practitioner for the investigation? Why or why not?
Investigations

- Plain film chest radiograph; no abnormality is noted, lung fields are clear, and there is no evidence of cardiac hypertrophy.
Questions

• What is the most likely diagnosis, based on these results? Justify your answer.
• Are any further investigations required?
• Explain the underlying pathophysiology of your diagnosis.
• What are the commonly accepted causes of this disorder?
• Describe the natural history of the disorder.
What is the most likely diagnosis

• The most likely diagnosis is costochondritis. Justification: palpatory findings along with strong clinical suspicion, in the absence of cardiac or respiratory findings, and in the absence of non-suppurative edema.
Explain the underlying pathophysiology

- Although unknown, the underlying physiological processes that lead to costcondritis are thought to be either tearing of the cartilage or inflammation; the inflammatory response in either scenario produces nociceptor stimulation and resultant pain presentation. All seven costchondral junctions may be affected by costchondritis, and in many cases more than one level is involved.
What are the commonly cause

- Although a large number of cases of costochondritis are idiopathic, some cases maybe due to overuse or repetitive strain activities, including aggressive exercise such as rowing, tennis and volleyball. Unaccustomed activities, such as moving heavy objects, may also lead to trauma at the costochondral joints; direct trauma can cause costochondral inflammation, and repetitive coughing due to preceding URI can also lead to this condition. Rarely, the patient who are intravenous drug users or who have recently had cardiothoracic surgery, bacterial or fungal infections may be possible causes.
Natural history of costochondritis

- Costochondritis is usually a self-limiting condition and is generally benign. The course may last from weeks to months and varies between individuals, however in most cases it resolves within 1 year. The patient may experience persistence of symptoms or may have a recurrent episode after the initial presentation.
Conclusions

• PT as a PRIMARY CARE provider who can provide both preventive/wellness care and regular care
• Medical screening is essential in PT practicing in DIRECT ACCESS environment
• Effective clinical decisions result from an orderly and strategic reasoning method
• Differential diagnosis can be as satisfying a feature of patient care as a favorable response to treatment