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DHA TELEHEALTH CLINICAL GUIDELINES

FOR VIRTUAL MANAGEMENT

OF CHEST PAIN – 45

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Health Policies and Standards Department
Health Regulation Sector (2021)

INTRODUCTION

Dubai Health Authority (DHA) is the responsible entity for regulating, licensing and monitoring health facilities and healthcare professionals in the Emirate of Dubai. The Health Regulation Sector (HRS) is an integral part of DHA and was founded to fulfil the following overarching strategic objectives:

Objective #1: Regulate the Health Sector and assure appropriate controls are in place for safe, effective and high-quality care.

Objective #2: Position Dubai as a global medical destination by introducing a value-based, comprehensive, integrated and high-quality service delivery system.

Objective #3: Direct resources to ensure happy, healthy and safe environment for Dubai population.

ACKNOWLEDGMENT

This document was developed for the Virtual Management of Chest Pain in collaboration with Subject Matter Experts. The Health Policy and Standards Department would like to acknowledge and thank these professionals for their dedication toward improving the quality and safety of healthcare services.

The Health Regulation Sector

Dubai Health Authority

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EXECUTIVE SUMMARY

Telehealth is based on Evidence Based Practice (EBP) which is the conscientious, explicit and judicious use of current best evidence in making decisions about the care of the individual patient.

It means integrating individual clinical expertise with the best available external clinical evidence and guidelines from systematic research

This guideline is presented in the format comprising of clinical history/symptoms, differential diagnosis, investigations and management. Identification of 'Red Flags' or serious conditions associated with the disease is an essential part of this telehealth guideline as it aids the physician to manage patients safely and appropriately by referrals to ER, family physicians or specialists for a face to face management.

DEFINITIONS/ABBREVIATIONS

Virtual Clinical Assessment: Is the evaluation of the patient's medical condition virtually via telephone or video call consultations, which may include one or more of the following: patient medical history, physical examination and diagnostic investigations.

Patient: The person who receives the healthcare services or the medical investigation or treatment provided by a DHA licensed healthcare professional.

ABBREVIATIONS

DHA	:	Dubai Health Authority
EBP	:	Evidence Based Practice
ER	:	Emergency Room
KPI	:	Key Performance Indicator

1. BACKGROUND

1.1. Introduction

1.1.1. Patients who call for teleconsultation with chest pain are a diagnostic challenge given the wide array of possible etiologies, including a potentially life-threatening condition. Studies have estimated that approximately one-third to one-half of these patients have musculoskeletal chest pain, 10 to 20% have gastrointestinal causes, 10% have stable angina, 5% have respiratory conditions, and approximately 2 to 4% have acute myocardial ischemia (including myocardial infarction).

2. SCOPE

2.1. Telehealth services in DHA licensed Health Facilities.

3. PURPOSE

3.1. To support the implementation of Telehealth services for patients with Chest Pain in Dubai Health Authority (DHA) licensed Health Facilities

4. APPLICABILITY

4.1. DHA licensed physicians and health facilities providing Telehealth services.

4.2. Exclusion for Telehealth services are as follows

4.2.1. Emergency cases where immediate intervention or referral is required.

4.2.2. Prescribe Narcotics, Controlled or Semi-Controlled medications.

5. HISTORY TAKING/SYMPTOMS

5.1. Taking detailed history of chest pain is very crucial and the following should be explored in more details:

5.1.1. Onset: Ask what the patient was doing. Also, whether the chest pain was abrupt and immediately severe or gradual with increasing severity? This is useful for cardiac markers as exertional pain suggests ischemia, aortic dissection, pneumothorax or pulmonary embolism. Gradual onset also suggests myocardial ischemia. Chest pain associated with pulmonary embolism can begin suddenly but may worsen over time. Nontraumatic pneumothorax most often occurs suddenly at rest, without any precipitating event. A history of forceful vomiting preceding symptoms in a toxic appearing patient raises concern for a ruptured esophagus and mediastinitis.

5.1.2. Site: A pain localized to a small area suggests pulmonary embolism or pleurisy whereas intrascapular or anterior chest pain is typical of aortic dissection. The classic location for acute coronary syndrome is substernal or in the left chest, and radiation to the arm, neck, jaw, back, abdomen, or shoulders may occur.

5.1.3. Character: Pleuritic character suggests PE, pneumothorax, or pneumonia. A sharp, tearing character could suggest aortic dissection. Burning pain

or a feeling of something stuck inside maybe suggestive of GERD especially if it is associated with meals. Patients often describe the symptoms of an acute coronary syndrome as discomfort rather than pain. The discomfort may be a pressure, heaviness, tightness, fullness, or squeezing. Ischemia is less likely if the discomfort is knifelike, sharp, pleuritic, or positional.

- 5.1.4. Radiation: Radiation to the neck, shoulder, arm(s) or jaw suggests myocardial ischemia. Radiation to the back, abdomen or legs suggests aortic dissection.
- 5.1.5. Severity: If chest pain increases over 5–10 minutes this is suggestive of MI.
- 5.1.6. Exacerbating factors: Activity, cold, or stress suggests myocardial ischemia. Inspiration or coughing suggests a pleuritic cause whereas movement or pressure suggests musculoskeletal.
- 5.1.7. Relieving factors: Exertional pain relieved by rest suggests angina, whereas relief from an upright position or leaning forwards is suggestive of pericarditis. Nitroglycerine (GTN) relief is non-specific.
- 5.1.8. Associated symptoms: Breathlessness, nausea, diaphoresis could suggest myocardial ischemia whereas a productive cough could suggest pneumonia and neurological signs could be important for aortic

dissection. Elderly patients with Acute Coronary Syndrome may only complain of symptoms other than chest pain, such as dyspnea, weakness, altered mental status, or syncope. Symptoms, such as diaphoresis and nausea, may also occur with non-ischemic chest pain, including aortic dissection, pulmonary embolus, acute heart failure, and esophageal spasm. Nausea and belching frequently accompany gastrointestinal causes of chest pain but can also occur in patients with inferior myocardial infarction. Fever raises concern for infectious causes, but is also associated with pericarditis, myocarditis, and rarely acute myocardial infarction.

5.1.9. Duration: If the pain lasts only for seconds or is unremitting for weeks, this is not typical for ischemic pain.

5.1.10. Trauma and Travel: A history of trauma may guide you towards musculoskeletal and a history of prolonged travel may be present in case of pulmonary embolism.

5.2. Ask the patient about prior diagnostic studies (eg, stress test or coronary CT angiography) for similar symptoms or prior procedures (eg, cardiac catheterization).

6. RISK FACTORS

6.1. Risk factors for ischemic heart diseases that should be explored (depending on the presenting history) include:

- 6.1.1. Tobacco use. Chewing tobacco, smoking and long-term exposure to secondhand smoke.
- 6.1.2. Diabetes
- 6.1.3. Hypertension
- 6.1.4. Hyperlipidemia
- 6.1.5. Older age. Men older than 45 and women older than 55 have a greater risk for cardiac disease than do younger adults.
- 6.1.6. Lack of exercise.
- 6.1.7. Obesity.
- 6.1.8. Stress.
- 6.1.9. Peripheral artery disease,
- 6.1.10. Family history of heart disease.
 - a. Refer to APPENDIX 1 for Family History-Based Estimate of Risk of Cardiovascular Disease.

7. VIRTUAL EXAMINATION/ASSESSMENT

- 7.1. Observation of the patient is very important. Patients with an immediately life-threatening cause for their chest pain tend to appear anxious and distressed and should be asked to call for ambulance immediately.
- 7.2. In addition, careful attention to the skin may reveal lesions (sometimes not mentioned by the patient) associated with specific musculoskeletal chest wall

syndromes, such as psoriasis, palmoplantar pustulosis, acne, hidradenitis suppurativa, or dissecting cellulitis of the scalp. Symptoms of conjunctivitis or uveitis, if present, are usually obvious to the patient and are also confirmed by virtual examination.

- 7.3. Virtual examination of Ribs and chest wall examination — the most important diagnostic feature in musculoskeletal chest wall syndromes is chest wall tenderness that consistently reproduces the patient's pain. This finding is generally considered diagnostic for a chest wall syndrome. Many chest wall syndromes are defined on the basis of the location of areas of tenderness. Therefore, a physician should instruct the patient how to palpate or press the focal area where the pain is.
- 7.4. Examination of the ribs and chest wall should also include an assessment for areas of localized swelling, such as the sternoclavicular joints and upper costochondral junctions. The articulations at either end of the clavicle (acromioclavicular and sternoclavicular joints) should then be palpated by the patient (based on the instruction given by the physician). Along the course of the sternum in the midline, tenderness may be found beside the sternalis muscle, the manubriosternal and xiphisternal joints, or the xiphoid process. In addition, tenderness should be sought at the costochondral junctions along both sides of the sternum and over the lower rib tips laterally. In the posterior thorax, costovertebral joint dysfunction may be

assessed by palpation over the areas just lateral to the vertebral bodies or over the affected rib.

- 7.5. In addition to direct palpation, patient can also be asked to lift and put his hands behind his/her head and to move laterally from side to side to reproduce chest wall pain.

8. DIFFERENTIAL DIAGNOSIS

8.1. Life threatening causes

8.1.1. Acute coronary syndrome – ACS results from atherosclerotic plaque rupture and thrombus formation via the adhesion, activation, and aggregation of platelets. Coronary blood flow is reduced, and myocardial ischemia occurs. The degree and duration of the oxygen supply-demand mismatch determines whether the patient develops reversible myocardial ischemia without injury (unstable angina) or myocardial ischemia with injury (myocardial infarction).

8.1.2. Aortic dissection – Aortic dissection is rare but may be a surgical emergency. Patients with acute aortic dissection typically present with acute chest and back pain that is severe and sharp and may have a ripping or tearing quality. It most commonly affects patients with systemic hypertension in their seventh decade of life, but it can affect younger

individuals, particularly those with known aortic valve or connective tissue abnormalities.

8.1.3. Pulmonary embolism – The most common symptoms of pulmonary embolism include dyspnea followed by pleuritic chest pain, cough, and symptoms of deep venous thrombosis.

8.1.4. Tension pneumothorax - Pneumothorax can occur following trauma or pulmonary procedures. It also occurs spontaneously in patients with underlying lung disease (secondary pneumothorax) and without (primary pneumothorax). Patients with primary spontaneous pneumothorax tend to be younger males who are tall and thin. Secondary spontaneous pneumothorax occurs with greatest frequency in patients with chronic obstructive pulmonary disease, cystic fibrosis, and asthma. Regardless of etiology, the accumulation of air in the pleural space can lead to tension pneumothorax with compression of the mediastinum, causing rapid clinical deterioration and death if unrecognized. Patients with spontaneous pneumothorax present with sudden onset of pleuritic chest pain and dyspnea. Evidence of labored breathing, or accessory muscle use suggest a sizeable pneumothorax. Hemodynamic compromise (eg. tachycardia, hypotension) is an ominous sign and suggests a tension pneumothorax and/or impending cardiopulmonary collapse.

8.1.5. Esophageal rupture/perforation – Spontaneous perforation of the esophagus (Boerhaave syndrome) caused by straining or vomiting presents as excruciating retrosternal chest pain.

8.1.6. Cardiac tamponade - Pericardial tamponade occurs when there is accumulation of pericardial fluid under pressure, leading to impaired cardiac filling. Tamponade covers a spectrum of clinical severity. Some patients have mild compromise, while others develop a severe compromise in cardiac filling, producing a picture resembling cardiogenic shock that requires emergent reduction in pericardial pressure by pericardiocentesis. Tamponade may occur with aortic dissection, after thoracic trauma, or as a consequence of acute pericarditis from infection, malignancy, uremia, or some other cause.

8.1.7. Sarcoidosis-related arrhythmias – Cardiac sarcoidosis can cause arrhythmias (including heart block and ventricular tachycardia) and sudden death, which may be heralded by chest pain, palpitations, syncope, or dizziness.

8.2. Cardiac causes

8.2.1. Stable myocardial ischemia — Angina pectoris, or angina, describes chest pain attributable to myocardial ischemia. It is considered stable when provoked by conditions associated with increased oxygen demand or

decreased oxygen supply, and unstable when it occurs without an obvious trigger.

8.2.2. Heart failure – Patients with acute decompensated heart failure may present with chest discomfort, usually along with progressive dyspnea, cough, fatigue, and peripheral edema.

8.2.3. Pericarditis/myopericarditis – Acute pericarditis refers to inflammation of the pericardial sac. Etiologies include infection, medications, autoimmune disorders, uremia, and malignancy.

8.2.4. Myocarditis – Acute myocarditis refers to inflammation of the cardiac muscle, due to infectious and noninfectious causes. Symptoms are similar to those of pericarditis.

8.2.5. Stress cardiomyopathy – Stress (takotsubo) cardiomyopathy is a syndrome characterized by transient regional systolic dysfunction of the left ventricle that often occurs in the setting of physical or emotional stress or critical illness.

8.3. Pulmonary causes

8.3.1. Pneumonia – Patients with pneumonia may have chest pain, which is often pleuritic. They also have fever and productive cough.

- 8.3.2. Malignancy – Patients with lung cancer may complain of chest pain, typically on the same side as the primary tumor. Other symptoms can include cough, hemoptysis, and dyspnea.
- 8.3.3. Asthma and COPD – Asthma and COPD exacerbations are often associated with chest tightness along with dyspnea. Triggers for exacerbation (eg: pneumonia) may also cause chest pain.
- 8.3.4. Pleuritis – Pleuritis is an inflammation of the lung pleura and causes pleuritic chest pain. Causes include autoimmune diseases (eg, systemic lupus erythematosus) and drugs (eg: procainamide, hydralazine, isoniazid).
- 8.3.5. Acute chest syndrome – Patients with sickle cell anemia may present with chest pain in the setting of acute chest syndrome. Other symptoms include fever, tachypnea, cough, and decreased oxygen saturation.
- 8.3.6. Pulmonary hypertension – Patients with pulmonary hypertension may have exertional chest pain in addition to exertional dyspnea and syncope.
- 8.4. Gastrointestinal causes
- 8.4.1. GERD – Chest pain due to GERD can mimic angina pectoris and may be described as squeezing or burning, located substernally and radiating to the back, neck, jaw, or arms. It can last minutes to hours and resolves

spontaneously or with antacids. It may occur after meals, awaken patients from sleep, and be exacerbated by emotional stress.

- 8.4.2. Peptic ulcer disease – Symptomatic peptic ulcers commonly present with epigastric pain or food-provoked epigastric discomfort and fullness, early satiety, and nausea.
- 8.4.3. Esophageal pain – Chest pain may have an esophageal origin (other than GERD), such as motility disorders, which may include spasm. Clues that suggest an esophageal etiology include persistent pain >1 hour, postprandial pain, lack of radiation, associated symptoms of heartburn or regurgitation, and pain relieved by antacids.
- 8.4.4. Esophagitis – Patients with medication-induced esophagitis may present with sudden-onset retrosternal chest pain in addition to odynophagia. Esophagitis may also be related to candidiasis, cytomegalovirus (as a complication of acquired immunodeficiency syndrome [AIDS]), or radiation injury.
- 8.4.5. Other – Hiatus hernias may cause chest pain in addition to reflux symptoms. Acute cholecystitis, biliary colic, and pancreatitis may have pain that involves the chest.

8.5. Musculoskeletal causes

8.5.1. Isolated musculoskeletal chest pain syndrome – Patients with isolated musculoskeletal chest pain syndromes have local or regional chest tenderness without other symptoms. The most common are costosternal (costochondritis) and lower rib pain syndromes.

a. Refer to APPENDIX 2 for the other types and characteristics of musculoskeletal chest pain.

8.5.2. Trauma – Patients can have a variety of injuries from trauma that cause musculoskeletal chest pain to rib fracture. Rib fractures are associated with pleuritic chest pain that is localized and reproducible with palpation. Patients often describe an associated injury, though some may occur without trauma (eg: osteoporosis).

8.5.3. Rheumatic diseases – Rheumatic diseases can be associated with musculoskeletal chest wall pain, but patients generally do not have isolated chest wall pain and have other symptoms of rheumatic disease.

8.5.4. Refer to APPENDIX 3 for rheumatic and systemic diseases associated with musculoskeletal chest wall pain.

8.6. Psychiatric causes

8.6.1. Panic attack/disorder – Panic attacks typically present with spontaneous, discrete episodes of intense fear that begin abruptly and last for several minutes to an hour. In panic disorder, patients experience recurrent panic attacks. Panic disorder may be present in 30% or more of patients with chest pain who have no or minimal coronary heart disease

8.6.2. Other – Other psychiatric causes of chest pain include depression, somatization, or factitious disorder.

8.7. Drug abuse cause

8.7.1. Cocaine – Myocardial ischemia is the most common cardiac condition associated with cocaine use and is usually due to coronary artery spasm. Other cardiac complications include aortic dissection, coronary artery aneurysm, myocarditis and cardiomyopathy, and arrhythmias.

8.7.2. Methamphetamine – Methamphetamine intoxication may mimic cocaine intoxication and cause similar cardiac complications

8.8. Other causes

8.8.1. Herpes zoster — Chest pain, especially in older adults, may be the presenting symptom of herpes zoster, preceding the characteristic rash

usually by 2 to three days. Dysesthesia is usually present in the affected dermatome. Postherpetic neuralgia may also cause chest pain.

- 8.8.2. Referred pain — Chest wall pain may be referred from painful disorders in visceral or somatic structures sharing the same spinal cord segments. The pain is perceived in the corresponding dermatomes and myotomes. For example, referred pain can come from abdominal organs, cervical disc disease, or from the ligaments, muscles, and periosteum of the cervical and thoracic spines.

9. RED FLAGS AND REFERRAL CRITERIA

- 9.1. Patients with the below suspected diagnoses or symptoms of life-threatening conditions should be referred to Emergency Department immediately:

- 9.1.1. Life-threatening conditions — Patients in whom there is concern for life-threatening condition should be referred to the emergency department by ambulance. These conditions include:

- a. Acute coronary syndrome – Patients with acute coronary syndrome (ACS) have anginal symptoms at rest, new-onset angina, or angina that is unpredictable or progressive (more frequent, longer in duration, or occurring with less exertion than previously). Women, individuals with diabetes, and younger adult patients may present

- without classic chest pain but have symptoms of dyspnea, weakness, nausea and vomiting, palpitations, or syncope.
- b. Aortic dissection – Is rare but may be a surgical emergency. Patients typically present with acute chest and back pain that is severe and sharp and may have a ripping or tearing quality. Pain can radiate anywhere in the chest or into the abdomen
 - c. Pulmonary embolism – The most common symptoms of pulmonary embolism include dyspnea followed by pleuritic chest pain, cough, and symptoms of deep venous thrombosis. Refer to APPENDIX 4 for risk factors that may predispose to thromboembolic disease.
 - d. Tension pneumothorax – Patients with spontaneous pneumothorax present with sudden onset of pleuritic chest pain and dyspnea. Evidence of labored breathing, or accessory muscle use suggest a sizeable pneumothorax. Hemodynamic compromise (eg, tachycardia, hypotension) is an ominous sign and suggests a tension pneumothorax and/or impending cardiopulmonary collapse.
 - e. Esophageal rupture, perforation – Spontaneous perforation of the esophagus (Boerhaave syndrome) caused by straining or vomiting presents as excruciating retrosternal chest pain.

- f. Cardiac tamponade –Symptoms are sudden in onset and include chest pain, tachypnea, and dyspnea. The jugular venous pressure is markedly elevated and may be associated with venous distension in the forehead and scalp.
- g. Sarcoidosis-related arrhythmias – Cardiac sarcoidosis can cause arrhythmias (including heart block and ventricular tachycardia) and sudden death, which may be heralded by chest pain, palpitations, syncope, or dizziness
- h. Hemodynamic instability which may suggests life-threatening condition and requires prompt transfer to the emergency department.

9.1.2. Non-life-threatening conditions:

- a. Pericarditis/myopericarditis –Key symptoms include sharp, pleuritic chest pain which is decreased by leaning forward from a seated position, and radiates to the trapezius ridge. There is often associated fever.
- b. Myocarditis –Symptoms are similar to those of pericarditis described above.
- c. Stress cardiomyopathy – Symptoms, including substernal chest pain, are similar to that of acute myocardial infarction.

- d. Pneumothorax – Typical symptoms include sudden onset of dyspnea and pleuritic chest pain, usually unilateral.
- e. Asthma and COPD – Asthma and COPD exacerbations are often associated with chest tightness along with dyspnea. Triggers for exacerbation (eg, pneumonia) may also cause chest pain.
- f. Acute chest syndrome – Patients with sickle cell anemia may present with chest pain in the setting of acute chest syndrome. These patients will also have an infiltrate on chest radiograph; other symptoms include fever, tachypnea, cough, and decreased oxygen saturation.
- g. Pulmonary hypertension – Patients with known or suspected pulmonary hypertension may have exertional chest pain in addition to exertional dyspnea and syncope.
- h. Patients with the following symptoms or history:
 - Clammy, unwell patient
 - Exertional chest pain
 - Heavy, tight, pressure type chest pain
 - Pain radiating to left arm, right shoulder or both arms
 - Chest pain association with nausea or vomiting
 - Family history of premature coronary artery disease

- Any chest pain which is suggestive of cardiac origin or Known history of previous coronary artery disease
- Severe chest pain, even if musculoskeletal-type of chest pain is suspected.

9.2. Indications for referral to a specialist such as a cardiologist, rheumatologist, physiatrist (physical medicine and rehabilitations specialist), or a pain management specialist, depending upon the specific condition or expertise required, include:

- 9.2.1. Exacerbation of stable angina
- 9.2.2. Presence of several risk factors or a strong family history
- 9.2.3. Patients asking for an early referral
- 9.2.4. Aortic valve disease – Symptoms of aortic stenosis include exertional angina, exertional dyspnea and decreased exercise tolerance, as well as exertional presyncope.
- 9.2.5. Mitral valve disease – Patients with mitral stenosis infrequently experience chest pain which resembles angina, due to pulmonary hypertension and right ventricular hypertrophy. Symptoms of mitral stenosis typically include slowly progressive exertional dyspnea.

- 9.2.6. Patients with mitral valve prolapse may have chest pain, but it is generally mild and not typical for angina.
- 9.2.7. Sarcoidosis – Chest pain is a common manifestation of pulmonary sarcoidosis, most commonly in association with cough and dyspnea.
- 9.2.8. Pneumonia – Patients with pneumonia may have chest pain, which is often pleuritic. They also have fever and productive cough.
- 9.2.9. Malignancy – Patients with lung cancer may complain of chest pain, typically on the same side as the primary tumor. Other symptoms can include cough, hemoptysis, and dyspnea.
- 9.2.10. Pleuritis – Pleuritis is an inflammation of the lung pleura and causes pleuritic chest pain. Associated systemic signs and symptoms of autoimmune disease include fever, rash, arthralgias, and constitutional symptoms
- 9.2.11. Herpes zoster — Chest pain, especially in older adults, may be the presenting symptom of herpes zoster, preceding the characteristic rash usually by two to three days. Dysesthesia is usually present in the affected dermatome. Postherpetic neuralgia may also cause chest pain.
- 9.2.12. Referred pain — Chest wall pain may be referred from painful disorders in visceral or somatic structures sharing the same spinal cord

segments. The pain is perceived in the corresponding dermatomes and myotomes. For example, referred pain can come from abdominal organs, cervical disc disease, or from the ligaments, muscles, and periosteum of the cervical and thoracic spines.

9.2.13. Persistent pain from posterior chest wall syndrome requiring intercostal nerve block or facet joint injection

9.2.14. Persistent pain from other isolated musculoskeletal conditions requiring local glucocorticoid injection

9.2.15. Lack of improvement after initiating therapy following teleconsultation

9.2.16. If concomitant psychiatric problems such as anxiety, depression, panic attacks, or abnormal health beliefs exist, psychiatric referral should be considered.

9.2.17. Uncertainty about the diagnosis

10. INVESTIGATIONS

10.1. If patient's chest pain is not thought to be due to musculoskeletal or GERD/Dyspepsia, then patient should be referred to hospital for further investigation and assessment.

10.2. However, investigations may be required for an apparent musculoskeletal chest wall syndrome and GERD/dyspepsia which are directed by the history and virtual

physical exam. Healthy patients with tender areas, but without swelling or other musculoskeletal or systemic findings, can be managed without any further laboratory studies.

10.3. Generally, in the young, healthy patient with pain of relatively short duration and with a normal general virtual physical examination, the likelihood of an underlying visceral or systemic illness is low; laboratory and radiographic evaluation is, therefore, unlikely to be fruitful in this setting.

10.4. However, investigations in patients with a suspected systemic process include: a complete set of blood studies (such as CBC, ESR, CRP, serum creatinine, and chest radiograph (CXR), ECG and ECHO are indicated depending on the clinical presentation. The white blood cell count and ESR/CRP may be elevated in any of the inflammatory or infectious etiologies of chest pain, such as pericarditis, mediastinitis, and pneumonia.

10.5. Refer to APPENDIX 5 for potential useful laboratory studies in musculoskeletal chest pain

11. MANAGEMENT

- 11.1. Refer to APPENDIX 6 for the Virtual Management of Chest Pain Algorithm.
- 11.2. The mainstay in the management of chest pain via teleconsultation is based on exclusion of the threatening causes. Once spinster cases are ruled, only the following causes of chest pain should be managed virtually following the Teleconsultation:
 - 11.2.1. Musculoskeletal chest pain, and
 - 11.2.2. Chest pain due to Gastroesophageal reflux (GERD) dyspepsia.
- 11.3. For management of GERD / dyspepsia, please refer to the Virtual Management of dyspepsia Guideline for detailed management of this condition.
- 11.4. Management of Musculoskeletal-related chest pain
 - 11.4.1. Non-pharmacological interventions

Initial management for most patients includes general nonpharmacologic interventions and the use of short-term analgesic medications (see section ‘pharmacological interventions’ below). Most isolated musculoskeletal pain improves over the course of a few weeks or months. Patients with symptoms lasting more than 3 months may also have a chronic widespread pain syndrome and should be referred to specialist for further assessment.

General measures for most patients — A few general measures may be helpful for most patients with isolated musculoskeletal chest pain, this includes:

- a. Education — All patients should receive education regarding the nature of their condition and the general management strategy. A common patient concern, stated or unstated, is that the pain is due to heart disease, and this concern must be addressed. Demonstration of the ability to reproduce or exacerbate the chest pain by palpation or with various maneuvers helps the patient understand the noncardiac nature of the problem. A careful explanation of the diagnosis and reassurance may be therapeutic for some patients. For them, watchful waiting without any other specific intervention may be appropriate.
- b. Activity restriction — Any activity that causes or reliably exacerbates the pain should be reduced and/or stopped, at least temporarily, if possible. As examples, overload and overuse, as during weight training, lifting, or pushing heavy objects, may cause musculoskeletal chest pain. Activity modification is particularly important for patients with spontaneous sternoclavicular subluxation

- c. Application of cold and heat — For isolated musculoskeletal chest pain, the application of cold or heat may be helpful. It is usually preferable the use of heat in patients with more muscle spasm, cold for patients experiencing localized swelling, and it is advisable to try the alternate modality if the first is not beneficial. This approach is based upon clinical experience and common practice, but this approach has not been established in randomized trials.
- Cold therapy – Cold may reduce swelling and discomfort. Crushed ice (covered, not directly applied) can be compressed against the injured area for up to 20 minutes followed by an exposure to room temperature for 1 to 2 hours; this treatment may be repeated every 2 to 2.5 hours and continued for 48 hours.
 - Heat therapy – Heat therapy increases blood flow and is thought to promote relaxation of tightened muscles. The usual recommendation is to avoid application of heat during the first 48 hours after an injury because of the potential to increase inflammation. Heat is applied with either a heating pad, hot compress, or chemical heat pack for 20 minutes, several times per day. Single-use, disposable heating pads or patches that can provide a source of heat for up to 8 hours are available without a

prescription; they can be applied to any part of the body. Thus, if local heat (eg, a heating pad) helps for 20 minutes at home, such pads or patches may provide benefit in other settings, such as at work, for a number of hours as well. Care should be taken to avoid thermal injury from excessive temperature or prolonged exposure time.

11.4.2. Pharmacological intervention

- a. Analgesia — Initial management usually includes analgesics as well. Although the efficacy and safety of the agents discussed below have not been specifically evaluated in patients with isolated musculoskeletal chest pain, they have been beneficial in treating musculoskeletal back and neck pain.
- b. Mild pain — For patients with mild isolated musculoskeletal chest pain, defined as pain that does not interfere with light activity, it is recommended the use of paracetamol or a nonsteroidal anti-inflammatory drug (NSAID) in a low to moderate dose, rather than non-pharmacologic or topical measures alone. In addition, patients may also add a topical pain therapy.
 - Comorbidities, patient preferences, and response to therapy influence the choice of agent. Although use of an oral analgesic

has the advantage of ease of use, some patients may have relative or absolute contraindications to such agents (eg, renal, gastrointestinal, or cardiovascular disease). In others, the combination of a systemic and local analgesic therapy together may be more effective.

- The following describes the general approach to pharmacotherapy:
- Paracetamol: In patients with mild pain, it is advisable to initially try paracetamol, given its safety; the magnitude of the patient's response is evident within a few doses. Paracetamol may provide adequate pain relief and is preferred for those who have a relative or absolute contraindication to the use of NSAIDs. The dosage of paracetamol is 500 mg to 1g every 4–6 hours to a max. of 4 g daily.
- Nonsteroidal anti-inflammatory drugs (NSAID) – In patients without an adequate response to paracetamol, or if pain is moderate, then NSAID is recommended if there is no contraindication. Examples include Ibuprofen, initially 300–400 mg 3– 4 times daily; increased if necessary to max. 2.4 g daily; maintenance dose of 0.6–1.2g daily.

- Topical – Topical analgesic and anti-inflammatory agents, applied as creams, gels, or patches, can be used for a trial period of up to 2 weeks to determine efficacy of a given agent, which should then be discontinued if it does not provide adequate relief of symptoms. The medication can be continued on an as-needed basis subsequently if it improves symptoms. Choice between agents is based upon patient preference and treatment response.

These include:

- Ibuprofen Gel, ibuprofen 5%. Dose apply topically up to 3 times daily.
- Ketoprofen Gel, ketoprofen 2.5%. Dose apply 2–4 times daily for up to 7 days (usual max. 15g daily)
- Capsaicin 0.025% Cream, apply sparingly 4 times daily (not more often than every 4 hours). It may need to be used for 1–2 weeks before pain is relieved.

11.5. Follow-up: Patients should be followed-up by within 2 to 4 weeks after the onset of pain to address patient concerns, assess effectiveness of initial therapy, and identify patients with persistent symptoms who may require treatment modification, referral for further evaluation, or additional treatment.

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2. Murphy, J. (2019). *What are the red flags for chest pain?* [online] BJFM. Available at: <https://www.bjfm.co.uk/blog/what-are-the-red-flags-for-chest-pain> [Accessed 21 Dec. 2019].
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APPENDICES

APPENDIX 1 – FAMILY HISTORY-BASED ESTIMATE OF RISK OF CARDIOVASCULAR DISEASE

Average risk	Moderate risk	High risk
<ul style="list-style-type: none"> • No known family history, OR • Only one second-degree relative (or more distantly related relative) affected 	<ul style="list-style-type: none"> • One first-degree relative with disease onset at an average age, OR • Two affected second-degree relatives on the same side of the family 	<ul style="list-style-type: none"> • Premature disease or unusual presentation in a first-degree relative, OR • Two or more first-degree relatives on the same side of the family affected, OR • Two or more second-degree relatives on the same side of the family affected, with at least one having premature disease onset, OR • Three or more affected on the same side of the family, OR • Moderate-risk status on both sides of the family

APPENDIX 2 – CHARACTERISTICS OF ISOLATED MUSCULOSKELETAL CHEST PAIN SYNDROMES

Disorder	Clinical manifestations
Muscle strains	Particularly of the intercostal muscles. Tenderness over the affected muscle is present, and increases with stretching the muscle (eg, taking a deep breath).
Costo-sternal syndromes (costochondritis)	Multiple areas of tenderness that reproduce the described pain, usually in the upper costal cartilages at the costochondral or costo-sternal junctions; there is no swelling.
Tietze syndrome	Painful, non-suppurative localized swelling of the costo-sternal, sternoclavicular, or costochondral joints, most often involving one joint in the area of the second and third ribs; rare, primarily affects young adults.
Sternalis syndrome	Localized tenderness over the body of the sternum or overlying sternalis muscle; palpation often causes radiation of pain bilaterally.
Xiphoidalgia	Localized discomfort over the sternum at the xiphoid process.
Spontaneous sternoclavicular subluxation	Most often occurs in the dominant side, associated with moderate to heavy repetitive tasks; almost exclusively occurs in middle-aged women.
Lower rib pain syndromes	Pain in the lower chest or upper abdomen with a tender spot on the costal margin; pain can be reproduced by pressing on the spot.
Posterior chest wall syndromes	May be caused by herniated thoracic disc, leading to band-like chest pain that may have a unilateral dermatomal distribution. Also induced by costovertebral joint dysfunction; tenderness over the affected area, worse with coughing or deep breathing.
Osteoarthritis of the sternoclavicular joint	Can cause focal pain of the sternoclavicular joint.

APPENDIX 3 - RHEUMATIC AND SYSTEMIC DISEASES ASSOCIATED WITH MUSCULOSKELETAL CHEST WALL PAIN

Disorder	Clinical characteristics
Fibromyalgia	Widespread pain with tenderness to palpation of the soft tissue in multiple anatomic regions, including the chest wall; fatigue, sleep disturbance, cognitive dysfunction; may have symptoms of depression and anxiety.
Rheumatoid arthritis	Up to one-fifth with sternoclavicular joint involvement; typically, without costochondral involvement; usually symmetric, inflammatory polyarthritis, affecting hands, wrists, feet, and other peripheral joints; extra-articular manifestations may occur.
Ankylosing spondylitis	Thoracic spine and chest wall pain from costovertebral, costotransverse, and thoracic apophyseal joint inflammation is common; usually low back pain and stiffness, buttock pain, and sacroiliitis; some have peripheral arthritis, enthesitis, dactylitis, and uveitis.
Psoriatic arthritis	Uncommon to rare anterior chest wall symptoms despite imaging evidence of manubriosternal and sternoclavicular joint disease in 10 to 25%; spondyloarthritis and inflammatory polyarthritis, nail diseases, enthesitis, and dactylitis may occur.
Sternocostoclavicular hyperostosis (SAPHO syndrome)	Arthritis of the anterior chest wall in the majority of patients, with sterile osteomyelitis; hyperostosis; palmoplantar pustulosis, acne, peripheral, and/or axial arthritis.
Systemic lupus erythematosus	Tenderness in muscles and joints of the chest wall that can mimic pleuritic pain; patients have multisystem autoimmune disease with arthritis, cutaneous manifestations, pleurisy, pericarditis, neurologic changes, and/or cytopenias; antinuclear antibodies.
Infectious arthritis	Most often affects the sternoclavicular joint, when present, but joints of chest wall and ribs are infrequent sites of bacterial arthritis.

Relapsing polychondritis	Up to 25% have inflammation of costochondral and manubriosternal regions, rarely with destructive changes; cartilage inflammation involves ears, nasal cartilage, respiratory tract; synovitis, ocular inflammation, inner ear dysfunction may occur.
Other systemic conditions	
Osteoporosis, osteomalacia	Low bone mass increases the risk of fracture, including fracture of the ribs; risk factors for osteoporosis include advanced age, glucocorticoids, chronic kidney injury, and others; osteomalacia may be associated with bone pain, muscle weakness, elevated alkaline phosphatase, and parathyroid hormone with decreased calcium and vitamin D.
Tumors (benign, malignant, metastatic and primary)	Primary neoplasms (eg, sarcoma or multiple myeloma) or secondary neoplasms (eg, lung or breast cancer) may very infrequently involve the ribs or soft tissues of the chest wall.
Sickle cell disease	Rib infarct, with resultant local pain, is a rare cause of acute chest pain syndrome in patients with sickle cell crisis.

APPENDIX 4 - RISK FACTORS OR CAUSES FOR THE DEVELOPMENT OF VENOUS THROMBOSIS

Inherited thrombophilia

Factor V Leiden mutation

Protein S deficiency

Protein C deficiency

Antithrombin deficiency

Other disorders and risk factors

Presence of a central venous catheter

Malignancy

Surgery, especially orthopedic

Trauma

Immobilization

Pregnancy

Oral contraceptives

Hormone replacement therapy

Certain cancer therapies (eg, tamoxifen, thalidomide, lenalidomide, asparaginase)

Heart failure

Congenital heart disease

Antiphospholipid syndrome

Older age (≥ 65 years)

Obesity

Severe liver disease

Myeloproliferative neoplasms

Polycythemia vera

Essential thrombocythemia

Paroxysmal nocturnal hemoglobinuria

Inflammatory bowel disease

Nephrotic syndrome

Myeloproliferative neoplasms

APPENDIX 5 - POTENTIAL USEFUL LABORATORY STUDIES IN MUSCULOSKELETAL CHEST PAIN

General	Rheumatologic
Complete blood count	Erythrocyte sedimentation rate (ESR), CRP
Liver enzymes	Rheumatoid factor (for true inflammatory joint disease)
Renal function tests	Sacroiliac radiographs with or without HLA-B27
Chest radiography	Chest wall
Electrocardiogram	Rib radiographs (Chest radiography)
Other cardiac studies	Sternoclavicular, manubriosternal joint radiographs

APPENDIX 6 -VIRTUAL MANAGEMENT OF CHEST PAIN ALGORITHM

