

# Triaging Capability of Large Language Model Chat GPT 4.1 Mini for Common Shoulder Pathologies

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**INTRODUCTION:** Within the field of orthopaedic surgery, ChatGPT usage has been analyzed for several different applications, demonstrating a wide range of effective to ineffective performance. To date, Chat GPT has yet to be assessed in its ability to generate a differential diagnosis when presented with triage questions and imaging related to common shoulder pathologies. We hypothesize that Chat GPT will fail to provide a sufficient differential compared to trained physicians when provided with triage questions and imaging.

**METHODS:** Ten triage stems were generated, discussing common complaints for individual shoulder pathologies. Additionally, imaging was selected for five of these triages. All stems were input as either triage alone, imaging alone (radiograph and magnetic resonance imaging), or triage with imaging into ChatGPT-4.1-2025-04-14 with instructions to generate a three-component differential diagnosis. Responses were graded for both accuracy and appropriateness by two fellowship-trained orthopaedic surgeons and one senior orthopaedic surgery resident. Accuracy was graded on a scale from 0-2: 0 = inaccurate, 1 = somewhat accurate, 2 = accurate. Appropriateness was similarly graded on a scale from 0-2: 0 = inappropriate, 1 = somewhat appropriate, 2 = appropriate.

**RESULTS SECTION:** Triage alone had a mean accuracy of 1.64 and mean appropriateness of 1.60. Isolated imaging had a mean accuracy of 0.33 and mean appropriateness of 0.27. When combined, the accuracy was 1.33 and appropriateness was 1.53. The top diagnosis provided by the grading surgeons appeared as either the first or second diagnosis for ChatGPT in 90% of triage scenarios and 100% of combined triage and imaging scenarios but only appeared in 20% of isolated imaging scenarios.

**DISCUSSION:** The primary finding of our study is that Chat GPT can generate a moderately accurate and appropriate differential when presented with triages on their own; however, Chat GPT consistently struggles to analyze imaging.

**SIGNIFICANCE/CLINICAL RELEVANCE:** In the context of clinical practice these findings highlight the importance of patient education and caution with utilizing Chat GPT to seek advice and knowledge related to various shoulder pathologies. The results of this study demonstrate that providers must be proactive in understanding the advantages and disadvantages of LLM use within clinical practice and exercise caution when discussing use with patients.

Table 1. Summary of Chat GPT's Response to Triages, Imaging, or both with Expert Grading for Accuracy and Appropriateness

Triage	Chat GPT Differential	Accuracy*	Appropriateness*
I have shoulder pain, and I hear crunching when I move my arm around.	RC Tendinopathy Osteoarthritis	1.33	1
My shoulder is tender to the touch and the pain spreads from my shoulder to the side of my arm when I move it.	Scapulothoracic Bursitis RC Tendinopathy Subacromial Bursitis	1.67	1.67
My shoulder has gotten progressively more painful, and I am having difficulty raising my arm.	Impingement Syndrome RC Tendinopathy Impingement Syndrome	1.67	1.67
I had surgery on my shoulder four weeks ago and now my shoulder is red, warm to the touch and I have a fever.	Adhesive Capsulitis Surgical Site Infection Deep Shoulder Joint Infection/Septic Arthritis	2	2
My shoulder is in a lot of pain and has a big bruise on it after I fell directly onto it.	Shoulder Contusion Clavicle Fracture	1.67	1.67
I have a sharp pain in my shoulder that moves toward my elbow and is accompanied with some numbness and tingling.	Shoulder Dislocation or AC Joint Separation Cervical Radiculopathy Brachial Plexus Injury/Thoracic Outlet Syndrome	1.33	0.67
I fell onto my shoulder while I was skiing and felt a pop.	RC Tear with Secondary Nerve Involvement AC Joint Separation RC Tear	1.67	1.67
I have pain and tenderness in the front of my shoulder that sometimes moves down my arm.	3 <sup>rd</sup> not Given Biceps Tendinitis RC Tendinopathy or Tear	1.67	1.67
My shoulder hurts, feels unstable, and has dislocated three different times.	Impingement Syndrome Recurrent Anterior Shoulder Instability Hill-Sachs Lesion	1.67	2
I have a lot of pain in my shoulder with so much stiffness in all directions that I can barely elevate my arm away from my body.	Multidirectional Instability Adhesive Capsulitis RC Tear	1.67	2
Imaging Type/Case	Chat GPT Differential	Accuracy*	Appropriateness*
Radiograph/Osteoarthritis	Anterior Shoulder Dislocation Hill-Sachs Lesion Possible Bankart Lesion or Glenoid Rim Fracture	0	0

Imaging Type and Triage	Chat GPT Differential	Accuracy*	Appropriateness*
Radiograph/Rotator Cuff Arthropathy	Posterior Shoulder Dislocation Reverse Hill-Sachs Lesion Potential Associated Rotator Cuff Injury or Soft Tissue Pathology	0	0
Radiograph/Proximal Humerus Fracture	Anterior Shoulder Dislocation with Associated Greater Tuberosity Fracture Hill-Sachs Lesion Bankart Lesion Full-Thickness RC Tear	0	0
MRI/Rotator Cuff Tear	Chronic RC Tear with Muscle Atrophy and Fatty Infiltration Subacromial/Subdeltoid Bursitis Massive RC Tear	1.67	1.33
Radiograph/MRI/Recurrent Anterior Shoulder Instability with Labral Tearing	RC Arthropathy	0	0
Imaging Type and Triage	Chat GPT Differential	Accuracy*	Appropriateness*
Radiograph	Pseudoparalysis of the Shoulder Glenohumeral Osteoarthritis		
I have shoulder pain, and I hear crunching when I move my arm around.	RC Arthropathy AC Joint Arthritis	1	1
Radiograph	RC Arthropathy		
My shoulder has gotten progressively more painful, and I am having difficulty raising my arm.	Massive RC Tear Glenohumeral Osteoarthritis	1.67	1.67
Radiograph	Proximal Humerus Fracture		
My shoulder is in a lot of pain and has a big bruise on it after I fell directly onto it.	Shoulder Contusion with Soft Tissue Swelling Possible Glenohumeral Subluxation or Malalignment RC Tear	1.67	1.67
MRI	Shoulder Dislocation	1	1.33
I fell onto my shoulder while I was skiing and felt a pop.	Labral Tear Anterior Shoulder Instability		
Radiograph and MRI	Anterior Shoulder Instability		
My shoulder hurts, feels unstable, and has dislocated three different times.	Hill-Sachs Lesion Anterior Labral Tear	1.33	2

RC = Rotator Cuff; AC = Acromioclavicular. \*Expressed as an average of scores from three reviewers. Accuracy is ranked on a scale from 0 to 2: 0 = inaccurate; 1 = somewhat accurate; 2 = accurate. Appropriateness is ranked on a scale from 0 to 2: 0 = inappropriate; 1 = somewhat appropriate; 2 = appropriate.