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REHABILITATION MEDICAL ACCESS PROGRAM: IMPROVING THE EFFICIENCY OF REFERRALS FOR ORTHOPAEDIC SURGERY

Major Raymond D. Trudel

JCSP 47

Service Paper

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By Major Raymond D. Trudel

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AIM

1. The impact of musculoskeletal injuries (MSKIs) on the health, employability, and deployability of Canadian armed forces (CAF) members is well known. Although timely access to care reduces the length of time off work and facilitates a return to duty, 59% of military members reported waiting too long for a specialist appointment.[1] With MSKIs accounting for 45% of sick parade visits[2] and 52% of military members reporting an acute or repetitive strain injury,[3] wait times for an orthopaedic surgeon must be minimized. One way to achieve that is to remove extraneous referrals or those unlikely to result in an orthopaedic intervention. This service paper aims to detail a framework for a collaborative program with physiotherapist-led triage for orthopaedic referrals. To understand this aim, the problems with the current referral process and how the civilian sector has attempted to address similar issues will be explored. Then, the framework of a CAF physiotherapy-led triage program for orthopaedic referrals will be detailed, and the results of a quality improvement strategy examining that framework will be discussed. Recommendations will be suggested supported by the data.

INTRODUCTION

2. The utilization of CAF medical facilities remains high, with 76% of Regular Force personnel seeking care in a CAF medical facility annually.[4] Without an ability to

[1] Francois Theriault, Karyn Gabler and Kiyuri Naicker, *Health and Lifestyle Information Survey of CanadianArmed Forces Personnel 2013/2014 – Regular Force Report.* (Ottawa, Canada: B.A. Strauss & J. Whitehead (Eds.),[2016]).

[2] Theriault, Gabler and Naicker, *Health and Lifestyle Information Survey of CanadianArmed Forces Personnel 2013/2014 – Regular Force Report.*

[3] Ibid

[4] Ibid

increase medical staffing, this represents a massive burden on the system. This burden is reflected in the wait times to see a primary health care provider for a routine, non-urgent health care problem, which is reported by the majority of CAF personnel to be more than two weeks.[5] This wait far exceeds that seen in the civilian sector, which reports an average wait time of two days to see their family physician for a similar appointment.[6] Even though medical utilization has remained consistent, MSKIs have increased in prevalence both in the military and civilian sectors.[7] This would cause an expected increase in referrals for all types of MSKI treatment, including for both physiotherapy and orthopaedic surgery. The increase in orthopedic surgery referrals is reflected by prolonged wait times where orthopaedics experiences the longest wait times of all specialties. In 2019, the wait for an initial appointment with an orthopaedic specialist was 14.6 weeks, an increase of 82% since 2018 or 173% since 1993.[8] These wait times have been identified as exceeding what is considered reasonable. It is suggested to find efficiencies or methods to reduce these wait times to a more realistic target.

3. One method to reduce wait times for an appointment with an orthopaedic surgeon is to decrease the number of referrals not resulting in an orthopaedic intervention, or that could be more appropriately managed by conservative therapy. This is shown in the literature where 70% to 78% of spinal pain issues,[9] 34% to 69% of knee and hip

[5] Theriault, Gabler and Naicker, *Health and Lifestyle Information Survey of CanadianArmed Forces Personnel 2013/2014 – Regular Force Report.*

[6] Bacchus Barua and Mackenzie Moir, *Waiting Your Turn: Wait Times for Health Care in Canada - 2019 Report*Fraser Institute,[2019]).

[7] Theriault, Gabler and Naicker, *Health and Lifestyle Information Survey of CanadianArmed Forces Personnel 2013/2014 – Regular Force Report.*; Justin J. Lang et al., "Global Burden of Disease Study Trends for Canada from 1990 to 2016," *CMAJ : Canadian Medical Association Journal = Journal De L'Association Medicale Canadienne* 190, no. 44 (2018), E1296-E1304. doi:10.1503/cmaj.180698.

[8] Barua and Moir, *Waiting Your Turn: Wait Times for Health Care in Canada - 2019 Report*

[9] Susan Robarts et al., "Evaluation of an Advanced-Practice Physiotherapist in Triaging Patients with Lumbar Spine Pain: Surgeon–physiotherapist Level of Agreement and Patient Satisfaction," *Canadian*

conditions,[10] and 53% of shoulder issues[11] were found to have equal or better results with conservative management than surgery. Additionally, it has been shown that without some form of triage, primary care referrals result in low surgical conversion rates (SCR) or the number of referrals that result in surgery. Specifically, without triage, the SCR was 30% for low back issues,[12] 22% for knee or shoulder conditions,[13] and 38% for chronic hip or knee pain.[14] Aside from not exhausting conservative therapy, inappropriate or missing diagnostic imaging is another factor that was considered as an unsuitable referral since the orthopaedic surgeon would have to complete the referral for imaging and not complete the assessment. It is expected that these numbers, both the wait times and the SCRs, would be similar in the military health care system as they are required to use provincial or territorial health care due to a lack of embedded specialists. Currently, primary care providers employed by the military refer directly to orthopaedic specialists. Although they realize that for the vast majority of MSKIs, active conservative therapy should be exhausted before referral to an orthopaedic surgeon, primary care providers do not have the time to verify if that has been completed. Instead, they rely on subjective

Journal of Surgery 60, no. 4 (Aug, 2017), 266-272. doi:10.1503/cjs.013416.; J. W. Heywood, "Specialist Physiotherapists in Orthopaedic Triage - the Results of A Military Spinal Triage Clinic," *Journal of the Royal Army Medical Corps* 151, no. 3 (Sep, 2005), 152-156. doi:10.1136/jramc-151-03-04.

[10] A. B. Aiken et al., "Easing the Burden for Joint Replacement Wait Times: The Role of the Expanded Practice Physiotherapist," *Healthcare Quarterly (Toronto, Ont.)* 11, no. 2 (2008), 62-66. doi:10.12927/hcq.2008.19618 [doi].

[11] Helen Razmjou et al., "Evaluation of an Advanced-Practice Physical Therapist in a Specialty Shoulder Clinic: Diagnostic Agreement and Effect on Wait Times," *Physiotherapy Canada* 65, no. 1 (2013), 46-55. doi:10.3138/ptc.2011-56.

[12] Brenna Bath, Stacey Lovo Grona and Bonnie Janzen, "A Spinal Triage Programme Delivered by Physiotherapists in Collaboration with Orthopaedic Surgeons," *Physiotherapy Canada* 64, no. 4 (2012), 356-366. doi:10.3138/ptc.2011-29.

[13] Christopher Napier et al., "A Physiotherapy Triage Service for Orthopaedic Surgery: An Effective Strategy for Reducing Wait Times," *Physiotherapy Canada* 65, no. 4 (2013), 358-363. doi:10.3138/ptc.2012-53.

[14] Dave Jovic et al., "Diagnosis and Management of Chronic Hip and Knee Pain in a Tasmanian Orthopaedic Clinic: A Study Assessing the Diagnostic and Treatment Planning Decisions of an Advanced Scope Physiotherapist," *Australian Journal of Primary Health* 25, no. 1 (Mar, 2019), 60-65. doi:10.1071/PY18076.

reports from the patient or refer early due to the prolonged wait to see the surgeon. These strategies further increase the delay for surgical appointments. Lengthy wait times have been shown to pose significant health risks for patients, such as deconditioning,[15] mental health issues,[16] reduced independence, increased time away from work and lower quality of life.[17]

DISCUSSION

4. The issues of excessive wait time for an appointment with an orthopaedic surgeon and extraneous referrals not resulting in orthopaedic intervention have been examined in the civilian sector. A solution that was explored was using a physiotherapist led triage for all orthopaedic referrals. Physiotherapists are adept at diagnosing MSK problems with diagnostic accuracy at par or greater than most other health care providers.[18] Research conducted on physiotherapy-led screening systems have demonstrated near-perfect agreement between the physiotherapist and orthopaedic surgeon, ranging from 74% to 92% when selecting either surgery or conservative management.[19] Examining the SCR from a physiotherapy-led triage also showed promising results with an average increase

[15] Elliot I. Layne et al., "Activities Performed and Treatments Conducted before Consultation with a Spine Surgeon: Are Patients and Clinicians Following Evidence-Based Clinical Practice Guidelines?" *The Spine Journal* 18, no. 4 (Apr, 2018), 614-619. doi:10.1016/j.spinee.2017.08.259.

[16] Tracey Carr et al., "Waiting for Surgery from the Patient Perspective," *Psychology Research and Behavior Management* 2 (2009), 107-119. doi:10.2147/PRBM.S7652.

[17] Tormod Landmark et al., "Chronic Pain: One Year Prevalence and Associated Characteristics (the HUNT Pain Study)," *Scandinavian Journal of Pain* 4, no. 4 (2013), 182-187. doi:10.1016/j.sjpain.2013.07.022.

[18] Josef H. Moore et al., "Clinical Diagnostic Accuracy and Magnetic Resonance Imaging of Patients Referred by Physical Therapists, Orthopaedic Surgeons, and Nonorthopaedic Providers," *The Journal of Orthopaedic and Sports Physical Therapy* 35, no. 2 (Feb, 2005), 67-71. doi:10.2519/jospt.2005.35.2.67.

[19] Aiken et al., "Easing the Burden for Joint Replacement Wait Times: The Role of the Expanded Practice Physiotherapist," , 62-66; Bath, Grona and Janzen, "A Spinal Triage Programme Delivered by Physiotherapists in Collaboration with Orthopaedic Surgeons," , 356-366; François Desmeules et al., "Validation of an Advanced Practice Physiotherapy Model of Care in an Orthopaedic Outpatient Clinic," *BMC Musculoskeletal Disorders* 14, no. 1 (May 8, 2013), 162. doi:10.1186/1471-2474-14-162.; Razmjou et al., "Evaluation of an Advanced-Practice Physical Therapist in a Specialty Shoulder Clinic: Diagnostic Agreement and Effect on Wait Times," , 46-55; Napier et al., "A Physiotherapy Triage Service for Orthopaedic Surgery: An Effective Strategy for Reducing Wait Times," , 358-363

of 55%, which means that a physiotherapist was able to identify 55 more patients, out of 100, who require surgery than the primary care clinicians.[20] This would result in fewer extraneous referrals, thereby decreasing the wait time to see the surgeon. While efficient, these triage systems require in-person assessment by physiotherapists. The military health care system employs a comprehensive electronic medical record (EMR), containing a military member's entire medical file, and could prove more efficient for screening, saving clinical time, than in-person assessments.

5. A collaborative quality improvement program was created to realize similar efficiencies in the military health care system, such as increasing the number of referrals resulting in orthopaedic intervention and decreasing wait times. This program, the Rehabilitation Medical Access Program for Orthopaedics (ReMAP (ortho)), was developed and implemented at the Canadian Forces Health Services Centre (Atlantic) in Halifax, Nova Scotia, in 2019 and utilized the EMR to complete the screening. Results from this program could build on the programs studied from the civilian sector.

6. The rationale for creating ReMAP (ortho) was due partly to long surgical wait times, which caused extended treatment periods in physiotherapy and occupational therapy. This led to prolonged periods where the patient had medical employment limitations delaying their return to full employability and deployability. The longer a person has medical employment limitations preventing them from completing their regular employment increases their risk of a medical release from the CAF.

[20] Bath, Grona and Janzen, "A Spinal Triage Programme Delivered by Physiotherapists in Collaboration with Orthopaedic Surgeons," , 356-366; Napier et al., "A Physiotherapy Triage Service for Orthopaedic Surgery: An Effective Strategy for Reducing Wait Times," , 358-363; Jovic et al., "Diagnosis and Management of Chronic Hip and Knee Pain in a Tasmanian Orthopaedic Clinic: A Study Assessing the Diagnostic and Treatment Planning Decisions of an Advanced Scope Physiotherapist," , 60-65

7. The primary purpose of screening in ReMAP (ortho) is not to select patients who would most benefit from surgery for their MSKI but rather select those who could benefit from conservative therapy or require specific diagnostic imaging before or instead of surgery. To that end, a screening tool was created by the Physical Rehabilitation section in collaboration with primary care clinicians and an orthopaedic specialist using recent evidence and clinical experience. The screening tool consists of: (1) inclusion and exclusion criteria for referrals, (2) conditions appropriate for a surgical consult, and (3) appropriate diagnostic imaging required for each condition before the consult. Training was provided to physiotherapists as the screeners. The inclusion and exclusion criteria and a referral algorithm were given to primary care clinicians to help select appropriate patients and ensure the proper diagnostic imaging was completed. The algorithm includes a table listing specific conditions suitable for a surgical consult with the necessary diagnostic imaging as identified by the surgeon. The inclusion and exclusion criteria,[21] referral algorithm,[22] and table of conditions[23] are included in Annex A, B, and C respectively. For patients referred to ReMAP (ortho) to be screened in to see the orthopaedic surgeon or identified as not requiring conservative therapy or diagnostic imaging, they must meet at least one of the inclusion criteria and none of the exclusion criteria.

8. Two quality improvement studies were completed to ensure the screening tool and the program as a whole are meeting their purpose. One examined the psychometric

[21] Mallory Pike et al., "Pilot Study: The Effectiveness of Physiotherapy-Led Screening for Patients Requiring an Orthopaedic Intervention," *Journal of Military, Veteran and Family Health*, no. 7.2 (Forthcoming May, 2021).

[22] Ibid

[23] Ibid

properties of the screening tool, and the other explored the program's effectiveness and if it had an important impact on the number of referrals considered surgically appropriate. The first study has been accepted for publication in May 2021, and the second study is being submitted for publication.

9. The two metrics examined for the screening tool were the interrater reliability, which is the tool's ability to produce similar results regardless of the rater, and the construct validity, which is the degree the tool can measure what it proposes to measure. For both parts of this study, the files of 41 patients were used.

a. Reliability: The patient files were randomly assigned to two physiotherapists for screening, and their recommendations were compared using percent agreement and the Fleiss' kappa. The reliability was found to have a moderate agreement (78%) and a kappa of 0.62.[24] These preliminary results exposed a flaw in the tool where the table with recommended diagnostic imaging was found not to be inclusive of all potential injuries. When the files with disagreement resulting from diagnostic imaging were removed, which decreased the number of cases to 33, the agreement increased to 94%, with a kappa of 0.88 representing a strong agreement.[25]

b. Validity: Forty-one patient files were screened by the physiotherapist to assess the validity. Additionally, all 41 patients also saw the orthopaedic surgeon regardless of the outcome of the screening. The recommendation of the surgeon was compared to the result of the physiotherapy triage. Results from

[24] Pike et al., "Pilot Study: The Effectiveness of Physiotherapy-Led Screening for Patients Requiring an Orthopaedic Intervention,"

[25] Ibid

both providers were either categorized as requiring orthopaedic intervention (encompassing surgery, injection, referral to another specialist, or specialized brace prescription) or conservative management (including physiotherapy, physiatry, diagnostic investigations, or other interventions.)[26] The comparison of outcomes allowed for calculating specificity, sensitivity, the positive predictive value (PPV), and the negative predictive value (NPV). Specificity is a measure of how well the tool meets its intended purpose. The ReMAP (ortho) screening tool was 88% specific, indicating it can correctly identify 88% of people who require conservative therapy or diagnostic imaging instead of surgery.[27] In this case, sensitivity suggests how well the tool identifies those who need surgery. The ReMAP (ortho) screening tool is 64% sensitive, meaning it may incorrectly identify 36% of people who require surgery.[28] While not ideal, the program has redundancy build into it for this reason. Those identified as not requiring surgery will instead receive either conservative therapy or diagnostic imaging. Once the imaging is complete, or they plateau with conservative management, they revert to the orthopaedic surgeon without rescreening. The PPV and NPV are similar to the metrics above but better indicate their usefulness in a clinical setting. The PPV was found to be 89% representing a high probability that those screened to the orthopaedic surgeon require surgery.[29] The NPV was found to be 61%

[26] Pike et al., "Pilot Study: The Effectiveness of Physiotherapy-Led Screening for Patients Requiring an Orthopaedic Intervention,"
[27] Ibid
[28] Ibid
[29] Ibid

representing a moderate probability that someone screened out does not require surgery.[30] A moderate NPV is acceptable in non-serious cases, as would be the situation for referrals seen in a military orthopaedic clinic.[31]

10. The orthopaedic intervention rate (ORI) and the SCR were used to examine the effectiveness of ReMAP (ortho). While the majority of the current literature focuses on the SCR, that is, referrals that result in surgery, it was determined that the OIR, including surgery, injections, or specialized brace prescription, encompasses the range of orthopaedic services that patients can be referred to and better reflects the utilization of the surgeon's time. This study was a retrospective design and compared the SCR and OIR between two groups referred to the orthopaedic surgeon. The first group was 119 patients referred in the seven months preceding the implementation of ReMAP (ortho) and were not screened by the physiotherapist. The second group was 102 patients referred in the eight months post-implementation of ReMAP (ortho) and therefore were screened by a physiotherapist.[32] The EMR of all patients were examined for the outcome of the appointment with the surgeon.

a. SCR: The implementation of ReMAP (ortho) resulted in a 13% increase in the SCR (from 30% in the pre-implementation group to 43% post-implementation.)[33] It is understood that even though there was a statistically significant increase in the SCR, it is still lower than those found in the

[30] Pike et al., "Pilot Study: The Effectiveness of Physiotherapy-Led Screening for Patients Requiring an Orthopaedic Intervention,"

[31] Robert Trevethan, "Sensitivity, Specificity, and Predictive Values: Foundations, Pliabilities, and Pitfalls in Research and Practice," *Frontiers in Public Health* 5 (Nov 20, 2017), 307. doi:10.3389/fpubh.2017.00307.

[32] Lucie Campagna-Wilson et al., "Improving the Referral Process for Orthopaedic Services– Results of the Rehabilitation Medicine Access Program (Orthopaedics)" Unpublished typescript 2021).

[33] Ibid

literature examining other physiotherapy-led triage. One possible explanation may be that the programs in the literature assessed for surgical applicability for only one or two MSK concerns, while ReMAP (ortho) includes any referrals to the surgeon. Therefore, the lower SCR may be due to the increased variability of conditions and the resulting increased latitude built into the tool. Another possible explanation is the difference in the mode of screening, in-person versus screening of the EMR. While using an EMR is more efficient, an in-person assessment allows for a more in-depth examination of those variables that may influence decision making.

b. OIR: The implementation of ReMAP (ortho) resulted in a 16% increase in the OIR (from 48% in the pre-implementation group to 64% post-implementation.)[34] This suggests that ReMAP (ortho) could help select patients for all orthopaedic interventions, better reflecting the reality in a military clinic.

11. One final metric collected to examine the effectiveness of ReMAP (ortho) was the wait time from receiving the referral from the primary care clinician to an appointment with the surgeon. Before implementation, the average wait to see the surgeon in Halifax was 140 days.[35] This wait decreased to an average of 26 days after the program was implemented.[36]

[34] Campagna-Wilson et al., "Improving the Referral Process for Orthopaedic Services– Results of the Rehabilitation Medicine Access Program (Orthopaedics)"

[35] Ibid

[36] Ibid

CONCLUSION

12. Implementation of a physiotherapy-led triage program for orthopaedic intervention has demonstrated effectiveness in reducing inappropriate referrals in the civilian sector and now in a military setting. ReMAP (ortho) utilizes a reliable and valid tool to screen the EMR of military members achieving greater efficiency by increasing the OIR of patients seen by the orthopaedic surgeon and decreasing wait time. Removing referrals that would benefit more from conservative therapy reduces the wait time to see the surgeon and decreases the required time on medical employment limitations or not completing full duties due to convalescence.

RECOMMENDATIONS

13. The Canadian Forces Health Services should support ReMAP (ortho) for national implementation. A point of contact should be appointed from both physiotherapy and primary care to maintain quality assurance, to aid with implementation into the clinics, and to address any concerns. Additionally, assigning a point of contact will allow for continued data collection to further strengthen the program.

14. Due to the flaw identified in para 9a, it is suggested to allow the table of conditions located in Annex C to be a living document. This will allow for amendment when conditions are found for which there is no suggested diagnostic imaging, or to change the imaging required based on surgeon preference.

Annexes:

A. Inclusion and exclusion criteria;

B. Referral algorithm; and

C. Table of specific conditions appropriate for surgical consult by the orthopaedic surgeon separated by body part.

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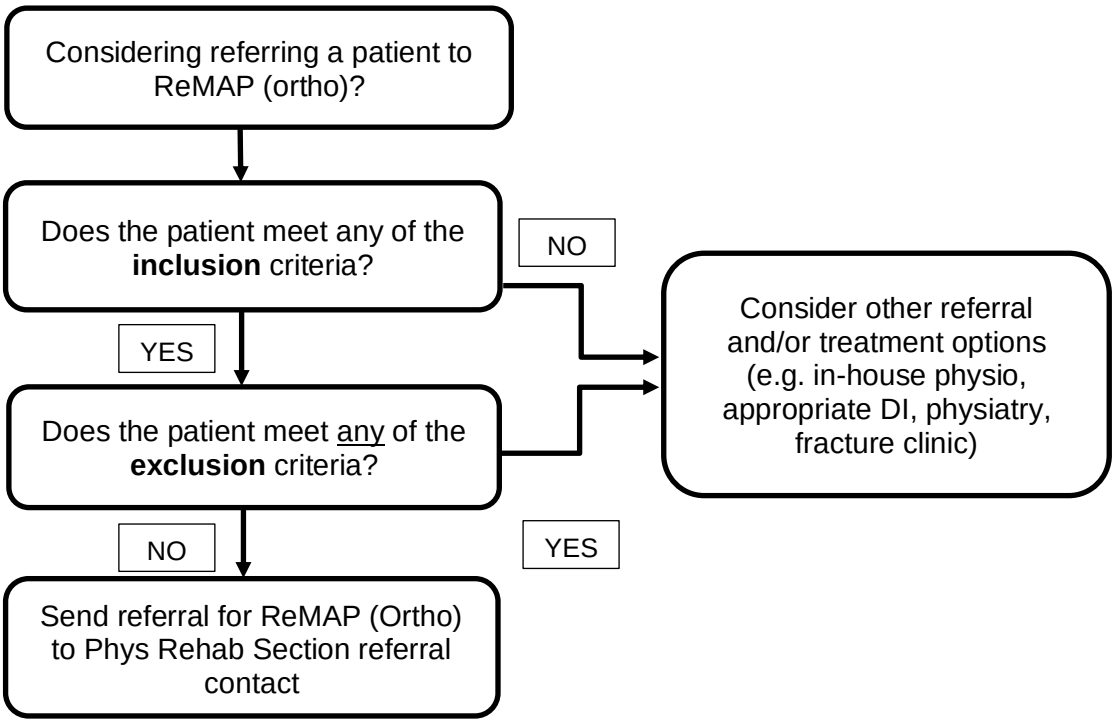
Annex A

Inclusion/Exclusion Criteria for Orthopedic Consult

<table>
<tr><th>Inclusion Criteria – Appropriate for Referral</th><th>Exclusion Criteria – Not Appropriate for Referral</th></tr>
<tr><td>Patient’s condition is not improving with rehabilitation, <u>including an appropriate active treatment protocol that the patient has been compliant with</u>; when treated by in-house Phys Rehab services in the past six (6) months;</td><td>Patient has not received appropriate diagnostic imaging (DI) - refer to Specific conditions appropriate for surgical consult by orthopaedic surgeon by body part (Appendix C) for specific imaging requirements;</td></tr>
<tr><td>Patient’s condition is listed in the Specific conditions appropriate for surgical consult by orthopaedic surgeon by body part (Appendix C);</td><td>Patient is being referred to fracture clinic. In this case the patient is not applicable for ReMAP and should be sent directly to the fracture clinic, no screening necessary;</td></tr>
<tr><td>Evidence of complete rupture of a structure;</td><td rowspan="2">Patient’s condition is more suited for an in-house Physiatry referral (e.g. requires procedures such as prolotherapy or corticosteroid injection).</td></tr>
<tr><td>Follow-up from previous consult (e.g. hardware removal, post-op follow up)</td></tr>
</table>

Annex B

Referral Algorithm



Annex C

Table of Specific Conditions Appropriate for Surgical Consult by the Orthopaedic Surgeon separated by Body Part

Shoulder	
Basic DI required: X-ray AP, axillary, and Y views	
Condition	**Additional Diagnostic Imaging Required.**
GH dislocation	
First dislocation for overhead athlete or patient with overhead work requirements	MRA required, if bone loss CT with 3D reconstruction required
Recurrent dislocation with prior repair	MRA required, if bone loss CT with 3D reconstruction required
Supraspinatus/general rotator cuff	
Calcific tendonitis, bursitis/tendonitis, chronic tendinopathy without significant change to recorded outcome measures with active rehabilitation protocol after 3-6 months, NSAIDs ± injection	
Acute injury, patient over 35 y/o and presence of mechanism of injury (urgent referral)	MRI required
Grade 1 or 2 tear with limited function and without significant change to recorded outcome measures with active rehabilitation protocol after 3-6 months	MRI required
Grade 3 tear	MRI required
OA	
Moderate to severe OA with limited ROM	
OA with adequate ROM but unresponsive to active rehabilitation protocol after 3-6 months, NSAIDs ± injection	
Other	
AC joint injury without significant change to recorded outcome measures with active rehabilitation protocol after 3-6 months, NSAIDs ± injection	X-ray AC joint view required
Labral tear without significant change to recorded outcome measures with active rehabilitation protocol after 3-6 months and NSAIDs	MRA required
Frozen shoulder: • In frozen and thawing phases without significant change to recorded outcome measures with active rehabilitation protocol after 3-6 months and NSAIDs	

• In freezing phase consider urgent referral for cortisone injection	
Elbow	
Basic DI required: X-ray AP, lateral, and oblique views	
Condition	**Additional Diagnostic Imaging Required.**
Tendinopathy or grade 1 or 2 tear without significant change to recorded outcome measures with active rehabilitation protocol after 3-6 months, NSAIDs ± injection	MRI required
Instability (dislocation or recurrent subluxation)	MRI required for recurrent injury
Loose body with limited function and ROM	
Olecranon bursitis or spur without significant change to recorded outcome measures with active rehabilitation protocol after 3-6 months and NSAIDs	
OA with limited function and ROM without significant change to recorded outcome measures with active rehabilitation protocol after 3-6 months and NSAIDs	
Wrist and Hand	
Basic DI required: X-ray AP, lateral, and oblique views	
Condition	**Additional Diagnostic Imaging Required.**
Scaphoid fracture not healing properly after 4 months	Scaphoid and fist views required
Tendinopathy or grade 1 or 2 tears (ECU, De Quervain) without significant change to recorded outcome measures with active rehabilitation protocol after 3-6 months and NSAIDs ± injection	
OA with limited function and ROM without significant change to recorded outcome measures with active rehabilitation protocol after 3-6 months and NSAIDs	
Conditions to refer directly to plastic surgeon	
Chronic carpal tunnel syndrome without significant change to recorded outcome measures with conservative management after 3 months	
Trigger finger affecting function	
Dupuytren's contracture affecting function	
Hip and pelvis	
Basic DI required: X-ray AP pelvis, frog leg, and Dunn views	
Condition	**Additional Diagnostic Imaging Required.**
Intraarticular: femoro-acetabular impingement (FAI) or labral tear without significant change to recorded outcome measures	MRA required

with active rehabilitation protocol after 3-6 months and NSAIDs	
Periarticular: • trochanteric bursitis, muscle strain, tendinopathy or grade 1 or 2 tendon tear (adductor, hamstring, RF, sartorius) without significant change to recorded outcome measures with active rehabilitation protocol after 3-6 months and NSAIDs • acute hamstring tear from ischium (urgent referral)	MRI required
SI joint injury without significant change to recorded outcome measures with active rehabilitation protocol after 3-6 months and NSAIDs	X-ray Lx spine and SI jt required no frog leg or Dunn views required
OA with limited function and ROM without significant change to recorded outcome measures with active rehabilitation protocol after 3-6 months and NSAIDs	no frog leg or Dunn views required
Knee	
Basic DI required: X-ray standing AP and lateral views	
Condition	**Additional Diagnostic Imaging Required.**
Tendinopathy or grade 1 or 2 tendon tear (patellar tendon, quadriceps, ITB) or PFS without significant change to recorded outcome measures with active rehabilitation protocol after 3-6 months and NSAIDs	X-ray skyline view required if PFS
Grade 1 or 2 ACL, PCL, LCL, MCL sprain or meniscus tear without significant change to recorded outcome measures with active rehabilitation protocol after 3-6 months and NSAIDs	MRI required
Grade 3 ACL, LCL, MCL sprain	MRI required
Acute meniscus tear causing knee locking, catching, spasm and/or major effusion (urgent referral)	MRI required (if possible)
Patella dislocation or recurrent subluxation without significant change to recorded outcome measures with active rehabilitation protocol after 3-6 months and NSAIDs	X-ray skyline view required
OA with limited function and ROM without significant change to recorded outcome measures with active rehabilitation protocol after 3-6 months and NSAIDs	X-ray flexed knee view required X-ray skyline view required if patellofemoral OA
Ankle and Foot	
Basic DI required: X-ray ankle AP, lateral, and oblique views	
Condition	**Additional Diagnostic Imaging Required.**
Tendinopathy or grade 1 or 2 tendon tear (tibialis posterior, tibialis anterior, peroneal tendons) without significant	

change to recorded outcome measures with active rehabilitation protocol after 3-6 months and NSAIDs	
Grade 3 tear of tendon or ligament with instability (ATFL, CFL, deltoid ligaments)	MRI required
OA with limited function and ROM without significant change to recorded outcome measures with active rehabilitation protocol after 3-6 months and NSAIDs	
Arch problems, Morton's neuroma, metatarsalgia without significant change to recorded outcome measures with active rehabilitation protocol after 3-6 months and NSAIDs	X-ray foot required
Bony deformity not managed by 3-6 month trial of orthotics	X-ray foot required
Spine - cervical and lumbar	
Basic DI required: X-ray AP, lateral, and oblique views	
Condition	**Additional Diagnostic Imaging Required.**
Pain and likely partial/full disc herniation with radiculopathy (including weakness and numbness)	MRI or CT required
Radiating pain to extremities without significant change to recorded outcome measures with active rehabilitation protocol after 3-6 months and NSAIDs	