Through its Intermountain Imaging Criteria Project, Intermountain Healthcare has developed a suite of standardized care process models (CPMs) for the use of advanced imaging procedures in eight priority clinical areas. These evidence-based guidelines are intended to be widely implemented to improve patient safety, improve outcomes, and reduce unnecessary medical spending for the Medicare population and the U.S. health system overall.

**Why Focus ON INTERMOUNTAIN IMAGING CRITERIA?**

Advanced imaging procedures, including MRI, CT, PET, and nuclear medicine, facilitate rapid and accurate detection and/or diagnosis of disease. The volume of advanced imaging procedures prescribed to patients in the U.S. increased three- to four-fold from 1996–2010 as the technologies became widely available.\(^{SMR}\) The inflating costs of advanced imaging outstripped that of any other medical service.\(^{SMR}\) These inflating costs resulted in up to $20–30 billion in unnecessary advanced imaging spending each year.\(^{SMR}\)

- **High cost.** Although the spending growth in advanced imaging dropped off after the early 2000s, 2014 costs to Medicare Part B for advanced imaging exceeded $2.4 billion for common conditions alone.\(^{LEV, CMS1}\)
- **Limited effectiveness.** Multiple studies suggest that up to a third of advanced imaging procedures fail to contribute to diagnosis or are clinically inappropriate.\(^{SMR}\)
- **Patient safety.** Advanced diagnostic imaging often exposes the patient to ionizing radiation and/or contrast media, posing additional medical risks that must be weighed against the potential benefits of the imaging procedure.
- **Overdiagnosis and overtreatment.** There is an unrecognized risk of overdiagnosis and subsequent overtreatment that carries associated risks (e.g., drug reactions or unnecessary surgical interventions) if advanced imaging is performed in patients with low pretest probability. The Intermountain Imaging Criteria approach seeks to avoid these risks.

**GOALS AND MEASURES**

This CPM was developed by Intermountain clinical experts to outline appropriate use criteria (AUC) for advanced imaging for hip pain. These guidelines, together with those for other priority clinical areas, will improve the quality of care provided to patients by:

- Increasing adherence to evidence-based AUC for the use of advanced imaging
- Reducing imaging tests that do not conform to AUC or for which there are no guidelines
- Decreasing system-wide spending on unnecessary advanced imaging services
- Reducing the risk of harm from unwarranted radiation exposure
- Documenting the incidence of a significant positive on advanced imaging tests and aligning with downstream care
OVERVIEW: INTERMOUNTAIN IMAGING CRITERIA APPROPRIATE USE CRITERIA CONTENT

Intermountain Imaging Criteria appropriate use criteria (AUC) support clinicians in providing evidence-based care to the patients they serve. Although appropriate use of Intermountain Imaging Criteria fulfills compliance requirements under PAMA, patients will only fully benefit from their use as they are deployed within the framework of a locally driven quality improvement program. To learn more about Intermountain’s process for developing and maintaining AUC, visit: https://intermountainhealthcare.org/services/imaging-services/intermountain-imaging-criteria/.

The care process model approach

Designed as care process models (CPMs), the Intermountain Imaging Criteria AUC content is a blueprint that logically guides the delivery of evidence-based care via an algorithmic visual presentation (see list at right and pages 5 through 22). Although these Intermountain Imaging Criteria CPMs specifically focus on the appropriate use of advanced imaging, they can be viewed as portions of broader CPMs that guide not only diagnostic but therapeutic interventions for a specific disease or condition.

Ideally, Intermountain Imaging Criteria CPMs are engaged early in the patient encounter and guide the various considerations that lead to the ultimate decision regarding the ordering of an imaging study. Point-of-order checklists are also included in the CPMs (beginning on page 23). These checklist-based guidelines are logically equivalent to the algorithms from which they are derived.

Knowing that local factors will invariably impact decisions about selecting the most appropriate exam, Intermountain Imaging Criteria CPMs specify the generally preferred exam but also provide alternative choices that may be appropriate in certain clinical settings.

Relative imaging cost and radiation risk rankings

To further aid providers, each algorithm includes a ranking of relative costs and radiation risk for each advanced imaging test recommended. The cost scale is derived using global non-facility relative value units (RVUs) published by the Centers for Medicare and Medicaid Services (CMS) as a surrogate for cost. The radiation risk is derived from data published in 2010 by the Health Physics Society.

Evidentiary review and ranking

Intermountain used the following two conceptual frameworks for evidentiary review of relevant literature:

1. The 2011 revision of the Oxford Centre for Evidence-Based Medicine (OCEBM) 2011 Levels of Evidence standard. This standard includes categorical leveling grades relevant to diagnostic studies and rates individual sources of evidence (published papers or other research data) on a five-point scale.

2. The extensively used Fryback and Thornbury conceptual framework, which uses six levels for assessing the efficacy of diagnostic imaging.

Each algorithmic presentation provides both rankings for the decision node (the pairing of AUC and recommended/alternative tests).

Using the algorithms and checklists

Under “Care Pathways” on page 3, there is an annotated algorithmic sample for a typical clinical scenario found in this CPM. Under “Point-of-Order Checklist” on page 4, there is an annotated sample of a typical point-of-order checklist for an imaging procedure recommended within the above sample algorithm.

HP ALGORITHMS

POST THA:

<table>
<thead>
<tr>
<th>Condition</th>
<th>AUC</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP + infection</td>
<td>5</td>
</tr>
<tr>
<td>HP + psoas irritation</td>
<td>6</td>
</tr>
<tr>
<td>HP + ischiofemoral impingement</td>
<td>7</td>
</tr>
<tr>
<td>HP + gluteus medius/ minimus tear</td>
<td>8</td>
</tr>
<tr>
<td>HP + hardware failure</td>
<td>9</td>
</tr>
</tbody>
</table>

NOT POST THA

Chronic HP +:

<table>
<thead>
<tr>
<th>Condition</th>
<th>AUC</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVN/ostonecrosis</td>
<td>11</td>
</tr>
<tr>
<td>Inflammatory/nonspecific arthropathy</td>
<td>12</td>
</tr>
<tr>
<td>Mild osteoarthritis</td>
<td>13</td>
</tr>
<tr>
<td>Femoral acetabular impingement/labrum tear</td>
<td>14</td>
</tr>
<tr>
<td>Ischiofemoral impingement</td>
<td>15</td>
</tr>
<tr>
<td>Gluteus medius/ minimus tear</td>
<td>16</td>
</tr>
<tr>
<td>Proximal hamstring tendinopathy</td>
<td>17</td>
</tr>
</tbody>
</table>

Acute HP +:

<table>
<thead>
<tr>
<th>Condition</th>
<th>AUC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute hamstring tear</td>
<td>18</td>
</tr>
<tr>
<td>Avulsion fractures</td>
<td>19</td>
</tr>
<tr>
<td>Stress fracture</td>
<td>20</td>
</tr>
<tr>
<td>Dislocation</td>
<td>21</td>
</tr>
<tr>
<td>Septic arthritis/ostomyelitis</td>
<td>22</td>
</tr>
</tbody>
</table>

Abbreviations used in this CPM

- AUC = appropriate use content
- AVN = avascular necrosis
- CPM = care process model
- CRP = C-reactive protein
- CT = computed tomography
- ER = external rotation
- ESR = erythrocyte sedimentation rate
- eGFR = glomerular filtration rate
- FABER = flexion abduction and external rotation test
- FADDIR = flexion adduction and internal rotation test
- IV = intravenous
- MARS = metal artifact reduction sequences
- MRI = magnetic resonance imaging
- PCP = primary care provider
- RVU = relative value units
- THA = total hip arthroplasty
- WBC = white blood cells
**INTERMOUNTAIN IMAGING CRITERIA FOR Hip Pain (HP)**

**Care pathways**

For each clinical scenario (e.g., chronic hip pain plus proximal hamstring tendinopathy), there is an algorithmic presentation of the care pathway context for the imaging decisions made. This pathway contains not only the appropriate use criteria (AUC) and evidence-based advanced imaging recommendations but also what constitutes significant positive imaging results and downstream care recommendations. Note the elements of this presentation below and key information provided in each test recommendation box as shown at right. There is also a legend at the bottom of each care pathway page. Algorithms are grouped as indicated on page 2.

The decision node box encompasses recommended advanced imaging based on the presence of evidence-based appropriate use criteria (AUC) or expert consensus (where evidence does not exist).

The Arabic number in the green box indicates an evidence ranking derived from the OCEBM scale. For this scale, the lower the number, the stronger the evidence ranking.

The Roman numeral in the orange box indicates an evidence ranking derived from the Fryback & Thornbury scale. For this scale, the higher the number, the stronger the evidence ranking.

Cost rankings are indicated based on a range developed from the CMS Global Relative Value Units (RVUs) as follows:
- $ = 0 – 5 RVUs
- $$$ = 10.01 – 15 RVUs
- $$$$ = 15.01+ RVUs

Radiation risk rankings use the scale developed by the American College of Radiology. This rating framework offers the following six levels for adult effective dose range risk:
- R0 = 0 mSv
- R1 = < 0.1 mSv
- R2 = 0.1 – 1 mSv
- R3 = 1 – 10 mSv
- R4 = 10 – 30 mSv
- R5 = 30 – 100 mSv

An alternate imaging recommendation has been included for when the primary recommendation is contraindicated or the alternative recommendation may be clinically appropriate.

This symbol indicates an Intermountain internal measure. Intermountain measures the incidence of significant positive results on advanced imaging tests.

Cost rankings are indicated based on a range developed from the CMS Global Relative Value Units (RVUs) as follows:
- $ = 0 – 5 RVUs
- $$$ = 10.01 – 15 RVUs
- $$$$ = 15.01+ RVUs

Radiation risk rankings use the scale developed by the American College of Radiology. This rating framework offers the following six levels for adult effective dose range risk:
- R0 = 0 mSv
- R1 = < 0.1 mSv
- R2 = 0.1 – 1 mSv
- R3 = 1 – 10 mSv
- R4 = 10 – 30 mSv
- R5 = 30 – 100 mSv

An alternate imaging recommendation has been included for when the primary recommendation is contraindicated or the alternative recommendation may be clinically appropriate.

### DECISION NODE #8

**Chronic HP + mild osteoarthritis**

**AUC met (IF ALL)?**
- Symptoms > 3 months
- Primarily deep anterior hip pain
- Positive FADDIR and/or FABER
- Radiographs inconclusive

**Imaging: primary recommendation**
- MRI hip arthrogram
  - 1 II $$$ R0
- OR
- MRI hip w/o contrast (3T)
  - 3 IV $$ R0

**Imaging: alternative recommendation**
- CT hip w/o contrast*
  - 2 II $$ R3

**Significant positive result (IF ANY)?**
- Articular cartilage loss
- Abnormal bone morphology
- Labrum tear
- AVN

- yes
  - REFER to hip preservation surgeon

- no
  - MANAGE with conservative measures

**CONSIDER these options:**
- Re-evaluating the diagnosis
- Managing with conservative measures
- Referring to a hip specialist

See abbreviations on page 2.
### Point-of-order checklists

For each advanced imaging test (e.g., MRI and CT), there is a checklist that compiles all of the appropriate use criteria from each clinical scenario (shown in the care pathways) for that test. These are presented in a checklist format for the provider to select the appropriate scenario AND the criteria that apply to the patient’s situation.

#### TABLE 1. MRI hip **without contrast** appropriate use indications (PRIMARY recommendation)

<table>
<thead>
<tr>
<th>POST THA (IF ALL)</th>
<th>NOT POST THA (IF ALL)</th>
<th>CHRONIC HP + MUSCLE OR TENDON LESION</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ HP + suspected psos irritation</td>
<td>□ Chronic HP + inflammatory or nonspecific arthropathy</td>
<td>□ Acute HP + suspected acute hamstring tear</td>
</tr>
<tr>
<td>□ Persistent anterior hip pain provoked by active hip flexion</td>
<td>□ Nonspecific hip pain</td>
<td>□ Positive mechanism of injury with painful pop</td>
</tr>
<tr>
<td>□ Symptoms &gt; 3 months</td>
<td>□ Limited hip range of motion</td>
<td>□ Bruising posterior thigh</td>
</tr>
<tr>
<td>□ No radiographic evidence of hardware failure</td>
<td>□ Radiographs inconclusive</td>
<td>□ Hamstring weakness</td>
</tr>
<tr>
<td>□ Failed conservative treatment by hip specialist</td>
<td>□ Positive lab workup for inflammatory arthritis</td>
<td>□ Difficulty with weight bearing</td>
</tr>
<tr>
<td>□ HP + suspected ischiofemoral impingement</td>
<td>□ Chronic HP + mild osteoarthritis</td>
<td>□ Negative or noncontributory radiographs</td>
</tr>
<tr>
<td>□ Symptoms &gt; 3 months</td>
<td>□ Symptoms &gt; 3 months</td>
<td>□ Acute HP + suspected avulsion fracture</td>
</tr>
<tr>
<td>□ Primarily pain in posterior buttock/ischium</td>
<td>□ Primarily deep anterior hip pain</td>
<td>□ Positive mechanism of injury with painful pop or bruising</td>
</tr>
<tr>
<td>□ Painful sitting and walking</td>
<td>□ Positive FADDIR and/or FABER</td>
<td>□ Associated muscle weakness</td>
</tr>
<tr>
<td>□ Radiographs indicating narrowed ischiofemoral space</td>
<td>□ Radiographs inconclusive</td>
<td>□ Difficulty with weight bearing</td>
</tr>
<tr>
<td>□ EITHER positive long stride OR ischiofemoral test</td>
<td>□ Chronic HP + suspected femoral acetabular impingement or labrum tear</td>
<td>□ Radiographs positive or equivocal for avulsion fracture</td>
</tr>
<tr>
<td>□ HP + gluteal tendon insertion tear/trochanteric bursitis</td>
<td>□ Symptoms &gt; 3 months</td>
<td>□ Acute HP + suspected stress fracture (femoral head/neck)</td>
</tr>
<tr>
<td>□ Absence of external snapping and advanced osteoarthritis</td>
<td>□ Primarily deep anterior hip pain</td>
<td>□ Acute groin pain</td>
</tr>
<tr>
<td>□ Symptoms &gt; 3 months</td>
<td>□ Positive FADDIR and/or FABER</td>
<td>□ Positive single-leg hop test</td>
</tr>
<tr>
<td>□ Pain localized to the peri-trochanter</td>
<td>□ Negative or noncontributory radiographs</td>
<td>□ Painful and weak hip flexion</td>
</tr>
<tr>
<td>□ Negative or noncontributory radiographs</td>
<td>□ Chronic HP + suspected femoral acetabular impingement or labrum tear</td>
<td>□ Negative impingement testing</td>
</tr>
<tr>
<td><strong>AND ANY ONE OR MORE OF THESE:</strong></td>
<td>□ Symptoms &gt; 3 months</td>
<td>□ Painful weight bearing</td>
</tr>
<tr>
<td>□ Trendelenburg gait</td>
<td>□ Primarily pain in posterior buttock/ischium</td>
<td>□ Radiographs positive or equivocal for avulsion fracture</td>
</tr>
<tr>
<td>□ Pelvic drop during ipsilateral single-leg stand</td>
<td>□ Pain with heel strike during gait</td>
<td>□ Acute HP + suspected stress fracture (femoral head/neck)</td>
</tr>
<tr>
<td>□ Abductor weakness</td>
<td>□ Positive resisted hamstring at 30 and/or 90 degrees</td>
<td>□ Acute groin pain</td>
</tr>
<tr>
<td>□ Positive hip lag sign</td>
<td>□ Painful sitting and walking</td>
<td>□ Positive single-leg hop test</td>
</tr>
</tbody>
</table>

Tables included on pages 23–27 indicate if the test is a primary recommendation or alternate recommendation.
HIP PAIN (HP) CARE PATHWAY ALGORITHMS: POST TOTAL HIP ARTHROPLASTY (THA)

For patients who HAVE had a total hip arthroplasty (THA) and present with hip pain, clinical scenarios are presented on pages 5 through 10.

DECISION NODE #1 KEY EVIDENCE


(For a full list of references for all decision nodes, see bibliography on pages 29 through 31.)
**INTERMOUNTAIN IMAGING CRITERIA FOR Hip Pain (HP)**

**DECISION NODE #2**

- **HP + suspected psoas irritation (POST THA)**

  - **AUC met (IF ALL)?**
    - Persistent anterior hip pain provoked by active hip flexion
    - Symptoms > 3 months
    - No radiographic evidence of hardware failure
    - Failed conservative treatment by hip specialist

  - **Imaging: primary recommendation**
    - MRI hip w/o contrast (MARS)
      - **Level of Evidence**: II
      - **Intermountain Measure**: $\$\$(0.01 - 5 RVUs)
      - **Radiation Dose**: R0 (0 mSv)

  - **Significant positive result?**
    - Iliopsoas bursal effusion/inflammation
      - **yes** REFER to hip specialist for management
      - **no** CONSIDER referral to hip specialist for management

  - **PROVIDE additional care as clinically warranted**

**DECISION NODE #2 KEY EVIDENCE**


(For a full list of references for all decision nodes, see bibliography on pages 29 through 31.)

See abbreviations on page 2.

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**DECISION NODE #3**

**AUC met (IF ALL)?**
- Symptoms > 3 months
- Primarily pain in posterior buttock/ischium
- Painful sitting and walking
- Radiographs indicating narrowed ischiofemoral space
- **EITHER** positive long stride **OR** ischiofemoral test

**Imaging: primary recommendation**
- MRI hip w/o contrast

**DECISION NODE #3 KEY EVIDENCE**


(For a full list of references for all decision nodes, see bibliography on pages 29 through 31.)
**DECISION NODE #4**

- **AUC met (IF ALL)?**
  - Absence of external snapping and advanced osteoarthritis
  - Symptoms > 3 months
  - Pain localized to the peri-trochanter
  - Negative or noncontributory radiographs

  **AND ANY OF THESE:**
  - Trendelenburg gait
  - Pelvic drop during ipsilateral single-leg stand
  - Abductor weakness
  - Positive hip lag sign

- **Imaging: primary recommendation**
  - MRI hip w/o contrast
  - Imaging: alternative recommendation
  - CT hip w/o contrast

- **Imaging: primary recommendation**
  - MRI hip w/o contrast

- **Imaging: alternative recommendation**
  - CT hip w/o contrast

- **Significant positive result (IF ANY)?**
  - Tear of the gluteus medius/minimus
  - Thickening of iliobibial band

- **REFER to hip surgeon**

- **no**

- **PROVIDE additional care as clinically warranted**

- **no**

- **RE-EVALUATE diagnosis**

- **OR**

- **MANAGE with conservative measures**

---

**DECISION NODE #4 KEY EVIDENCE**


(For a full list of references for all decision nodes, see bibliography on pages 29 through 31.)
**INTERMOUNTAIN IMAGING CRITERIA FOR Hip Pain (HP)**

**DECISION NODE #5A**

- **AUC met (IF ALL)?**
  - Yes: **Imaging: primary recommendation**
    - CT hip w/o contrast (MARS)**
      - $0 – 5$ RVUs
      - Level of Evidence: II
      - Dose: $1 – 10$ mSv
      - Refer to hip surgeon if significant positive result.
  - No: PROVIDE additional care as clinically warranted.

- **Significant positive result (IF ANY)?**
  - Yes: Refer to hip surgeon for management.
  - No: CONSIDER referral to hip surgeon for management.

**DECISION NODE #5B**

- **AUC met? Equivocal CT**
  - Yes: **Imaging: alternative recommendation**
    - MRI hip w/o contrast
      - Level of Evidence: I
      - Dose: $0 – 5$ mSv
    - Bone scan
      - Level of Evidence: I
      - Dose: $10.01 – 30$ mSv
  - No: PROVIDE additional care as clinically warranted.

- **Significant positive result?**
  - Yes: Refer to hip surgeon for management.
  - No: CONSIDER referral to hip surgeon for management.

---

**LEGEND**

- **Clinical Scenario**
- **Urgent or Emergency Situation**
- **OCEBM Level of Evidence**
- **Fryback & Thornbury Level of Evidence**
- **Intermountain Measure**

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HIP PAIN (HP) CARE PATHWAY ALGORITHMS: NOT POST-THA

For patients who have NOT had a total hip arthroplasty (THA) and present with hip pain, clinical scenarios are grouped as either chronic or acute. Common chronic pain scenarios are covered on pages 11 – 17. Common acute pain scenarios begin on page 18.

DECISION NODE #6

Chronic HP + suspected avascular necrosis (AVN) or osteonecrosis

AUC met (IF ALL)?
- Nonspecific hip pain
- Painful limited hip range of motion
- Antalgic gait
- Radiographs inconclusive

yes →

Image: primary recommendation

MRI hip w/ and w/o contrast (3T)

1 VI $ R0

OR

MR hip arthrogram (1.5T)

3 IV $$$ R0

Image: alternative recommendation

CT hip w/o contrast*

4 IV $ R3

OR

MRI hip w/o contrast

1 II $ R0

no →

Significant positive result?

yes →

REFER to hip surgeon

no →

RE-EVALUATE diagnosis

OR

CONSIDER referral to hip specialist

PROVIDE additional care as clinically warranted

DECISION NODE #6 KEY EVIDENCE


* During pregnancy, CT may be contraindicated. Consult with radiologist.

For a full list of references for all decision nodes, see bibliography on pages 29 through 31.)
**Decision Node #7**

### Chronic HP + inflammatory or nonspecific arthropathy

- **AUC met (IF ALL)?**
  - Yes: Refer to rheumatologist or hip surgeon (if already under rheumatologist care)
  - No: PROVIDE additional care as clinically warranted

**Imaging: primary recommendation**

- MRI hip w/o contrast
  - **1**II **$** R0

**OR**

- MRI hip w/ and w/o contrast (depending on expertise)
  - **5**II **$** R0

**Imaging: alternative recommendation**

- CT hip w/o contrast *
  - **3**II **$** R3

**Significant positive result?**

- Yes: Synovitis, Articular cartilage loss

**Refer to rheumatologist**

- **CONSIDER** referral to rheumatologist

### Key Evidence


* During pregnancy, CT may be contraindicated. Consult with radiologist.

---

For a full list of references for all decision nodes, see bibliography on pages 29 through 31.
DETECTION NODE #8

Chronic HP + mild osteoarthritis

AUC met (IF ALL)?
- Symptoms > 3 months
- Primarily deep anterior hip pain
- Positive FADDIR and/or FABER
- Radiographs inconclusive

Imaging: primary recommendation
- MRI hip arthrogram*
  - 1 II $$$ R0
- OR
- MRI hip w/o contrast (3T)
  - 3 IV $ R0

Imaging: alternative recommendation
- CT hip w/o contrast **
  - 2 II $ R3

DECISION NODE #8 KEY EVIDENCE


Smith TO, Simpson M, Ejindu V, & Hing, CB. The diagnostic test accuracy of magnetic resonance imaging, magnetic resonance arthrography and computer tomography in the detection of chondral lesions of the hip. Euro J Orthop Surg Trauma. 2013;23(3):335-344.

(For a full list of references for all decision nodes, see bibliography on pages 29 through 31.)
DECISION NODE #9 KEY EVIDENCE


(For a full list of references for all decision nodes, see bibliography on pages 29 through 31.)
**DECISION NODE #10**

**Chronic HP + suspected ischiofemoral impingement**

- AUC met (IF ALL)?
  - Symptoms > 3 months
  - Primarily pain in posterior buttock/ischium
  - Painful sitting and walking
  - Radiographs indicating narrowed ischiofemoral space
  - EITHER positive long stride OR ischiofemoral test

**Imaging: primary recommendation**

- MRI hip w/o contrast

**Significant positive result (IF ANY)?**

- Edema in or narrowing of the ischiofemoral/quadratus femoral spaces
- Inflammation of the sciatic nerve

- YES: REFER to hip specialist for conservative management
- NO: RE-EVALUATE diagnosis OR CONSIDER referral to hip specialist
- PROVIDE additional care as clinically warranted

**DECISION NODE #10 KEY EVIDENCE**


(For a full list of references for all decision nodes, see bibliography on pages 29 through 31.)
**DECISION NODE #11**

**AUC met (IF ALL)?**
- Absence of external snapping and advanced osteoarthritis
- Symptoms > 3 months
- Pain localized to the peri-trochanter
- Negative or noncontributory radiographs

**AND ANY OF THESE:**
- Trendelenburg gait
- Pelvic drop during ipsilateral single-leg stand
- Abductor weakness
- Positive hip lag sign

**Imaging: primary recommendation**
- MRI hip w/o contrast

**Significant positive result (IF ANY)?**
- Tear of the gluteus medius/minimus
- Thickening of the iliotibial band

**DECISION NODE #11 KEY EVIDENCE**


(For a full list of references for all decision nodes, see bibliography on pages 29 through 31.)

---

**LEGEND**
- Clinical Scenario
- Urgent or Emergency Situation
- Level of Evidence
- Level of Evidence
- Fryback & Thornbury Level of Evidence
- Intermountain Measure
- RO (0 mSv) R3 (1 – 10 mSv) R4 (10.01 – 30 mSv) See page 2 – 3 for explanation.
- $ (0 – 5 RVUs) $ (5.01 – 10 RVUs) $ (10.01 – 15 RVUs) $ (15.01+ RVUs)
### DECISION NODE #12

**Chronic HP + suspected proximal hamstring tendinopathy**

#### DECISION NODE #12 KEY EVIDENCE


#### AUC met (IF ALL)?
- Symptoms > 3 months
- Primarily pain in posterior buttock/ischium
- Pain with heel strike during gait
- Positive resisted hamstring at 30 and/or 90 degrees
- Painful sitting and walking
- Negative or noncontributory radiographs

#### Imaging: primary recommendation
- MRI hip w/o contrast

#### Imaging: alternative recommendation
- CT hip w/o contrast *

#### Significant positive result (IF ANY)?
- Tendinopathy of hamstring origin
- Edema of the ischiofemoral space
- Inflammation of the sciatic nerve

**yes**

- REFER to hip surgeon

**no**

- PROVIDE additional care as clinically warranted

- RE-EVALUATE diagnosis OR MANAGE with conservative measures

* During pregnancy, CT may be contraindicated. Consult with radiologist

(For a full list of references for all decision nodes, see bibliography on pages 29 through 31.)
For patients who have NOT had a total hip arthroplasty (THA) and present with hip pain, clinical scenarios are grouped as either chronic or acute. Common chronic pain scenarios were covered on pages 11–17. For common acute pain scenarios, see pages 18–22.

DECISION NODE #13

Acute HP + suspected acute hamstring tear

AUC met (IF ALL)?
- Positive mechanism of injury with a painful pop
- Bruising posterior thigh
- Hamstring weakness
- Difficulty with weight bearing
- Negative or noncontributory radiographs

Imaging: primary recommendation
MRI hip w/ o contrast 2 II $$ R0

Significant positive result?
Avulsion of hamstring origin

yes

REFER to hip surgeon

no

MANAGE with conservative measures

yes

no

PROVIDE additional care as clinically warranted

DECISION NODE #13 KEY EVIDENCE


(For a full list of references for all decision nodes, see bibliography on pages 29 through 31.)
**Decision Node #14**

**Acute HP + suspected avulsion fracture***

- Positive mechanism of injury with painful pop or bruising
- Associated muscle weakness
- Difficulty with weight bearing
- Radiographs positive or equivocal for avulsion fracture

**Imaging: primary recommendation**
- MRI hip w/o contrast

**Imaging: alternative recommendation**
- CT hip w/o contrast **

**Significant positive result?**
- Avulsion fracture with significant displacement
  - yes → REFER to hip surgeon
  - no → MANAGE with conservative measures

**Provide** additional care as clinically warranted

---

**Legend**

- **Clinical Scenario**
- **Urgent or Emergency Situation**
- **OCEBM Level of Evidence**
- **Fryback & Thornbury Level of Evidence**
- **Intermountain Measure**

- **RO** (0 mSv) **R3** (1 – 10 mSv) **R4** (10.01 – 30 mSv) **See page 2 – 3 for explanation.**
- **$** (0 – 5 RVUs) **$$** (5.01 – 10 RVUs) **$$** $ (10.01 – 15 RVUs) **$$** $ (15.01+ RVUs)

---

**DECISION NODE #14 KEY EVIDENCE**


*Avulsion fractures include fractures of the ischium, lesser trochanter, and ASIS (anterior superior iliac spine).*

**During pregnancy, CT may be contraindicated. Consult with radiologist.**

*(For a full list of references for all decision nodes, see bibliography on pages 29 through 31.)*
**Decision Node #15**

**Acute HP + suspected stress fracture (femoral head/neck)**

**AUC met (IF ALL)?**
- Acute groin pain
- Positive single-leg hop test
- Painful and weak hip flexion
- Negative impingement testing
- Painful weight bearing
- Radiographs positive or equivocal for fracture

**Imaging: primary recommendation**
- MRI hip w/o contrast
  - Significant positive result?
    - yes: Stress fracture
      - yes: REFER to hip surgeon
      - no: MANAGE with conservative measures
    - no: PROVIDE additional care as clinically warranted
  - no: MRI hip w/o contrast

**Imaging: alternative recommendation**
- CT hip w/o contrast *
  - Significant positive result?
    - yes: Stress fracture
      - yes: REFER to hip surgeon
      - no: MANAGE with conservative measures
    - no: CT hip w/o contrast

---

**Decision Node #15 Key Evidence**


*During pregnancy, CT may be contraindicated. Consult with radiologist.*

---

(For a full list of references for all decision nodes, see bibliography on pages 29 through 31.)
**DECISION NODE #16**

**Acute HP + suspected dislocation (post relocation)?**
- Positive mechanism of injury
- Persistent pain
- Limited hip motion
- Radiographs have been performed to ensure proper reduction

**AUC met (IF ALL)?**

**Imaging: primary recommendation**
- MRI hip w/o contrast (3 T)  
  - Level of Evidence: VI  
  - RVUs: $  
  - Dose: R0
- OR
- MRI hip arthrogram (1.5 T)  
  - Level of Evidence: II  
  - RVUs: $$$  
  - Dose: R0

**Imaging: alternative recommendation**
- CT hip w/o contrast *  
  - Level of Evidence: II  
  - RVUs: $  
  - Dose: R3

**Significant positive result (IF ANY)?**
- Osteochondral injury
- Loose bodies

**MANAGE** with conservative measures

**REFER** to hip surgeon

**DECISION NODE #16 KEY EVIDENCE**


* During pregnancy, CT may be contraindicated. Consult with radiologist.

(For a full list of references for all decision nodes, see bibliography on pages 29 through 31.)
**INTERMOUNTAIN IMAGING CRITERIA FOR Hip Pain (HP)**

**DECISION NODE #17**

Acute HP + suspected septic arthritis or osteomyelitis

**AUC met (IF ALL)?**
- Atypical hip pain
- Constitutional symptoms
- Elevated ESR, CRP, or WBC
- Negative or noncontributory radiographs

**Imaging: primary recommendation**

- MRI hip w/ and w/o contrast
  - yes
  - R0
  - II
  - $S$

**Imaging: alternative recommendation**

- Bone scan
  - yes
  - R3
  - II
  - $S$

**Significant positive result (IF EITHER)?**
- Osteomyelitis
- Joint effusion with synovitis

**DECISION NODE #17 KEY EVIDENCE**


*(For a full list of references for all decision nodes, see bibliography on pages 29 through 31.)*

**LEGEND**

- Clinical Scenario
- Urgent or Emergency Situation
- OCEBM Level of Evidence
- Fryback & Thornbury Level of Evidence
- Intermountain Measure

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### POINT-OF-ORDER CHECKLISTS

The provider must check BOTH:
1. The box next to the relevant clinical scenario
2. EACH AUC box that applies to the patient’s situation

#### TABLE 1. MRI hip without contrast appropriate use indications (PRIMARY recommendation)

<table>
<thead>
<tr>
<th>POST THA (IF ALL)</th>
<th>NOT POST THA (IF ALL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ HP + suspected psoas irritation</td>
<td>□ Chronic HP + inflammatory or nonspecific arthropathy</td>
</tr>
<tr>
<td>□ Persistent anterior hip pain provoked by active hip flexion</td>
<td>□ Nonspecific hip pain</td>
</tr>
<tr>
<td>□ Symptoms &gt; 3 months</td>
<td>□ Limited hip range of motion</td>
</tr>
<tr>
<td>□ No radiographic evidence of hardware failure</td>
<td>□ Radiographs inconclusive</td>
</tr>
<tr>
<td>□ Failed conservative treatment by a hip specialist</td>
<td>□ Positive lab workup for inflammatory arthritis</td>
</tr>
<tr>
<td>□ HP + suspected ischiofemoral impingement</td>
<td>□ Chronic HP + mild osteoarthritis</td>
</tr>
<tr>
<td>□ Symptoms &gt; 3 months</td>
<td>□ Symptoms &gt; 3 months</td>
</tr>
<tr>
<td>□ Primarily pain in posterior buttock/ischium</td>
<td>□ Primarily deep anterior hip pain</td>
</tr>
<tr>
<td>□ Painful sitting and walking</td>
<td>□ Positive FADDIR and/or FABER</td>
</tr>
<tr>
<td>□ Radiographs indicating narrowed ischiofemoral space</td>
<td>□ Radiographs inconclusive</td>
</tr>
<tr>
<td>□ EITHER positive long stride OR ischiofemoral test</td>
<td>□ Chronic HP + suspected femoral acetabular impingement or labrum tear</td>
</tr>
<tr>
<td>□ HP + gluteal tendon insertion tear/trochanteric bursitis</td>
<td>□ Symptoms &gt; 3 months</td>
</tr>
<tr>
<td>□ Absence of external snapping and advanced osteoarthritis</td>
<td>□ Primarily deep anterior hip pain</td>
</tr>
<tr>
<td>□ Symptoms &gt; 3 months</td>
<td>□ Positive FADDIR and/or FABER</td>
</tr>
<tr>
<td>□ Pain localized to the peri-trochanter</td>
<td>□ Negative or noncontributory radiographs</td>
</tr>
<tr>
<td>□ Negative or noncontributory radiographs</td>
<td>□ Chronic HP + suspected proximal hamstring tendinopathy</td>
</tr>
<tr>
<td>□ AND ANY ONE OR MORE OF THESE:</td>
<td>□ Symptoms &gt; 3 months</td>
</tr>
<tr>
<td>□ Trendelenburg gait</td>
<td>□ Primarily deep anterior hip pain</td>
</tr>
<tr>
<td>□ Pelvic drop during ipsilateral single-leg stand</td>
<td>□ Positive FADDIR and/or FABER</td>
</tr>
<tr>
<td>□ Abductor weakness</td>
<td>□ Pain with heel strike during gait</td>
</tr>
<tr>
<td>□ Positive hip lag sign</td>
<td>□ Positive resisted hamstring at 30 and/or 90 degrees</td>
</tr>
<tr>
<td>□ Positive hip lag sign</td>
<td>□ Painful sitting and walking</td>
</tr>
<tr>
<td>□ Chronic HP + suspected ischiofemoral impingement</td>
<td>□ Negative or noncontributory radiographs</td>
</tr>
<tr>
<td>□ Symptoms &gt; 3 months</td>
<td>□ Radiographs indicating narrowed ischiofemoral space</td>
</tr>
<tr>
<td>□ Primarily pain in posterior buttock/ischium</td>
<td>□ EITHER positive long stride OR ischiofemoral test</td>
</tr>
<tr>
<td>□ Painful sitting and walking</td>
<td></td>
</tr>
</tbody>
</table>
### Table 2. MRI hip without contrast appropriate use indications (ALTERNATIVE recommendation)

<table>
<thead>
<tr>
<th>POST THA (IF ALL)</th>
<th>NOT POST THA (IF ALL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ HP + suspected hardware failure</td>
<td>□ Chronic HP + suspected avascular necrosis (AVN) or osteonecrosis</td>
</tr>
<tr>
<td>□ Hip and thigh pain</td>
<td>□ Nonspecific hip pain</td>
</tr>
<tr>
<td>□ Negative or noncontributory radiographs</td>
<td>□ Radiographs inconclusive</td>
</tr>
<tr>
<td>□ Equivocal CT</td>
<td>□ Painful limited hip range of motion</td>
</tr>
<tr>
<td>□ Nonspecific hip pain</td>
<td>□ Antalgic gait</td>
</tr>
<tr>
<td>□ Radiographs inconclusive</td>
<td></td>
</tr>
</tbody>
</table>

### Table 3. MRI hip with and without contrast appropriate use indications (PRIMARY recommendation)

<table>
<thead>
<tr>
<th>POST THA (IF ALL)</th>
<th>NOT POST THA (IF ALL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ HP + suspected infection</td>
<td>□ Chronic HP + suspected avascular necrosis (AVN) or osteonecrosis</td>
</tr>
<tr>
<td>□ Pain or constitutional symptoms</td>
<td>□ Nonspecific hip pain</td>
</tr>
<tr>
<td>□ Positive lab results (WBC, ESR, CRP)</td>
<td>□ Painful limited hip range of motion</td>
</tr>
<tr>
<td>□ Negative or noncontributory radiographs</td>
<td>□ Antalgic gait</td>
</tr>
<tr>
<td>□ Chronic HP + inflammatory or nonspecific arthropathy (depending on expertise)</td>
<td>□ Radiographs inconclusive</td>
</tr>
<tr>
<td>□ Nonspecific hip pain</td>
<td>□ Positive lab workup for inflammatory arthritis</td>
</tr>
<tr>
<td>□ Limited hip range of motion</td>
<td></td>
</tr>
<tr>
<td>□ Radiographs inconclusive</td>
<td></td>
</tr>
<tr>
<td>□ Positive lab workup for inflammatory arthritis</td>
<td></td>
</tr>
<tr>
<td>□ Acute HP + suspected septic arthritis or osteomyelitis</td>
<td>□ Atypical hip pain</td>
</tr>
<tr>
<td>□ Nonspecific hip pain</td>
<td>□ Constitutional symptoms</td>
</tr>
<tr>
<td>□ Elevated ESR, CRP, or WBC</td>
<td>□ Elevated ESR, CRP, or WBC</td>
</tr>
<tr>
<td>□ Negative or noncontributory radiographs</td>
<td>□ Negative or noncontributory radiographs</td>
</tr>
</tbody>
</table>
## TABLE 4. MRI hip arthrogram appropriate use indications (PRIMARY recommendation)

<table>
<thead>
<tr>
<th>NOT POST THA (IF ALL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Chronic HP + suspected avascular necrosis (AVN) or osteonecrosis</td>
</tr>
<tr>
<td>□ Nonspecific hip pain</td>
</tr>
<tr>
<td>□ Painful limited hip range of motion</td>
</tr>
<tr>
<td>□ Antalgic gait</td>
</tr>
<tr>
<td>□ Radiographs inconclusive</td>
</tr>
<tr>
<td>□ Chronic HP + mild osteoarthritis</td>
</tr>
<tr>
<td>□ Symptoms &gt; 3 months</td>
</tr>
<tr>
<td>□ Primarily deep anterior hip pain</td>
</tr>
<tr>
<td>□ Positive FADDIR and/or FABER</td>
</tr>
<tr>
<td>□ Radiographs inconclusive</td>
</tr>
<tr>
<td>□ Chronic HP + suspected femoral acetabular impingement or labrum tear</td>
</tr>
<tr>
<td>□ Symptoms &gt; 3 months</td>
</tr>
<tr>
<td>□ Primarily deep anterior hip pain</td>
</tr>
<tr>
<td>□ Positive FADDIR and/or FABER</td>
</tr>
<tr>
<td>□ Negative or noncontributory radiographs</td>
</tr>
<tr>
<td>□ Acute HP + suspected dislocation, post-relocation</td>
</tr>
<tr>
<td>□ Positive mechanism of injury</td>
</tr>
<tr>
<td>□ Persistent pain</td>
</tr>
<tr>
<td>□ Limited hip motion</td>
</tr>
</tbody>
</table>
| □ Radiographs have been performed to ensure proper reduction

## TABLE 5. CT hip without contrast* appropriate use indications (PRIMARY recommendation)

<table>
<thead>
<tr>
<th>POST THA (IF ALL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ HP + suspected hardware failure</td>
</tr>
<tr>
<td>□ Hip and thigh pain</td>
</tr>
<tr>
<td>□ Negative or noncontributory radiographs</td>
</tr>
</tbody>
</table>

*During pregnancy, CT may be contraindicated. Consult with radiologist.

## TABLE 6. CT hip with contrast* appropriate use indications (ALTERNATIVE recommendation)

<table>
<thead>
<tr>
<th>POST THA (IF ALL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ HP + suspected infection</td>
</tr>
<tr>
<td>□ Pain or constitutional symptoms</td>
</tr>
<tr>
<td>□ Positive lab results (WBC, ESR, CRP)</td>
</tr>
<tr>
<td>□ Negative or noncontributory radiographs</td>
</tr>
</tbody>
</table>

*During pregnancy, CT may be contraindicated. Consult with radiologist.
## POINT-OF-ORDER CHECKLISTS, CONTINUED

### TABLE 7. CT hip without contrast* appropriate use indications (ALTERNATIVE recommendation)

<table>
<thead>
<tr>
<th>POST THA (IF ALL)</th>
<th>NOT POST THA (IF ALL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ HP + gluteal tendon insertion tear/trochanteric bursitis</td>
<td></td>
</tr>
<tr>
<td>□ Absence of external snapping and advanced osteoarthritis</td>
<td></td>
</tr>
<tr>
<td>□ Symptoms &gt; 3 months</td>
<td></td>
</tr>
<tr>
<td>□ Pain localized to the peri-trochanter</td>
<td></td>
</tr>
<tr>
<td>□ Negative or nondcontributory radiographs</td>
<td></td>
</tr>
<tr>
<td><strong>AND ANY ONE OR MORE OF THESE:</strong></td>
<td></td>
</tr>
<tr>
<td>□ Trendelenburg gait</td>
<td></td>
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<tr>
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<tr>
<td>□ Positive hip lag sign</td>
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</tr>
<tr>
<td>□ Chronic HP + suspected avascular necrosis (AVN) or osteonecrosis</td>
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<tr>
<td>□ Nonspecific hip pain</td>
<td></td>
</tr>
<tr>
<td>□ Painful limited hip range of motion</td>
<td></td>
</tr>
<tr>
<td>□ Antalgic gait</td>
<td></td>
</tr>
<tr>
<td>□ Radiographs inconclusive</td>
<td></td>
</tr>
<tr>
<td>□ Chronic HP + inflammatory or nonspecific arthropathy</td>
<td></td>
</tr>
<tr>
<td>□ Nonspecific hip pain</td>
<td></td>
</tr>
<tr>
<td>□ Limited hip range of motion</td>
<td></td>
</tr>
<tr>
<td>□ Radiographs inconclusive</td>
<td></td>
</tr>
<tr>
<td>□ Positive lab workup for inflammatory arthritis</td>
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</tr>
<tr>
<td>□ Chronic HP + suspected proximal hamstring tendinopathy</td>
<td></td>
</tr>
<tr>
<td>□ Symptoms &gt; 3 months</td>
<td></td>
</tr>
<tr>
<td>□ Primarily pain in posterior buttoc / ischium</td>
<td></td>
</tr>
<tr>
<td>□ Pain with heel strike during gait</td>
<td></td>
</tr>
<tr>
<td>□ Positive resisted hamstring at 30 and/or 90 degrees</td>
<td></td>
</tr>
<tr>
<td>□ Painful sitting and walking</td>
<td></td>
</tr>
<tr>
<td>□ Negative or noncontributory radiographs</td>
<td></td>
</tr>
<tr>
<td>□ Chronic HP + mild osteoarthritis (also appropriate as pre-operative planning tool)</td>
<td></td>
</tr>
<tr>
<td>□ Symptoms &gt; 3 months</td>
<td></td>
</tr>
<tr>
<td>□ Primarily deep anterior hip pain</td>
<td></td>
</tr>
<tr>
<td>□ Positive FADDIR and/or FABER</td>
<td></td>
</tr>
<tr>
<td>□ Radiographs inconclusive</td>
<td></td>
</tr>
<tr>
<td>□ Acute HP + suspected avulsion fracture</td>
<td></td>
</tr>
<tr>
<td>□ Positive mechanism of injury with a painful pop or bruising</td>
<td></td>
</tr>
<tr>
<td>□ Associated muscle weakness</td>
<td></td>
</tr>
<tr>
<td>□ Difficulty with weight bearing</td>
<td></td>
</tr>
<tr>
<td>□ Positive radiographs for avulsion fracture</td>
<td></td>
</tr>
<tr>
<td>□ Acute HP + suspected stress fracture (femoral head/neck)</td>
<td></td>
</tr>
<tr>
<td>□ Acute groin pain</td>
<td></td>
</tr>
<tr>
<td>□ Positive single-leg hop test</td>
<td></td>
</tr>
<tr>
<td>□ Painful and weak hip flexion</td>
<td></td>
</tr>
<tr>
<td>□ Negative impingement testing</td>
<td></td>
</tr>
<tr>
<td>□ Painful weight-bearing</td>
<td></td>
</tr>
<tr>
<td>□ Radiographs positive or equivocal for fracture</td>
<td></td>
</tr>
<tr>
<td>□ Acute HP + suspected dislocation, post-relocation</td>
<td></td>
</tr>
<tr>
<td>□ Positive mechanism of injury</td>
<td></td>
</tr>
<tr>
<td>□ Persistent pain</td>
<td></td>
</tr>
<tr>
<td>□ Limited hip motion</td>
<td></td>
</tr>
<tr>
<td>□ Radiographs have been performed to ensure proper reduction</td>
<td></td>
</tr>
</tbody>
</table>

*During pregnancy, CT may be contraindicated. Consult with radiologist.*
TABLE 8. CT arthrogram* appropriate use indications (ALTERNATIVE recommendation)

<table>
<thead>
<tr>
<th>POST THA (IF ALL)</th>
<th>NOT POST THA (IF ALL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Chronic HP + suspected femoral acetabular impingement or labrum tear</td>
<td></td>
</tr>
<tr>
<td>□ Symptoms &gt; 3 months</td>
<td></td>
</tr>
<tr>
<td>□ Primarily deep anterior hip pain</td>
<td></td>
</tr>
<tr>
<td>□ Positive FADDIR and/or FABER</td>
<td></td>
</tr>
<tr>
<td>□ Negative or noncontributory radiographs</td>
<td></td>
</tr>
</tbody>
</table>

*During pregnancy, CT may be contraindicated. Consult with radiologist.

TABLE 9. Bone scan appropriate use indications (ALTERNATIVE recommendation)

<table>
<thead>
<tr>
<th>POST THA (IF ALL)</th>
<th>NOT POST THA (IF ALL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ HP + suspected hardware failure</td>
<td></td>
</tr>
<tr>
<td>□ Hip and thigh pain</td>
<td></td>
</tr>
<tr>
<td>□ Negative or noncontributory radiographs</td>
<td></td>
</tr>
<tr>
<td>□ Equivocal CT</td>
<td></td>
</tr>
</tbody>
</table>

| □ Acute HP + suspected septic arthritis or osteomyelitis (at the discretion of the hip surgeon) |
| □ Atypical hip pain |
| □ Constitutional symptoms |
| □ Elevated ESR, CRP, or WBC |
| □ No significant positive finding on MRI |
RESOURCES

Intermountain provides educational materials designed to support providers in their efforts to care for, educate, and engage patients and their families.

Intermountain’s patient education materials complement and reinforce clinical team interventions by providing a means for patients to reflect and learn in another mode and at their own pace.

Intermountain’s Care Process Models (CPMs) outline evidence-based guidelines for patient care. In addition to the suite of Intermountain Imaging Criteria CPMs, Intermountain provides topical CPMs that have been developed by expert clinical teams. They can be accessed by navigating to intermountainphysician.org and selecting Care Process Models in the Tools and Resources drop-down menu.

To access Intermountain’s Imaging Criteria CPMs and supporting materials, visit: https://intermountainhealthcare.org/services/imaging-services/intermountain-imaging-criteria/.

Fact sheets:
- Hip Replacement Surgery: Home instructions
- Surgery for Hip Fracture (Geriatric)
- Treatment for Hip Fracture: A decision guide
- Computed Tomography (CT) Scan
- Radiation Exposure in Medical Tests
- Intravenous (IV) Contrast Material

Patient education:
- Managing Chronic Pain
- Pain Med Tracking Sheet

Related Care Process Models (CPMs):
- Prescribing Opioids for Chronic Pain CPM
- Imaging Radiation Exposure CPM
- Geriatric Hip Fracture CPM
INTERMOUNTAIN IMAGING CRITERIA FOR Hip Pain (HP)

BIBLIOGRAPHY

NODE #1


NODE #2


NODE #3


NODE #4


NODE #5


NODE #6


NODE #7


NODE #8


BIBLIOGRAPHY, CONTINUED


NODE #10


NODES #11–13


NODES #14–16


NODE #17


REFERENCES (from pages 1 through 3)


This CPM presents a model of best care based on the best available scientific evidence at the time of publication. It is not a prescription for every physician or every patient, nor does it replace clinical judgment. All statements, protocols, and recommendations herein are viewed as transitory and iterative. Although physicians are encouraged to follow the CPM to help focus on and measure quality, deviations are a means for discovering improvements in patient care and expanding the knowledge base.