Client: HEALTH BENCHMARKS, INC. STANDARD ALGORITHM
Implemented for Blue Cross Blue Shield of Illinois

Measure Title: PLAIN RADIOGRAPHY PRIOR TO MRI OF THE KNEE

Disease State: Knee pain

Indicator Classification: Utilization

Strength of Recommendation: C

Organizations Providing Recommendation:
- American Academy of Orthopedic Surgeons
- American College of Radiology

Clinical Intent: To ensure that an x-ray is conducted prior to an MRI for eligible members diagnosed with knee pain.

Physician Specialties: Mixed Specialty, Surgery-Orthopedic

Background: Disease Burden
- In 1999, patients made 3.7 million visits to primary care physicians for knee pain with the most common diagnoses (and estimated prevalence) being osteoarthritis (34%), meniscal injuries (9%), collateral (7%) and cruciate (4%) ligamentous injuries, gout (2%), and fracture (1.2%).[1]
- Data from administrative sources, Medicare Part B databases, and the Medicare Payment and Advisory Commission (MedPac) indicate that the use of magnetic resonance imaging (MRI) has grown rapidly in the past 15 years compared to other services. From 1991 to 1995, the utilization of MRI to image the knee increased by 140% to 3.4 per 1,000 person years without clear changes for the indications for knee MRI in the same period, prompting the suggestion that it was the increase in the availability of MRI facilities that led to the increase in MRI use.[2]
- From 1993 to 1998, utilization of musculoskeletal MRIs, including imaging of the knee, increased by 142% to 1,058 per 100,000 Medicare beneficiaries from 438 per 100,000 beneficiaries.[3]
- Finally, from 1999 to 2002, the use of non-neurological MRI grew by 20.1% annually per Medicare beneficiary compared to a 3.3% increase in service use for all services over the same time period.[4]

Reason for Indicated Intervention or Treatment
- There is evidence to suggest that utilization of MRI is at least partially explained by the relative ease of access to an MRI facility, not on clinical necessity.[5]
- In a MedPAC report to Congress, significant geographical variation in the use of imaging services does not correlate with improved quality of care.
but instead is sensitive to the supply of such imaging resources.[4]

- Literature reviews have demonstrated that physicians with a vested interest in an imaging facility are 54% more likely to refer a patient for high cost diagnostic procedures such as MRI.[6]
- A review of the price associated with MRI vs. plain radiograph using an online CPT-4 database indicates that, at Medicare Relative Value Payment Amounts, an MRI of the knee costs approximately twenty times more than radiography of the knee.[7]

Evidence Supporting Intervention or Treatment

- No well designed trials have specifically investigated if the use of plain radiograph as opposed to MRI to evaluate knee pain is associated with better patient outcomes like better functional status or decreased pain.
- A review of the literature regarding acute knee trauma determined that the Ottawa Knee Rules were best suited for the appropriate diagnosis of knee trauma and that when effectively applied, the added value of an MRI to the accuracy of a diagnosis was marginal.[1] These rules are nearly 100% sensitive and 49% specific in detecting clinically significant fracture.[8]
- Literature reviews have shown that plain radiographs are 91% sensitive and 86% specific for osteoarthritis when combined with criteria indicating osteoarthritis including any of the following: age older than 50 years, crepitus, and morning stiffness of 30 minutes or less.[1]
- Limitations in published research in this field include: lack of blinding to test results when comparing the index test with a gold standard test, lack of or inappropriate comparison groups, incomplete description of the content of the examination of the knee, knee examinations performed by specialists rather than generalist physicians, and the lack of any data on inter-observer agreement or reliability.[1]

Clinical Recommendations

- According to guidelines from the American College of Radiology an MRI of the knee should be performed only for a valid medical reason and after careful consideration of alternative imaging modalities. An analysis of the strengths of MRI and other modalities should be weighed against their suitability for particular patients and particular clinical conditions. Radiographs frequently will be the first imaging test performed for suspected bone and soft tissue abnormalities in the knee and will often suffice to diagnose or exclude an abnormality or will direct further imaging work-up.[14]
- The American Academy of Orthopedic Surgeons clinical guideline for knee osteoarthritis recommends history, physical exam, laboratory testing, and plain radiography; MRI is not a first line study in the diagnosis or evaluation of osteoarthritis of the knee.[9] The American Academy of Orthopedic Surgeons clinical guideline for acute knee injury recommends history, physical exam and plain radiography as necessary. MRI is not recommended for initial evaluation of knee injury.[10]
- The Brigham and Women’s Hospital’s guideline for the diagnosis of
lower extremity musculoskeletal disorders recommends plain films in cases where osteoarthritis is suspected and in cases where ligament or meniscus damage is suspected to rule out the possibility of knee fracture. MRI is only recommended after clinical examination, never as a primary diagnostic tool.[11]

**Source**  
Health Benchmarks, Inc.

**Denominator Definition**  
Continuously enrolled members ages 18 years and older by the end of the measurement year who received a primary diagnosis of knee pain and underwent an MRI of a knee during the measurement year.

**Denominator Codes**  
*Knee pain/injury*  
ICD-9 diagnosis code(s): 712.x6, 715.00, 715.09, 715.10, 715.16, 715.18, 715.20, 715.26, 715.28, 715.30, 715.36, 715.38, 715.80, 715.86, 715.88, 715.90, 715.96, 715.98, 716.00, 716.06, 716.08, 716.09, 716.10, 716.16, 716.18, 716.19, 716.20, 716.26, 716.28, 716.29, 716.30, 716.36, 716.38, 716.39, 716.40, 716.46, 716.48, 716.49, 716.50, 716.56, 716.58, 716.59, 716.60, 716.66, 716.68, 716.80, 716.86, 716.88, 716.89, 716.90, 716.96, 716.98, 716.99, 717.xx, 718.00, 718.08, 718.09, 718.10, 718.18, 718.19, 718.20, 718.26, 718.28, 718.29, 718.30, 718.36, 718.38, 718.39, 718.40, 718.46, 718.48, 718.49, 718.50, 718.56, 718.58, 718.59, 718.60, 718.70, 718.76, 718.78, 718.79, 718.80, 718.86, 718.88, 718.89, 718.90, 718.98, 718.99, 719.00, 719.06, 719.08, 719.09, 719.10, 719.26, 719.28, 719.29, 719.30, 719.36, 719.38, 719.39, 719.40, 719.46, 719.48, 719.49, 719.50, 719.56, 719.58, 719.59, 719.60, 719.66, 719.68, 719.69, 719.80, 719.86, 719.88, 719.89, 719.90, 719.96, 719.98, 719.99, , 729.5, 821.xx, 822.xx, 823.xx, 827.xx, 828.xx,829.xx, 836.xx, 844.x, 924.4, 924.5, 924.9, 924.11, 928.11, 928.8, 928.9, 959.7  
*Knee MRI*  
CPT-4 code(s): 73721, 73722, 73723

**Denominator Exclusion Definition**  
Members who had a diagnosis for which an MRI is primarily indicated during the 0-6 months prior to the index date (inclusive of the index date).

**Denominator Exclusion Codes**  
*Extensor mechanism abnormalities:*  
ICD-9 diagnosis code(s): 727.65, 727.66  
*Synovial-based disorders:*  
ICD-9 diagnosis code(s): 727.51  
*Aseptic necrosis of medial femoral condyle:*  
ICD-9 diagnosis code(s): 733.43  
*Muscle and tendon disorders:*  
ICD-9 diagnosis code(s): 726.6x  
*Neoplasms of bone, joint, or soft tissue:*  
ICD-9 diagnosis code(s): 170.7, 170.8, 171.3x  
*Infections of bone, joint, or soft tissue:*  
ICD-9 diagnosis code(s): 730.x6, 711.x6  
*Congenital and developmental conditions:*  
ICD-9 diagnosis code(s): 732.4  
*Vascular conditions:*  
ICD-9 diagnosis code(s): 732.4
ICD-9 diagnosis code(s): 442.3

**Numerator Definition**
Members who had a radiograph of the knee 0-6 months prior to the index date (inclusive of the index date).

**Numerator Codes**
Radiograph, Knee:
CPT-4 code(s): 73560-73565, 73580
ICD-9 surgical proc code(s): 88.27

**Physician Attribution Description**
Score all physicians (in the selected specialties) who diagnosed the member with knee pain or injury (as defined in denominator criterion [A]; use any diagnosis field) during the 0-6 months prior to the index date (including the index date).

**References**