IRISH ASSOCIATION FOR EMERGENCY MEDICINE

IAEM Clinical Guideline

The Limping Child

Version 1.0

August 2023

Authors: Dr Abdullah Rana, Dr Laura Melody

Guideline lead: Dr Laura Melody, in collaboration with IAEM Clinical Guideline Committee and Our Lady's Children's Hospital Crumlin, Dublin, Ireland.

To reference this document please reference as:

Rana A, Melody L. Limping child. IAEM Guidelines 2023. https://iaem.ie/professional/clinical-guidelines/ (accessed 1st May 2023)

DISCLAIMER

IAEM recognises that patients, their situations, Emergency Departments and staff all vary. These guidelines cannot cover all clinical scenarios. The ultimate responsibility for the interpretation and application of these guidelines, the use of current information and a patient's overall care and wellbeing resides with the treating clinician.

Revision History

Date	Version	Section	Summary of changes	Author
August 2023	V1.0	All	Final Version	AR/LM

CONTENTS

GLOSSARY OF TERMS

AP	Anteroposterior
CK	Creatine Kinase
CRP	C-reactive Protein
DDH	Developmental Dysplasia of the Hip
ED	Emergency Department
ESR	Erythrocyte Sedimentation Rate
FBC	Full Blood Count
LDH	Lactate Dehydrogenase
MRI	Magnetic Resonance Imaging
MRSA	Methicillin-Resistant Staphylococcus Aureus
NAI	Non-Accidental Injury
SUFE	Slipped Upper Femoral Epiphysis

The Limping Child

INTRODUCTION

Limping can be defined as a deviation from the normal gait pattern expected for a child's age.[1] Most children who present to the ED with a limp will have pain causing the child to limp. It is important to remember that the pain may be a referred pain (e.g., pain in the knee may be referred from the hip, and hip pain may be referred from the back or abdomen). NAI should also be considered in children presenting with an atraumatic limp.

Given that this is a relatively common presentation with various different underlying aetiologies, this guideline aims to provide clarification regarding necessary investigations, interventions, and ultimate disposition of these patients. It is worth noting that a vast majority of these patients do not require any investigations and this guideline aims to help clinicians to differentiate between patients who require further investigations, and those who can be managed without additional testing.

PARAMETERS

Target audience:	This guideline is directed at healthcare professionals engaged in the care of paediatric patients presenting to the ED with a non-traumatic limp.
Patient population:	Children and adolescents aged 16 years and under who present to the ED with a non-traumatic limp.
Exclusion criteria:	Age over 16 years. History of trauma. Previous surgery to the spine, pelvis, or lower limbs. Ataxic gait, as opposed to limp.

AIMS

The aim of this guideline is to assist clinicians in the initial assessment, management, and definitive care of paediatric patients presenting to the ED with a non-traumatic limp. The objective is to avoid unnecessary investigations and interventions, and optimise the care and outcomes of paediatric patients.

ASSESSMENT

It is helpful to categorise the different causes of limp by the child's age, as shown in the Table 1, below.



Toddler (0-4 years)	Child (5-10 years)	Adolescents (> 10 years)
Transient Synovitis	Perthes Disease	Slipped Upper Femoral Epiphysis
Acute Myositis	Transient Synovitis	Stress Fractures and Sprains
Toddlers fracture	Acute Myositis	Traction Apophysitis (Osgood-Schlatter – Tibial Tuberosity, Severs-Calcaneus)
Developmental Dysplasia of the hip	Developmental Dysplasia of the hip	Juvenile/Rheumatoid Arthritis

Causes to consider in all ages

- Non-Accidental
- Infectious – Osteomyelitis, Septic arthritis, Discitis, Bursitis, Epidural Collection
- Malignancy – Bone, Soft tissue, Haematological
- Rheumatological disorders – Reactive/Autoimmune Arthritis, Post-Infectious arthritis, Henoch Schonlein Purpura, Vasculitis, Serum sickness, Guillain- Barre Syndrome
- Intra-abdominal or Genitourinary conditions – Acute appendicitis, Ovarian/Testicular torsion
- Haematological – Vaso-occlusive crisis in sickle cell, Haemophilia

Table 1: Table showing common causes of limp by age. (Source: Royal Children's Hospital, Melbourne)

The vast majority of patients presenting to the ED will not require investigations, and can be discharged appropriately from the ED. Therefore, a detailed history and a careful examination are essential.

History

The following points in the history should be elicited:

- Recent viral infection. This could be associated with transient synovitis or myositis.
- Duration of the limp.
- Systemic and constitutional symptoms (fever, lethargy, anorexia, weight loss, night sweats, etc.). If these features are present, this may indicate a serious underlying pathology[2], and should always have further work-up and senior review before discharge.
- Nocturnal pain/symptoms.
- Localised severe joint pain, especially with a fever. This could indicate septic arthritis.
- Inability to walk. This may suggest severe underlying pathology. In general, a child who is unable to walk despite adequate analgesia should always be admitted for further work-up and senior review)
- Changes to urinary/bowel habits.

Examination

- Assess gait, if possible. Ideally this should include walking and running.
- Assess for unexplained rash or bruising. This may indicate underlying haematological or inflammatory joint disease. NAI should be considered.
- Examine joints using “Look, Feel, Move” technique. This should be performed on the joint of interest, along with the joints above and below, keeping in mind that the pain may be referred.[3]

Look: leg length discrepancy, pelvic asymmetry, swelling, skin changes, or any obvious deformities.

Feel: palpate the spine, abdomen, and testis (where appropriate) for tenderness, feel for peripheral pulses, and perform a peripheral neurological exam where applicable.

Move: tone, power, reflexes, along with active and passive range of motion at each joint. Always compare to the opposite side.

MANAGEMENT OF LIMPING CHILD

Please see the algorithm below for the management of the limping child (Figure 1).

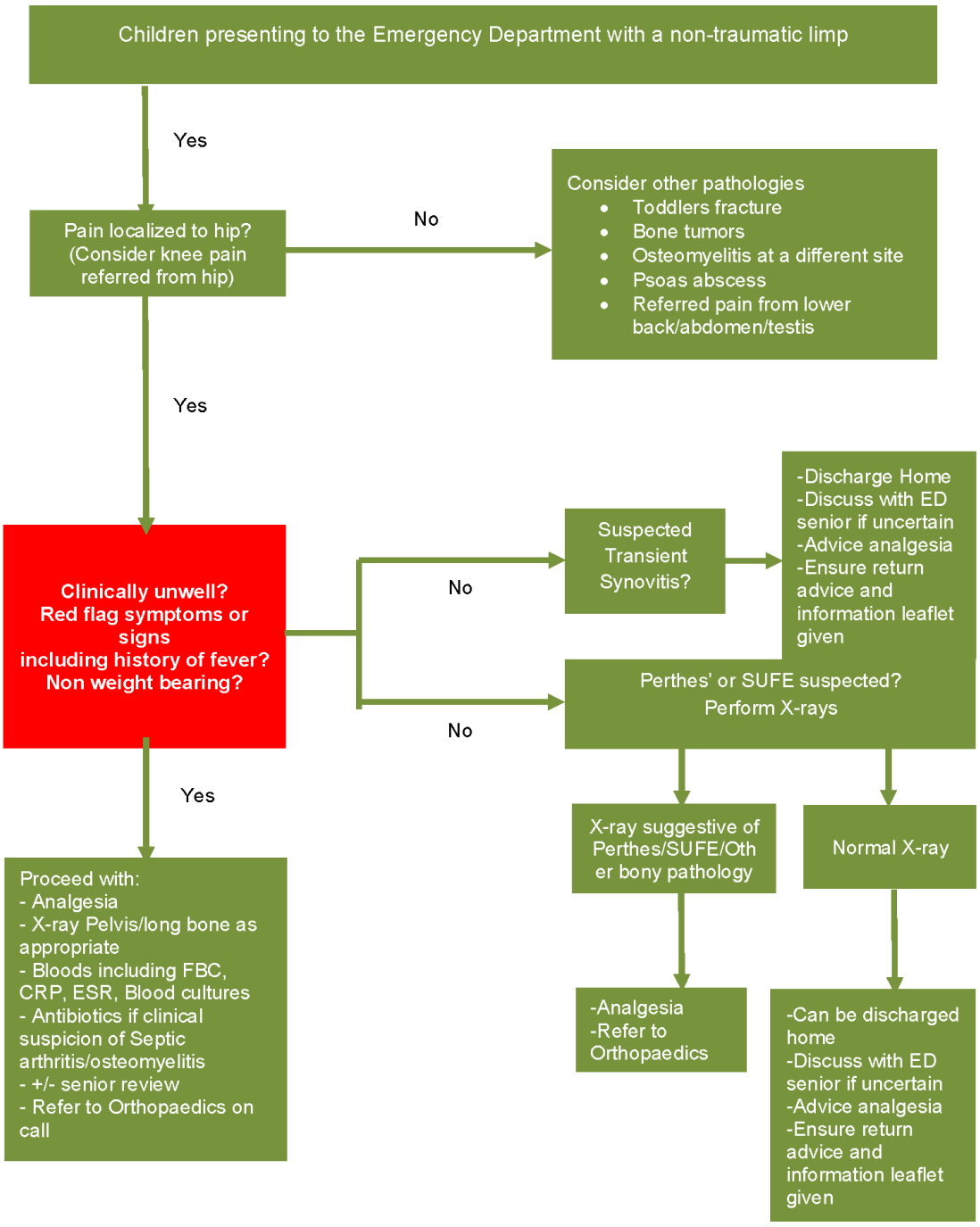

Figure 1: Algorithm for management of a limping child presenting to the Emergency Department.

Investigations

No investigations are indicated if **all** of the following are present[4]:

- No red flags in history or exam.
- Mobile child with mild or no discomfort, and requiring simple analgesia.
- Clear working diagnosis / return advice if limp not settling within a week, or as discussed with an ED senior.

Imaging

- Standard x-rays are useful as first-line imaging modality. Pelvis AP and frog leg view are useful for identifying SUFE, DDH (>6 months-old), Perthes disease, and common pelvic avulsion injuries.
- It is important to remember that a **normal x-ray does not** exclude early Perthes disease, septic arthritis, or osteomyelitis[5].
- If there is a high index of suspicion for an underlying Perthes disease, septic arthritis, or osteomyelitis, an MRI may be warranted. This may require further discussion with the orthopaedic or radiology team, as per local agreement.

Laboratory Tests

Blood tests will not be indicated in all cases. Consider doing blood tests if there is clinical suspicion of septic arthritis, osteomyelitis, malignancy, or underlying haematological disease.

- FBC, CRP, ESR are the first-line laboratory investigations[6].
- Consider adding CK if myositis is suspected.
- Add clotting profile, LDH, and urate level if underlying malignancy is suspected.
- Blood cultures if there is clinical suspicion of septic arthritis, septic bursitis, or osteomyelitis.

- If there is suspicion of an underlying infective process, send MRSA screen if history of prior hospitalisation or history/family history of MRSA.
- Send wound swab of any visibly infected skin area.

DIFFERENTIAL DIAGNOSES

Transient Synovitis[7]

- Self-limiting inflammatory disorder of the hip, which is more common in boys, and in patients, aged 3-10 years of age.
- Presents acutely with mild to moderate hip pain and limp, in an otherwise well child.
- Usually occurs after a viral illness, although not always.
- Diagnosis of exclusion, after all other possibilities have been considered.
- Ensure no red flag symptoms or signs are present.
- No specific investigations required.
- Can be discharged from ED on simple analgesia, and with return advice (parent information leaflet, if available).

Perthes' disease[8]

- Idiopathic avascular necrosis of the femoral head, which is more common in boys aged 5-15 years old.
- Can present as hip pain, or referred pain to the thigh, groin, or knee over a period of days to weeks.
- Typically unilateral, although can be bilateral in approximately 10-20%.
- Child is systemically well, with no other joint involvement or evidence of joint inflammation.

- Obtain pelvis x-rays as first-line imaging. Early x-rays may be normal. An example of an x-ray suggestive of Perthes' disease is seen in Figure 2. Other x-ray signs may be found here: https://radiopaedia.org/articles/perthes-disease
- Once diagnosis is radiographically confirmed, or there is a high index of suspicion despite normal pelvis x-rays, refer to orthopaedics team.

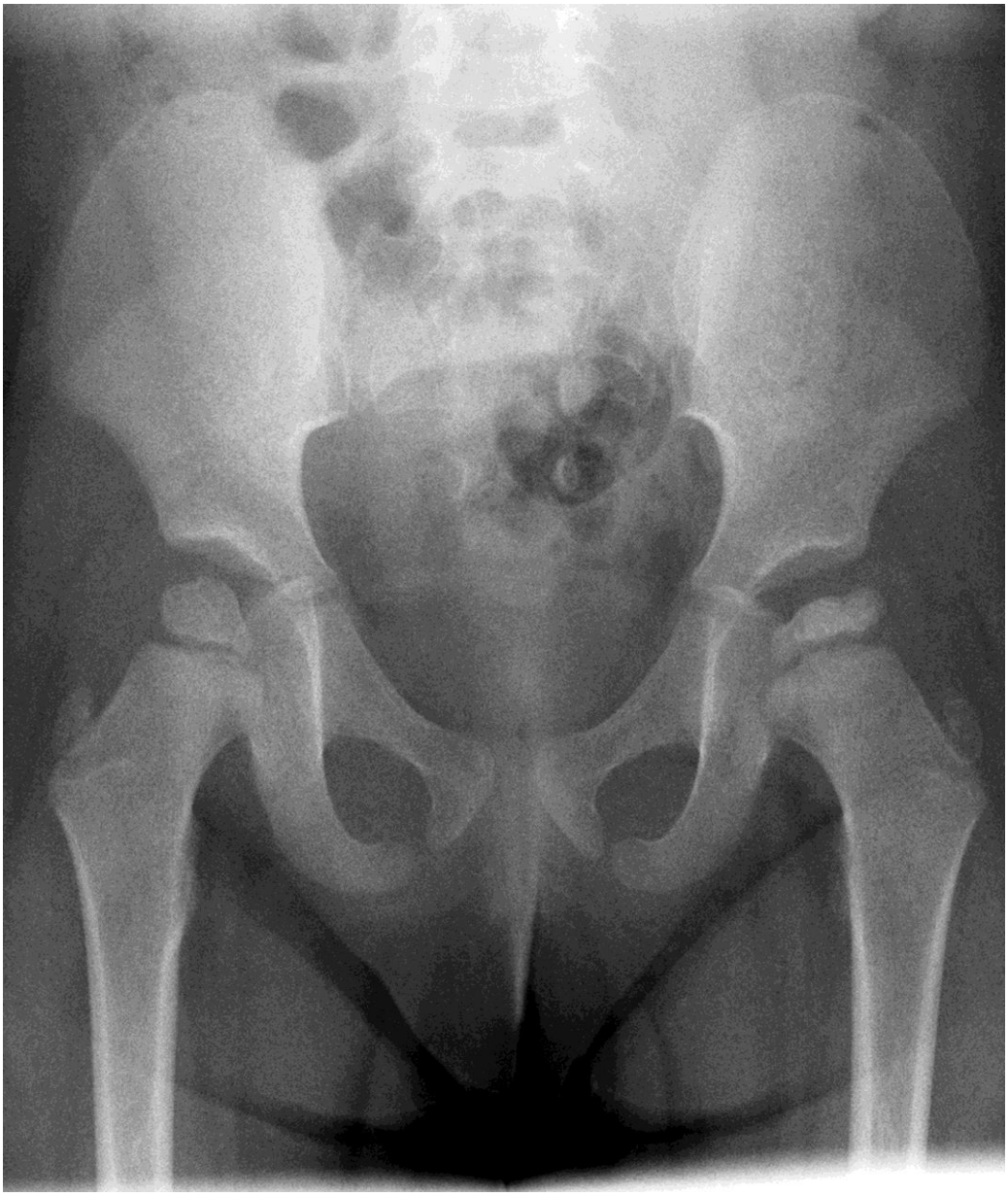

Figure 2: AP pelvis x-ray showing left sided Perthes' disease with evidence of flattening and sclerosis of the left femoral epiphysis (Source: Orthobullets)

Slipped Upper Femoral Epiphysis (SUFE)

- Tends to be more common in boys aged between 10-15 years old. Male : female ratio is approximately 2 : 1.4.
- 50% of patients have body weight above the 95th centile for weight[9], or alternatively may be excessively tall and lean.
- May have associated underlying renal disease or endocrinopathies, including hypothyroidism, hypogonadism, acromegaly, or hyperparathyroidism.[10]
- May be bilateral in up to 25% of cases[11], hence AP views and bilateral frog views should be obtained as first-line. MRI may be needed in specific cases.
- Once diagnosis is radiographically confirmed or there is a high index of suspicion despite normal pelvis x-rays, refer to orthopaedics team.

To check for SUFE on an AP-Pelvis x-ray (Figure 3)

- Klein's line is drawn along the radiographic border of the superior aspect of the neck of the femur. This line should intersect the epiphysis.
- Klein's line is normal on the left hip, where it intersects the superior femoral epiphysis.
- Klein's line with slip on the right hip; the epiphysis is out of alignment. This sign is called Trethowan’s sign, and is indicative of SUFE.

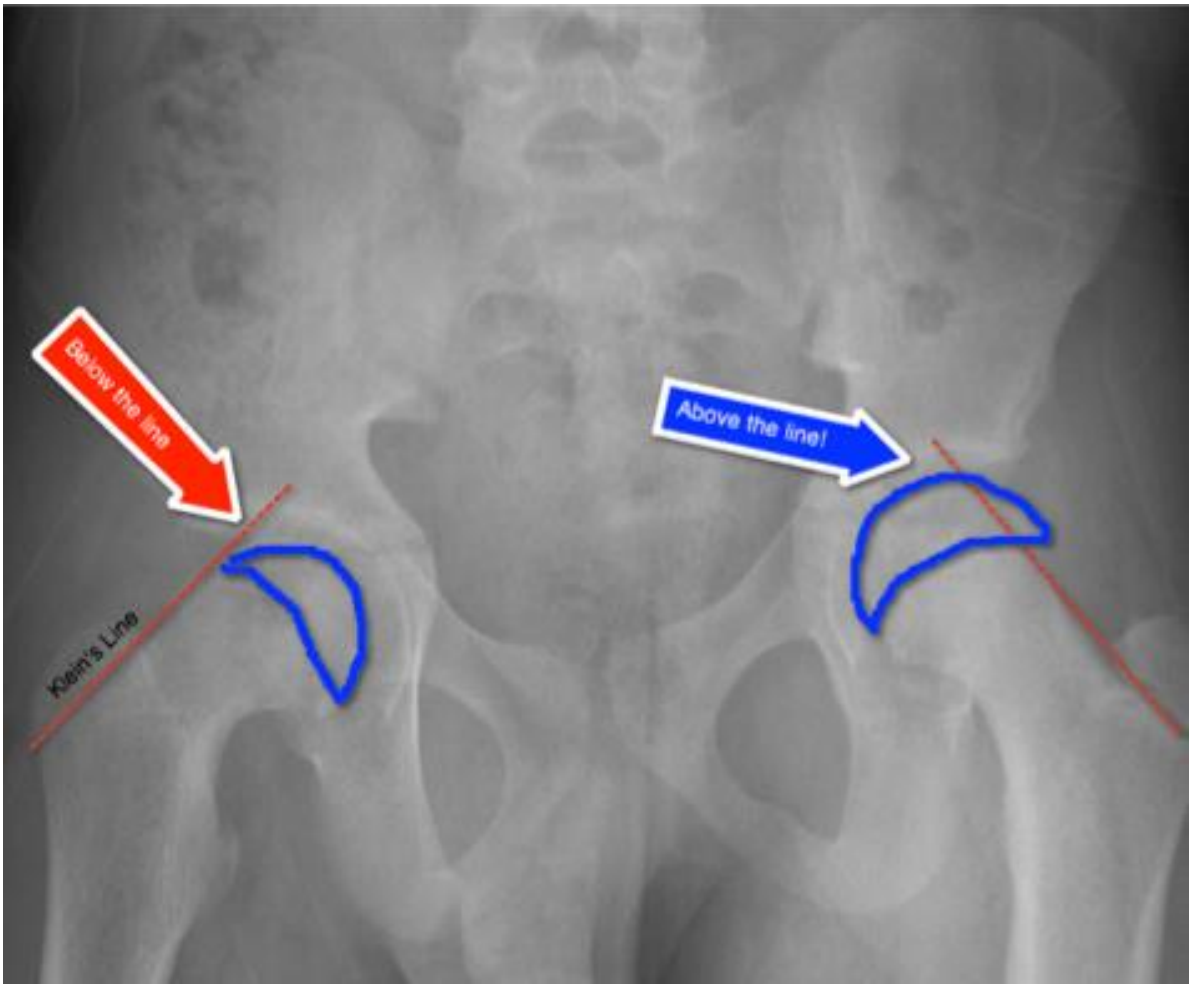

Figure 3: AP pelvis x-ray showing right sided SUFE. Trethowan's sign is demonstrated on the right; Klein's line, drawn along the superior aspect of the femoral neck, does not intersect the superior femoral epiphysis. (Source: Orthobullets)

Septic Arthritis

- Consider as a possible differential for the limping child in all age groups.
- Pain is the most common presenting symptom of septic arthritis, followed by joint swelling, fever, sweats, and rigors.
- Children who are immunocompromised, have sickle cell disease, or who have haemophilia are more likely to develop septic arthritis of the hip than other children.[12]

- Clinical suspicion is the most important diagnostic tool in diagnosis in these cases as even apyrexial patients with a normal white cell count can have septic arthritis.
- X-ray may show signs of effusion. If a large effusion is present, but otherwise serves mainly to rule out other underlying pathology.
- Once the working diagnosis of septic arthritis is made, provide adequate analgesia, send appropriate blood tests, and refer to the orthopaedic team on-call.
- Modified Kocher's criteria, shown below in table 2, is useful in determining the likelihood of septic arthritis.[13]

Criteria	Number of Positive Criteria	Probability of Septic Arthritis
Non weight bearing	0	16.9%
Temp > 38.5	1	36.7%
ESR > 40mm/1st hour	2	62.4%
WCC > 12000/mm^3	3	82.6%
CRP > 20	4	93.1%
	5	97.5%

Table 2: Modified Kocher's criteria [13]

COMPANION DOCUMENTS

- RCH- Clinical Guidelines
- Radiopaedia- Perthe's Disease
- Transient Synovitis of the Hip - Orthobullets
- SUFE- Orthobullets
- Paediatric Hip Septic Arthritis - Orthobullets

REFERENCES

1. Nelson WE, Behrman RE, Kliegman R, Arvin AM. *Textbook of Pediatrics*. 15th ed. Philadelphia, Pa: Saunders; 1996.
2. Sinigaglia R, Gigante C, Bisinella G, Varotto S, Zanesco L, Turra S. Musculoskeletal manifestations in pediatric acute leukemia. *J Pediatr Orthop*. 2008 Jan-Feb. 28 (1):20-8. [Medline].
3. Adamson, J. and Waterfield, T. (2020) Fifteen-minute consultation: the limping child. *Archives of Disease in Childhood* **105**(3), 137-141.
4. Dubois-Ferrière V, Belaieff W, Lascombes P, de Coulon G, Ceroni D. Transient synovitis of the hip: which investigations are truly useful?. *Swiss Med Wkly*. 2015. 145:w14176
5. Ortega R.R. Septic Arthritis: a Real Emergency. Radiological manifestations. Advantages and disadvantages associated to the different types of tests based on images. *European Congress of Radiology.* 2014:11
6. Unkila-Kallio L, Kallio MJ, Eskola J, Peltola H. Serum C-reactive protein, erythrocyte sedimentation rate, and white blood cell count in acute hematogenous osteomyelitis of children. *Pediatrics*. 1994 Jan. 93 (1):59-62
7. Rossiter DJ, Ahluwalia A, Vo P, Mapara R. The limping child: a systematic approach to assessment and management. Br J Hosp Med (Lond). 2018 Oct 2;79(10):C150-C153. doi: 10.12968/hmed.2018.79.10.C150. PMID: 30290754
8. Mills S, Burroughs KE. Legg Calve Perthes Disease. [Updated 2021 Jul 13]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan
9. Murray AW, Wilson NI. Changing incidence of slipped capital femoral epiphysis: a relationship with obesity?. *J Bone Joint Surg Br*. 2008 Jan. 90 (1):92-4
10. Burrow SR, Alman B, Wright JG. Short stature as a screening test for endocrinopathy in slipped capital femoral epiphysis. *J Bone Joint Surg Br*. 2001 Mar. 83 (2):263-8
11. Loder RT, Skopelja EN. The epidemiology and demographics of slipped capital femoral epiphysis. ISRN Orthop. 2011;2011:486512.

12. Momodu II, Savaliya V. StatPearls [Internet]. StatPearls Publishing; Treasure Island (FL): Jul 8, 2021. Septic Arthritis
13. Kocher MS, Mandiga R, Zurakowski D, Barnewolt C, Kasser JR. Validation of a clinical prediction rule for the differentiation between septic arthritis and transient synovitis of the hip in children. J Bone Joint Surg Am. 2004 Aug;86(8):1629-35. doi: 10.2106/00004623-200408000-00005. PMID: 15292409