Self Directed Learning Program
For
Triage Requested X-Ray Procedures

Medical Directive for Emergency Room Nursing and Paramedical Staff

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Introduction / Purpose of the Learning Module:

Musculoskeletal injuries, including sprains and strains account for a high percentage of minor injuries seen in Emergency Departments. Without appropriate treatment they can be serious and debilitating. Inadequate care can result in chronic pain, re-injury and long term disability. Recognizing the injury correctly and providing the appropriate investigations and treatment as soon as possible will provide the best chance of complete recovery. Research done over the last 15 years has indicated that triage initiated x-ray requests are appropriate and have the potential to decrease waiting times and increase patient and staff satisfaction in the emergency room. (Lindley-Jones, M and Finlayson,BJ, 2000; Tambimutu,J et al 2002;

Learning Outcomes:

At the end of this program, you will be able to:
- Gather a comprehensive history relative to the injury
- Conduct an advanced musculoskeletal and neurovascular assessment
- Determine appropriate x-ray views

INSTRUCTIONS FOR COMPLETION

1. Please do not write in this module. Record your answers on a separate piece of paper.

2. Review each section of the learning module, consulting with additional cited resources as needed.

3. Complete the self-tests or learning activities within or at the end of each section of the module to assess your understanding of the material. Review the appropriate sections of the module for those questions you did not answer correctly.

4. Obtain the post-test answer sheet(s) from your preceptor/nurse manager/clinical educator or photocopy the sheet(s) available in the manual.

5. Complete the post-test(s) and submit it/them to your nurse manager/clinical educator.

6. If you do not achieve a minimum of 85% on the post-test, your Nurse Manager and /or the Clinical Educator will contact you.
SECTION 1
The Comprehensive Patient History/ Assessment

Learning Objectives:
On completion of this section, the learner will be able to:
• Identify the key components of the patient history and generic physical assessment related to musculoskeletal injury

Instructions:
Read and carefully consider the policy that accompanies this Learning Pack, in addition to any other required reading or video presentations related to each of the Learning Objectives. Continue to read the rest of the material within this Section and discuss the reflective questions at the end with your preceptor or experienced colleague.

Required Readings:


Chapter 2: Hand
Chapter 3: Wrist
Chapter 4: Elbow
Chapter 5: Shoulder
Chapter 6: Pelvis and Hip- read hip sections only
Chapter 7: Knee
Chapter 8: Ankle
Chapter 9: Foot
Chapter 16: Emergency Paediatric Radiology
Gathering a comprehensive history relative to injury:

The value of careful history taking in musculoskeletal injuries is often underestimated. In fact, knowing the precise mechanism of injury or listening carefully to the patient’s symptoms may be the key to diagnosing fractures or dislocations (Tintinalli, 2005). It would be a simple process to order an x-ray of the site that the patient has indicated is causing pain. However, this may not be the only injury that the patient has sustained. For instance, a patient who reports that he fell from some height and has pain in his ankles may also have injuries to the tibia/fibula, femur, pelvis and lumbar vertebrae.

The patient may also have co-morbid conditions that can significantly contribute to the potential severity of the injury, or prolong and complicate their recovery process, i.e. diabetes, anticoagulant medications, steroids, osteoporosis, etc.

A comprehensive history is key to helping determine the actual injury, and the factors that could significantly complicate management and subsequent recovery.

Components of a Patient History:

General History:

Initial subjective data includes the patient’s age, chief complaint or presenting problem, the history of that complaint, any other injuries sustained, allergies, and dominant hand.

The medication history can be important as many drugs can affect the musculoskeletal system. Corticosteroids, for instance, can cause muscle weakness, myopathy, osteoporosis, etc. If the patient is stable, additional information should include their:

- Past medical history, including similar or other injuries
- Past surgical history and health habits, (especially smoking, alcohol use, caffeine, etc.)
- Family and social history (FH of joint, auto immune disease or genetic disorders may be relevant to the injury; May need to screen for abuse if suspicions are aroused, especially in vulnerable groups)

It may also be relevant to explore occupation and hobbies if it is expected that the injury will have an impact on a patient’s ability to continue to pursue them. It would be useful to explore the effects the injury may be having on their ability to perform ADL’s, particularly in the elderly, as additional home supports may need to be part of eventual care planning and discharge.
Specific History Related to the Injury:

A history of the injury is obtained from either the patient or someone familiar with the incident. Ask the patient to identify what was injured and describe what was felt or heard upon injury. Their pain scale should also be assessed in relation to the origin, type and radiating characteristics. It may also be useful to determine whether the patient has taken anything for pain relief and how effective it was. They may also be able to describe any aggravating or relieving factors that affect their pain. In general, pain related to a fracture is usually localised around the fracture site.

Next, the actual mechanism of the injury must be determined. How, what, where, and when, are some of the questions that can help to determine the type and mechanism of injury:

- How did the injury happen? Did you receive a direct impact to the limb? Were there deceleration forces involved?
- What were you doing at the time of injury? What position was the limb in during the injury?
- Where did the injury occur?
- When did it occur?

Other questions may arise as you try to learn more about the actual circumstances of the injury. Gathering information related to the degree of force and mechanism of injury can assist in determining the severity of the injury. This can also help the practitioner detect any additional tissue or bony injuries.

Components of the Physical Assessment:

There are several steps basic to all orthopaedic examinations that should be followed when examining the injured limb:

- **LISTEN** History – (as above)
- **LOOK** Inspection
- **FEEL** Palpation
- **MOVE**
- **STRESS**

  - **Look**: at the joint and surrounding area inspecting for,

    - deformity,
    - swelling,
    - bruising,
    - wounds, lacerations, abrasions
    - inflammation / infection.
- **Feel:** gently palpate for
  
  - tenderness, attempting to differentiate soft tissue from bony tenderness
  - swellings or effusion (hemarthrosis),
  - temperature changes,
  - crepitations,
  - for distal pulse, capillary refill and sensation.

- **Move:** assessing the range of movement (ROM), and the presence and extent of the patient’s pain and limitations; it is also important to check ability to weight bear in injuries of the lower limbs.

  - active movement is observed first, prior to passive movement,
    - active movements – those that the patients performs for themselves
    - passive movements – those that we perform for the patients
  - always compare the ROM with the opposite side.

**Neurovascular Assessment:**

Based on the outcome of your general assessment, you will be able to determine whether a more detailed neurovascular assessment is required, and using the 6P’s is a useful guide:

- **P**ain: Ask the patient if he feels pain. Assess the location, severity, quality, aggravating and relieving factors, radiation, etc. of that pain.

- **P**aresthesia: Assess for loss of sensation by touching the injured area with the tip of an open safety pin. Abnormal sensation or loss of sensation indicates neurovascular involvement.

- **P**aralysis: Assess whether the patient can move the affected area. If he can’t, there may be tendon or nerve damage.

- **P**allor: paleness, discolouration on the injured side may indicate neurovascular compromise.

- **P**ulse: Check all pulses distal to the injury site. Decreased or absent pulse means reduced blood flow to the area.

- **P**olar: Coolness of the area indicates neurovascular compromise.
The next two sections will identify the most common injuries of the upper and lower limbs and any specific elements, signs or symptoms that may be determined during the history and examination.
Figure 1.0: History and Assessment in Summary

Undertake primary/secondary assessment

**Actual or life/limb threatening injuries?**

- **YES**
  - Consult with ERP immediately
- **NO**

**Identify General History:**
- Presenting problem
- Age of patient
- Current/past history
- Relevant surgical history
- Routine or recent medications
- Allergies
- Social history

**Identify Specific History:**
- Site of injury
- Mechanism of injury
- Time of injury
- Neuro-vascular assessment
- Tetanus status (if open wound)
- Pain

**Consider the following as part of the assessment:**
- Localised swelling/deformity
- Bruising
- Associated lacerations/abrasions
- Associated joint dislocations
- Assess joint above and below injury
- Localised pain
- Neurovascular Assessment
- Range of movement and weight bearing
- Ottawa ankle rules/knee rules
SECTION 1 Review

Complete the following reflective questions. Review the material in Section 1 for any questions that you are unable to answer.

1. What is included in a patient history that is related to an injury?

2. Why is it important to understand the mechanisms of injury?

3. What additional patient information can be important to include?

4. What is the purpose of the neurovascular assessment?
SECTION 2

Upper Extremity Injuries and Fractures

Learning Objectives:
On completion of this section, the learner will be able to:
• Identify the key components of the patient history and physical assessment related to specific musculoskeletal injury in the upper extremities.

Instructions:
Read and carefully consider the policy that accompanies this Learning Pack, in addition to any other required reading or video presentations related to each of the Learning Objectives. Continue to read the rest of the material within this Section and discuss the reflective questions at the end with your preceptor or experienced colleague.
Part 1: The Hand and Wrist

History and Mechanism of Injury

Injuries to the wrist are generally caused by a fall onto the outstretched hand, (FOOSH) commonly resulting in pain, swelling, and reduced ROM.

**Common injury patterns and indications for x-ray**

1) **Soft tissue injuries:**

   a) **Wrist sprains.** Usually, no localising bony tenderness but often diffuse soft tissue tenderness, especially over dorsal aspect of joint line and distal radioulnar joint. Pain is worse on movement than on palpation.

      *No indication for x-ray.*

   b) **Tenosynovitis.** No clear history of significant trauma or localising bony tenderness. Often associated with repetitive movements, i.e. exercise or gardening, and accompanied by the gradual onset of increasing wrist discomfort with soft tissue swelling over dorsal aspect of distal radius. Crepitus may be felt with wrist movements.

      *No indication for x-ray.*

2) **Common Fractures:**

   a) Distal radius and ulnar injuries are amongst the most common fractures seen in ER. Patients are more frequently female and over the age of 50 yrs, often presenting with a simple history of “FOOSH” with the wrist in extension. This results in the classic “dinner fork” deformity associated with Colles’ fractures.

   b) A similar injury of “FOOSH” with the hand held in flexion, may produce a Smith’s (or reverse Colles’) fracture. Whilst the deformity may be different, the indications and threshold for x-ray request are the same.

      *If swelling and localising tenderness over distal radius – x-ray wrist.*
c) Scaphoid injuries are generally associated with relatively high impact accidents, most frequently involving young adult males. There are very few convincing signs on examination. Tenderness in the anatomical snuff box (ASB) and discomfort on axial loading of the thumb being the most commonly observed signs.
In view of the seriousness of potential complications, there is a relatively low threshold for x-ray.

*If tenderness present in the ASB – X-ray wrist.*

**Childhood injuries**

d) Due to bone growth and development being incomplete, relatively minor trauma can produce *greenstick* and *torus* fractures of the distal radius / ulna. Children will often forget about an injury very quickly. Those that are not using a limb when seen in triage may well have bony injury with very little in the way of signs. Listen carefully to what the parent says as swelling, tenderness and reduced range of movement may all be very subtle.

*In view of the often subtle signs, if localising tenderness over the distal radius – x-ray wrist.*

**Hand and Finger Injuries**

There are a variety of injury mechanisms causing hand and finger injuries. Where there is swelling, bruising, tenderness and reduced ROM, with or without deformity, then it would be prudent to x-ray.

Commonly seen injuries include:

a) **Fractured neck of 5th metacarpal**, although injury can occur at the head of the 4th or other metacarpals (Boxers fracture). Usually seen in young male adults and the mechanism generally involves punching and less frequently, a fall onto the knuckles.

*If swelling and tenderness over distal 5th MC – x-ray.*

b) **Avulsion injuries** of terminal phalynx, (mallet deformity or baseball finger). Generally caused by a direct blow to the hyperextended finger, causing sudden and violent hyperflexion / hyperextension, usually of the terminal phalanx. Injury is typical at the second digit as the result of forced hyperflexion – i.e. catching a ball.

*If joint tenderness, swelling or laxity – x-ray to exclude avulsion #.*
c) Bennetts Fracture, an oblique fracture of the base of the first metacarpal with associated dorsal dislocation or subluxation. Generally occurs due to an axial blow on a partially flexed first metacarpal, such as would occur during delivery of a punch with a clenched fist. Failure to treat rapidly and appropriately can lead to disability.

*Acute, severe pain and swelling at base of thumb, grossly reduced movement at first metacarpal joint – x-ray*

**Additional Optional Readings:**

http://www.aafp.org/afp/20040415/1941.pdf


**Additional Optional Video Presentation:**

mms://a332.v.32454.c.3245.g.vm.akamaistream.net/7/332/3245/v0001/www.hss.edu/files/HandandWristExamforWeb.wmv

http://www.wikiradiography.com/page/Radiography+of+Subtle+Wrist+Fractures
Hand and Wrist Quick Anatomy Review:

Attempt to label the diagram below. Check your answers against the education link noted below.

Diag 1.

http://chionline.com/anatomy/anat4.html
Part 2: The Forearm and Elbow

History and Mechanism of Injury

Injuries to the elbow and forearm are generally caused by a fall onto the outstretched arm or by direct trauma to the point of the elbow.

Common injury patterns and indications for x-ray.

1) Soft Tissue Injuries
   a) Elbow sprains / strains. Usually, no localising bony tenderness, however mild swelling and reduced / painful movements may be present.
      
      No clear indication for x-ray.

   b) Tennis elbow. History does not usually include significant trauma, but will generally involve recent sport or physical activity, i.e. cleaning, gardening, etc. Localising tenderness over the lateral epicondyle, with relatively normal ROM are characteristic.
      
      No indication for x-ray.

   c) Olecranon bursitis. Characterised by a large, hot, fluctuant swelling over the olecranon process. Generally associated with a history of minimal trauma, and unlike a fracture, there is often minimal pain and swelling initially; however they may become significant during subsequent hours / days.
      
      No clear indication for x-ray.

   d) Pulled elbow. A specific injury, most commonly seen in children between 1-3yrs, and is generally diagnosed on the history alone. Classically, the child is lifted by the hands or wrists, or falls whilst remaining hold of parent’s hand, thus “pulling” the elbow. Any child that falls onto an arm and injures it, does not have a pulled elbow.
The child normally presents:
- refusing to use the arm, but may be otherwise quite happy
- distressed with passive movements, i.e. getting undressed,
- no obvious swelling or deformity
- pain++ on attempted supination.

*No indication for x-ray.*

**Fractures**

a) **Supracondylar**, and to a lesser extent epicondylar fractures represent some of the most serious elbow injuries that we see on a regular basis, and should be suspected in any child with a significant history of injury and associated swelling and tenderness around the elbow and distal humerus.

The nature of the injury is such that associated pain and risk of neurovascular injury is significant. Therefore early assessment of:
- distal pulse and capillary refill,
- distal sensation, and
- degree of pain and need for analgesia, are paramount.

*X-ray elbow. NB, may include humerus and forearm if indicated.*

b) **Radial head.** Undoubtedly the most commonly seen fracture around the elbow region. Patients generally present with painful elbow and reduced ROM.

On examination, there is usually no deformity and only mild swelling of the joint, haemarthrosis. The patient is tender over the radial head with pain that is significantly increased on pronation / supination.

*X-ray of elbow is indicated.*

c) **Olecranon.** Generally a clear history of falling onto the point of the elbow with immediate discomfort, early swelling and reduced ROM. Deformity may be present.

*X-ray of elbow is indicated*

d) **Shaft of radius and ulna.** Frequently injured by FOOSH as well as direct trauma to the forearm.
NB with any injury to the wrist or elbow, the possibility of a forearm injury should be considered.

In children the resulting deformity can be dramatic due to displacement / angulation. Such pts require further assessment and analgesia prior to undergoing x-ray.

In other patients, signs may be subtle with localising tenderness on palpation of the radius & ulna which is increased with attempted pronation / supination.

*X-ray of the forearm is indicated*

**Additional Optional Reading:**

http://www.ampa.co.nz/Kim_Musculoskeletal%20Problems%20Forearm-elbow%20injuries_FINAL.doc

**Additional Optional Video Presentation:**

mms://a1218.v32451.c3245.g.vm.akamaistream.net/7/1218/3245/v0001/www.hs.edu/files/ElbowExamforWeb.wmv
Forearm and Elbow Quick Anatomy Review:
Attempt to label the diagram below.
Check your answers against the education link noted below.

Diag 2:

http://chionline.com/anatomy/anat2.html
Part 3: The Shoulder and Clavicle

History and Mechanism of Injury

Once again, injuries to the upper arm, shoulder and clavicle can be caused in two ways:
- by a transmitted force, i.e. FOOSH or onto the point of the shoulder,
- or by direct trauma.

The shoulder joint is a complicated one and subject to a wide range of injuries and conditions. None the less, the principle applied to other joints can be applied equally reliably, with experience, to the shoulder joint.

Common injury patterns and indications for x-ray.

1) Soft Tissue Injuries
   a) Shoulder sprains. Usually, there is no bony tenderness or deformity but either localising or diffuse soft tissue tenderness around the shoulder region and a reduced/painful ROM. Generally precipitated by vigorous activity or trauma.
      
      No clear indication for x-ray.

2) Fractures
   a) Clavicle fractures. Occurs in all age groups, but is particularly more common in children and adolescents; mechanism of injury is often related to falls onto the point of the shoulder, and often sports related. On examination point tenderness, swelling and sometimes deformity are seen overlying the clavicle, classically at junction of middle and medial thirds. Patient will not raise the affected arm and may tilt head to the affected side.
      
      X-ray of Clavicle is indicated.

   b) Acromioclavicular (AC) joint disruption. Usual cause; fall onto point of shoulder.
      On examination, there is:
      - localising tenderness over AC joint,
      - “step down” seen between the clavicle and acromian when compared with other shoulder.
X-ray of AC joint is indicated. You will need to specify AC joint specifically as specialised views are needed.

c) **Scapula.** Occurs primarily in young men, usually caused by violent, direct trauma (MVAs, falls, crush injuries) or, less commonly, severe muscle contraction.

Pont tenderness, pain during shoulder movement, bone displacement and swelling over injured area may be evident.

* X-ray of scapula is indicated.

d) **Humerus.** Fractures of the neck, and less frequently the shaft of the humerus, tend to be seen more frequently in the elderly and are associated with direct trauma to the arm in simple falls.

Pain and a reduced ROM are seen, plus extensive bruising when such patients present several days after the injury.

* X-ray of shoulder / humerus is indicated.

e) **Dislocation of shoulder:** usually, in the elderly, associated with direct trauma to shoulder, and in the young with forced movements taking the joint beyond its normal ROM. There are also a group of patients who suffer repeated dislocations, often with very minor trauma.

On examination:
- there is obvious deformity as the normal angle of the shoulder is lost,
- swelling anteriorly,
- pain and significantly reduced ROM.

* Following adequate analgesia, x-ray is indicated."

Additional Optional Reading:


Additional Optional Video Presentation:

http://www.youtube.com/watch?v=VSrLbzZzJU8&feature=related
Shoulder and Clavicle Quick Anatomy Review:
Attempt to label the diagram below.
Check your answers against the education link noted below.

Part 3: THE SHOULDER AND CLAVICLE

Diag 3
SECTION 3

Lower extremity Injuries and Fractures

Learning Objectives:
On completion of this section, the learner will be able to:

- Identify the key components of the patient history and physical assessment related to specific musculoskeletal injury in the lower extremities.

Instructions:
Read and carefully consider the policy that accompanies this Learning Pack, in addition to any other required reading related to each of the Learning Objectives. Continue to read the rest of the material within this Section and complete the self-test at the end.
Part 1: The Foot and Ankle

History and Mechanism of Injury

Common injury patterns and indications for x-ray.

Injuries to the ankle and foot can be caused in a number of ways, but by far the most common mechanism is that of ankle inversion. Radiographic assessment of acute ankle injuries is performed primarily to exclude the presence of a clinically significant fracture that may alter patient management. The incidence of significant fracture is less than 15% among patients commonly presenting to emergency departments with an acute ankle injury. Despite this low proportion of fractures, the vast majority of patients are routinely referred for a radiographic examination.

Therefore, the Ottawa guidelines have been developed in recent years to assist in the identification of those patients who will potentially have incurred an ankle fracture, and thus differentiating them from those with simple ankle sprains.

Criteria for x-ray of the ankle joint:

- An ankle x-ray series is only indicated if there is pain near the malleoli AND one or more of the following,
  • aged 55yrs or greater,
  • unable to wt bear - (immediately and / or in ER),
  • bone tenderness, (at the posterior edge or tip of either malleoli).

NB be sure to examine the head of fibula with all significant ankle inversion injuries, as the same injury may also produce a fracture of the head of neck of the fibula, (Maisonneuve fracture), which is frequently missed on initial presentation!

The mechanism of injury that produces the majority of ankle injuries is also responsible for many injuries to the midfoot and base of the 5th metatarsal. Therefore, the Ottawa rules also provide us with guidelines on when to request some foot x-rays.
Ottawa ankle and foot rules:

An ankle x-ray is required only if there is any pain in malleolar zone and any of these findings:

- bone tenderness at A
- bone tenderness at B
- inability to weight bear both immediately and in the casualty department.

A foot x-ray is required if there is any pain in the midfoot zone and any of these findings:

- bone tenderness at C
- bone tenderness at D
- inability to weight bear both immediately and in the casualty department.

Ankle injuries are extremely common but many features on history and physical examination are unreliable. The combined Ottawa ankle and foot rules have a sensitivity of 97.8% and a specificity of 31.5%, giving a negative likelihood ratio of 0.07; this will yield a post-test probability of about 1% for fracture of the ankle if test results are negative (not requiring x ray).

Treatment for ligament injuries should include dynamic splinting and RICE (rest, ice, compression, and elevation). Rule out a complete tear of the ligaments by doing drawer testing of the ankle before discharging the patient.
Other injuries to the foot, that are not due directly to inversion cannot be assessed using the above Ottawa guidelines.

a) **Toes**: are frequently injured in a variety of ways but are not usually x-rayed unless:
   - the great toe is involved,
   - there is obvious deformity,
   - there are overlying wounds or trephining is to be performed.

b) **Metatarsals**: are normally injured as a result of direct trauma, but sometimes occur as a result of exercise, – stress fractures.

   *If swelling, bony tenderness and reduced mobility – x-ray.*

c) **Calcaneum**: should be excluded in patients that fall from a height onto their feet, and is classically very painful. Patients have:
   - localizing, exquisite tenderness over calcaneum
   - swelling, and if several days old significant bruising
   - unable to put wt through the heel

   *x-ray, specifying injury to calcaneum.*
Foot and Ankle Quick Anatomy Review:
Attempt to label the diagram below.
Check your answers against the education link noted below.

**Part 1: THE FOOT AND ANKLE**
Diag 5.

History and Mechanism of Injury

HISTORY AND MECHANISM OF INJURY

The knee is the largest and most complicated joint in the human body and is subject to a range of mechanisms, each of which is capable of producing specific injuries. Some of these mechanisms include:

- direct trauma to the knee; fall, pedestrian MVA,
- rotational injury, a frequent component of sporting injuries,
- sudden contraction of extensor mechanism.

Common Injury Patterns and Indications for X-ray

1) Soft tissue injuries.
   a) Sprains and strains: are frequently seen in ER, and caused by a whole range of mechanisms. As long as the patient:
      - has no obvious deformity
      - is able to weight bear with minimal distress,
      - has no large effusion, and
      - has a normal ROM
      - no history of knee locking / giving way.

   No clear indication for x-ray.

   b) Prepatellar bursitis or housemaids knee: Rarely associated with direct trauma, although on occasions it may be related to minor injuries. Generally associated with long periods of kneeling and seen most frequently seen in workmen, i.e. carpet fitters.

   Similarly, the bursae above and below the patella (supra and infrapatellar) may also become inflamed

   On exam there is:
      - large swelling overlying, (above or below) the patella
      - mild to moderate discomfort
      - inflammation and local heat
c) **Osgood-Slatters disease**: affects young adolescents. There is usually no history of trauma, and the symptoms are generally associated with sporting activity. The patients classically present with:
   - swelling and tenderness overlying tibial tubercle,
   - discomfort on extension against resistance.
   - normal mobility.

**No indication for X-ray.**

2) **Fractures / significant joint injuries.**

Deciding which patients with knee injuries to x-ray can be difficult to determine and will undoubtedly take time and practice to develop confidence and clinical acumen.

Common injuries seen in ER include:

- Patella fractures and dislocations,
- Fractures of tibial plateau / spine,
- Meniscal injuries, (most common),
- Cruciate ligament injuries.
- Significant collateral ligament injuries with joint instability

An examination and assessment of the knee joint is, in itself, complicated and involved, necessitating that the patient is able to lie on a trolley with the lower limbs exposed. However some simple (common sense) guidelines include:

- obvious deformity
- an inability to fully weight bear,
- a large effusion developing within a few hours of the injury
- an inability to straight leg raise, (SLR).

*If any of the above present, then knee x-ray is indicated.*

The Ottawa knee rules also offer some criteria to guide decision making:
Ottawa knee rules:

A knee x-ray is only required for knee injury patients with any of these findings:

- age 55 or over
- isolated tenderness of the patella (no bone tenderness of the knee other than the patella)
- tenderness at the head of the fibula
- inability to flex to 90 degrees
- inability to weight bear both immediately and in the casualty department (4 steps - unable to transfer weight twice onto each lower limb regardless of limping).

Required Video presentation:

Ottawa Knee Rules:

http://www.ohri.ca/emerg/cdr/knee_rule_flash.html
Knee Quick Anatomy Review:  
Attempt to label the diagram below.  
Check your answers against the education link noted below.

Part 2: THE KNEE

Diag 7.

Part 3: The Hip

History and Mechanism of Injury

Injuries to the hip that will necessitate the requesting of radiological examinations by the triage nurse/paramedic are few and far between. The dosage of radiation needed to penetrate the tissues of the hip and pelvic region is significantly higher than that needed for simple limb studies. In addition, the proximity of pelvic organs and the possible implications of unnecessary radiation exposure must be taken into account.

Therefore, only the following instance is considered appropriate for triage led request for x-ray.

1) Adults, generally elderly; involves women more frequently than men, who usually give a history of simple fall onto the affected hip.

On examination;
• There is pain on movement of the hip or on transferring pt,
• Reduced ROM
• Deformity including shortening and external rotation

NB Pain in the knee may well be referred from a hip injury!

X-ray of hip (and pelvis) indicated.

Required Reading:


Chapter 6: Pelvis and Hip- read hip sections only
Hip Quick Anatomy Review:
Attempt to label the diagram below. Check your answers against the following resource:

Part 3: THE HIP

Diag 8.
SECTION 4

Foreign Bodies

Learning Objectives:
On completion of this section, the learner will be able to:
- Identify the indications for x-ray in the presence of a suspected foreign body.

History:

A) Mechanism of Injury:
- Bite Injuries: may be animal or human; consider retained tooth fragments and infection risk
- Broken objects: consider the risk of retained and embedded fragments
- Sharp objects penetrating shoes, gloves, clothing, etc.; consider risk of retained cloth, leather or rubber

B) Foreign Body Types:
- Metal:
  - easiest to identify on x-ray
  - lower risk of infection with retained foreign body
  - removal may not be required with small asymptomatic inert metal objects
- Glass:
  - all glass is radiopaque, but <2mm fragments may be missed on x-ray
  - cause the most foreign body sensations
  - removal may not be needed if small and asymptomatic
- Pencil leads or graphite:
  - should be removed as soon as possible due to secondary tattooing
- Wood or vegetative material:
  - must be removed due to infection and inflammation risk
- Fishhooks

Examination:

Evaluate circulation, sensation and motor function
Exercise caution during palpation, especially with splinters- risk of puncture to examiner
Symptoms:

Sensation of a foreign body may be present

1) Soft Tissue Foreign Bodies

If the patient presents with a suspected soft tissue foreign body, and the material is thought to be radio-opaque, then:

A soft tissue x-ray for FB is indicated.

ALL lacerations caused by glass should be x-rayed unless very superficial.

2) Ingested Foreign Bodies

The majority of patients presenting with ingested foreign bodies will be children having swallowed coinage or adults with a possible fish bone lodged in the throat or oesophagus. Most will pass beyond the throat and into the stomach without any problems.

However, indications for x-ray include:

- episode / history of choking,
- drooling / difficulty in swallowing
- sensation of foreign body

*If high index of suspicion of problems related to FB ingestion, X-ray*

**NB** X-rays should always be requested for suspected ingestion of batteries.

3) Intra-Ocular FB’s

There should always be a suspicion of an intra-ocular foreign body when there is an eye injury caused by a high-speed grinder or a cold chisel (high velocity metal fragments), without the protection of safety goggles.

However, in practice, the majority of such injuries are relatively superficial with the foreign body lying on or just under the surface of the cornea.

*X-ray is rarely needed and is perhaps best determined by the examining practitioner, rather than at triage.*
APPENDIX 1

ANATOMICAL POSITIONS

The following terms refer to anatomical positions, or directions. They will be of use to you in your clinical note keeping when describing the location of injuries, as well as the completing of x-ray requests.

1) Superior:

2) Inferior:

3) Anterior:

4) Posterior:

5) Medial:

6) Lateral:

7) Proximal:

8) Distal:
APPENDIX 2

ANATOMICAL MOVEMENTS - DIRECTIONAL

The following definitions will be of use to you in your clinical note keeping when describing the location of injuries, completing of x-ray requests, and when discussing specific injuries with other nursing / medical colleagues.

1) Flexion

2) Extension

3) Pronation

4) Supination

5) Abduction

6) Adduction

7) Inversion
References - Weblinks:

http://www.aafp.org/afp/20040415/1941.pdf
http://www.gentili.net/fracturemain1.asp#
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References:


IWK Health Centre (200?) Guidelines for triage Requested X-ray Procedures.


Required Testing Questions: Passing Grade 85%

1. Why is it essential to identify injuries to the hand or wrist early?

2. What complications are associated with fractures of the elbow?

3. What injuries may be associated with a scapular fracture and why?

4. Why is a cast applied to the hand of a person with a suspected scaphoid fracture despite negative radiographs?

5. Why is it important to check the CSM in a foot of a patient who has suffered a knee injury/fracture?
6. List 4 tips for accurately assessing for an ankle injury prior to ordering an Xray.

7. Why is it important to monitor serial vital signs in a patient suspected of having fractured a hip?

8. What other types of injuries can be associated with a fracture of the calcaneous?