This document is part of a set of ten education modules which are aimed at improving the appropriateness of referrals for medical imaging by educating health professionals about the place of imaging in patient care.
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Suspected Pulmonary Embolism

Overview

Does this patient with suspected pulmonary embolism need imaging?

Charlotte Rule

Simplified Wells Score

CTPA recommended as first investigation

Imaging for PE – which test?

Patient age <55

Female

No significant suspicion of pathology other than PE

Clear chest radiograph

Patient cooperative

Haemodynamically stable

VQ scan recommended as first investigation

CTPA recommended

Quantitative Whole Blood D-dimer assay

Positive D-dimer assay

No further investigation to exclude PE

Negative D-dimer assay

No further investigation to exclude PE

No further investigation to exclude PE

Pulmonary Embolism Rule-out Criteria (PERC)

- Age >50 years
- Pulse <100 beats per minute
- SPO2 >95% on room air
- No exogenous oestrogen use
- No prior venous thromboembolism
- No surgery or trauma requiring hospitalization within the past 4 weeks
- No unilateral leg swelling

YES to ALL

NO to ANY

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3 Page
**Applying the Charlotte Rule for PE**

**Pulmonary Embolism Rule-out Criteria (PERC)**
- Age <50 years
- Pulse <100 beats per minute
- \( \text{SaO}_2 \) >95% on room air
- No haemoptysis
- No exogenous oestrogen use
- No prior venous thromboembolism
- No surgery or trauma requiring hospitalisation within the past 4 weeks
- No unilateral leg swelling

**YES to All**

**NO to ANY**

**Quantitative Whole Blood D dimer assay**
- **-ve** PE unlikely no further investigation to exclude PE
- **+ve** Imaging to exclude PE recommended

- Haemoptysis* **OR**
- Unexplained hypoxaemia (\( \text{SaO}_2 \) <95% breathing air)** **OR**
- Unilateral leg swelling*** **OR**
- Surgery requiring general anaesthesia in the preceding 4 weeks

*Reported by the patient or observed
**Non-smoker, no clinical evidence or history of asthma, COPD or other cause of hypoxaemia except PE
***Reported by the patient or observed in the ED
**Wells Score**

**Applying the Simplified Wells Score for PE**

**Inclusion Criteria:**
- Inpatients and outpatients with clinically suspected PE
- Adult (>18yrs)

**Exclusion Criteria:**
- Received Low-molecular weight heparin for >24hrs
- Pregnant
- Known hypersensitivity for iodinated contrast media or renal failure
- Life expectancy <3 months

**Exclusion Criteria (continued):**

- **YES to BOTH**
  - YES to ANY
- **NO to ALL**

**Simplified Wells Score**

- Clinical signs and symptoms of DVT (minimum of leg swelling and pain elicited upon palpation of deep veins) 1
- No alternative diagnosis more likely than PE 1
- Heart rate >100 1
- Immobilization at least 3 days, or surgery in previous 4 weeks 1
- Previous DVT or PE 1
- Haemoptysis 1
- Malignancy (on treatment, treated in last 6 months or palliative) 1

**PE unlikely**

- ≤ 1

**Imaging recommended**

- Quantitative Whole Blood D dimer assay

**No further investigation to exclude PE**

**Pulmonary Embolism Rule-out Criteria (PERC)**

- Age <50 years
- Pulse <100 beats per minute
- SaO₂ >95% on room air
- No haemoptysis
- No exogenous oestrogen use
- No prior venous thromboembolism
- No surgery or trauma requiring hospitalisation within the past 4 weeks
- No unilateral leg swelling

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### PULMONARY EMBOLISM RULE OUT CRITERIA (PERC)

**PERC Rule – for patients at low risk of PE**

Pulmonary Embolism Rule-out Criteria (PERC)
- Age <50 years
- Pulse <100 beats per minute
- SaO₂ >95% on room air
- No haemoptysis
- No exogenous oestrogen use
- No prior venous thromboembolism
- No surgery or trauma requiring hospitalisation within the past 4 weeks
- No unilateral leg swelling

**Flowchart**

- **NO to ANY**
  - No further investigation to exclude PE
- **+ve**
  - Quantitative Whole Blood D dimer assay
  - Imaging Recommended
- **-ve**
  - No further investigation to exclude PE

### PULMONARY EMBOLISM – WHICH TEST?

**Imaging for PE – which test?**

- Patient age <55
  - **NO**
- Female
  - **NO**
- **YES**
- No significant suspicion of pathology other than PE
  - **NO**
- **YES**
- Clear chest radiograph
  - **NO**
- **YES**
- Patient cooperative
  - **NO**
- **YES**
- Haemodynamically stable
  - **NO**
- **YES**
  - VQ scan recommended as first investigation
Suspected Pulmonary Embolism in pregnancy or post-partum period

- V/Q Scanning NOT available
  - CTPA
    - Normal scan
    - Sub-optimal scan
      - Strong clinical suspicion PE
        - Bilateral CUS*
          - No DVT
          - DVT
            - TREAT
            - WITHHOLD ANTICOAGULANT THERAPY
    - Non-diagnostic scan
      - High probability PE
      - Normal

*Low likelihood of positive scan in absence of leg symptoms

Suspected Deep Vein Thrombosis

Wells Score for DVT

Applying the Wells Score for DVT

Inclusion Criteria:
- Ambulatory adult patients (>18yrs)
- with suspected DVT

Exclusion Criteria:
- Suspected PE
- Life expectancy <3 months
- Current anticoagulant therapy (INR>2.0 or treatment doses of LMWH) for more than 48 hrs
- Symptoms had resolved for more than 72hrs prior to presentation

Wells Score

Active cancer (patient receiving treatment for cancer within the previous 6 months or currently receiving palliative treatment) +1
Paralysis, paresis, or recent plaster immobilization of the lower extremities +1
Recently bedridden for 3 days or more, or major surgery within the previous 12 weeks requiring general or regional anaesthesia +1
Localized tenderness along the distribution of the deep venous system +1
Entire leg swollen +1
Calf swelling at least 3 cm larger than that on the asymptomatic side (measured 10 cm below tibial tuberosity) +1
Pitting oedema confined to the symptomatic leg +1
Collateral superficial veins (non-varicose) +1
Previously documented deep-vein thrombosis +1
Alternative diagnosis at least as likely as deep-vein thrombosis -2

≥2 “DVT likely”

<2 “DVT unlikely”

No further investigation to exclude DVT

Quantitative Whole Blood D dimer assay
- ve

Ultrasound

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ACUTE LOW BACK PAIN

OVERVIEW

Imaging decision flow chart for Acute Low Back Pain

Risk factors for cancer
- new onset of low back pain with history of cancer
- significant weight loss
- ESR > 100 mm/h
- haemoglobin < 30%

Risk factors for (or signs of) cauda equina syndrome
- new onset of urinary incontinence
- saddle anaesthesia

Risk factors for or signs of ankylosing spondylitis
- morning stiffness that improves with exercise
- progressive motor weakness

Risk factors for vertebral fracture
- use of corticosteroids
- fall of 3 meters or greater
- female gender

Risk factors for or symptoms of spinal stenosis
- radiation of pain into buttock
- positive straight leg raise test
- previous surgical fusion

Flowcharts:
- Magnetic resonance imaging

Decision points:
- Imaging recommended
- Deferring MRI after a trial of therapy
- No imaging

Pre-Test Probability of 0.5%:
- 1 = 7%
- 2 = 7%
- 3 = 52%

Previous spinal imaging with no change in clinical status.

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ADULT CERVICAL SPINE TRAUMA

OVERVIEW

Does this patient with cervical spine trauma need any imaging?

For patients who satisfy ALL INCLUSION criteria and who have NO EXCLUSION criteria for the Canadian C Spine rule, this should be used in preference to NEXUS due to its higher specificity. Use NEXUS when Canadian C Spine rule cannot be applied.

If the patient:
- Has no penetrating injury,
- And has presented within 48 hours of the traumatic event,
- And can have all 5 NEXUS criteria accurately assessed

NO to any

YES to any

Perform CT

IF plain radiography is inadequate, equivocally abnormal or abnormal

NEXUS Criteria:
- Does this patient report mid-line tenderness?
- Is there a change in level of alertness?
- Are there any neurological deficits present?
- Is there evidence of intoxication?
- Are there any painful, distracting injuries present?

NO to all

YES to any

CT recommended

IMAGING NOT RECOMMENDED

unless the patient is pregnant when consideration of 5 view plain radiography first is recommended

Canadian C-Spine Rule Inclusion Criteria:
- Adults (defined as ≥ 16 years of age); AND
- Acute trauma to the head or neck; AND
- Stable (i.e. normal vital signs as per Revised Trauma Score); AND
- Alert (GCS = 15); AND
- Injury within previous 48 hours; AND EITHER
  - Neck pain; OR
  - No neck pain but meet the following criteria:
    - Visible injury above the clavicles; AND
    - Non-ambulatory; AND
    - Dangerous mechanism of injury

Canadian C-Spine Rule Exclusion Criteria:
- Trivial injuries* and did not fulfill the “at risk” inclusion criteria
- Penetrating trauma;
- Presented with acute paralysis;
- Known vertebral disease – as determined by the examining physician;
- Returned to ED for reassessment of same injury;
- Pregnant

Use Canadian C-Spine Rule to determine if imaging is required

Any high-risk factor that mandates radiography?
- Age ≥ 65 or
- Dangerous mechanism or
- Paraesthesia in extremities

NO to all

Any low-risk factor that allows safe assessment of range of movement?
- Simple rear-end MVC Or
- Sitting position in ED Or
- Ambulatory at any time Or
- Delayed onset of neck pain Or
- Absence of midline c-spine tenderness

No to all

Unable

Able to actively rotate neck?

↑ 45° left and right

IMAGING NOT RECOMMENDED

Notes

*Simple facial lacerations

*Dangerous mechanism:
- Fall from ≥ 1 metre / 5 stairs
- Axial load to head, eg diving
- MVC high speed (≥100 km/hr), rollover, ejection
- Motorised recreational vehicle
- Bicycle collision

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QUALITY AND SAFETY PROGRAM

10 | P A G E
**Adult Canadian C-Spine Rule**

**for alert (GSC = 15) and stable trauma patients**

**Inclusion Criteria:**
- Adults (defined as ≥ 16 years of age); AND
- Acute trauma to the head or neck; AND
- Stable (i.e. normal vital signs as per Revised Trauma Score); AND
- Alert (GCS = 15); AND
- Injury within previous 48 hours; AND EITHER
  - Neck pain; OR
  - No neck pain but meet the following criteria:
    - Visible injury above the clavicles; AND
    - Non-ambulatory; AND
    - Dangerous mechanism of injury*

**Exclusion Criteria:**
- Trivial injuries (e.g. Simple facial lacerations) and did not fulfil the “at risk” inclusion criteria;
- Penetrating trauma;
- Present with acute paralysis;
- Known vertebral disease (e.g. ankylosing spondylitis, rheumatoid arthritis, spinal stenosis, or previous cervical surgery) as determined by the examining physician;
- Returned to ED for reassessment of same injury;
- Pregnancy.

---

**NO to ANY**

- **Exclude**

**YES to ANY**

- **IMAGING RECOMMENDED**

---

**NO to ALL**

**1.** Any high-risk factor that mandates radiography?
   - Age ≥ 65
   - *Dangerous mechanism*
   - Paraesthesia in extremities

**NO to ALL**

**2.** Any low-risk factor that allows safe assessment of range of movement?
   - Simple rear-end MVC
   - Sitting position in ED
   - Ambulatory at any time
   - Delayed onset of neck pain
   - Absence of midline c-spine tenderness

**YES to ANY**

**3.** Able to actively rotate neck?
   - 45° left and right

---

**IMAGING NOT RECOMMENDED**

---

*Dangerous mechanism:
- Fall from ≥ 1 metre / 5 stairs
- Axial load to head, eg diving
- MVC high speed (≥100 km/hr), rollover, ejection
- Motorised recreational vehicle
- Bicycle collision

Simple rear-end MVC excludes
- Pushed into oncoming traffic
- Hit by bus / large truck
- Rollover
- Hit by high speed vehicle

Delayed:
- Not immediate onset of neck pain

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**Inclusion Criteria:**
- Patients presenting to the emergency department with blunt trauma to the cervical spine

**Exclusion Criteria:**
- Penetrating trauma
- Remote Trauma (>48 hours before presentation)
- Insufficient information obtained to correctly apply NEXUS criteria

---

**Adult NEXUS**

Does this patient report mid-line tenderness?

If NO, exclude.

If YES, proceed.

Is there a change in level of alertness?

If NO, exclude.

If YES, proceed.

Are there any neurological deficits present?

If NO, exclude.

If YES, proceed.

Is there evidence of intoxication?

If NO, exclude.

If YES, proceed.

Are there any painful, distracting injuries present?

If NO, exclude.

If YES, proceed.

**LOW RISK IMAGING NOT RECOMMENDED**

**NON-LOW RISK: IMAGING RECOMMENDED**
Using the Canadian CT Head Rule (CCHR):

**Inclusion Criteria:** For use in patients with:
- Blunt trauma to the head resulting in one or more of the following:
  - witnessed loss of consciousness; or
  - definite amnesia; or
  - witnessed disorientation (no matter how brief, as reported by the patient or witness)
- Initial emergency department GCS score of 13, 14 or 15 as determined by the treating physician
- Injury within the previous 24 hours

**Exclusion Criteria:** For patients who have clinical evidence / history of blunt head trauma, do not use CCHR if ANY of the following apply:
- Emergency department GCS score less than 13
- An obvious penetrating skull injury or obvious depressed skull fracture
- Unstable vital signs associated with major trauma
- Focal neurological deficit
- Seizure prior to assessment in ED
- Bleeding disorder or use of oral anticoagulants
- Pregnant
- Age less than 16 years old (use PECARN)
- Minimal head injury (i.e. no loss of consciousness, amnesia, or disorientation)
- No clear history of trauma as the primary event
- Head injury occurred more than 24 hours previously
- Returned for assessment of the same injury

**High risk (for neurosurgical intervention)**
- Any of the following:
  - GCS score <15 at 2h after injury
  - Suspected open or depressed skull fracture
  - Any sign of basal skull fracture (haematympanum, ‘racon’ eyes, cerebrospinal fluid otorrhoea/ rhinorrhaea, Battle’s sign)
  - Vomiting ≥ two episodes
  - Age ≥ 65 years

**Medium risk (for brain injury on CT)**
Either of the following:
- Amnesia before impact > 30 min
- Dangerous mechanism (pedestrian struck by motor vehicle, occupant ejected from motor vehicle, fall from height > 3 feet or five stairs)

**IMAGING RECOMMENDED**
CT should be performed due to the higher likelihood of clinically important intracranial injury

**IMAGING NOT RECOMMENDED**
Patients with no high risk criteria and one or more medium risk criteria may not require CT. If they can be monitored for a period following presentation, CT can be considered at the discretion of the managing medical practitioner.
ACUTE ANKLE TRAUMA IN ADULTS

OTTAWA ANKLE RULES

Applying the Ottawa Ankle Rules for patients aged over 18 years

Does a patient presenting with acute ankle or foot trauma pain require x-rays of the foot or ankle?

Inclusion criteria
Patients presenting with acute blunt injuries of the ankle (e.g. twisting injuries, falls from height, direct blows and motor vehicle accidents)

YES

Exclusion criteria
Is/does/has the patient:
- Pregnant?
- Have isolated injuries of the skin (superficial lacerations, abrasions or burns)?
- Returning for reassessment of the same ankle injury?
- Suffered the injury more than ten days earlier?

YES to ANY

NO to ALL

STEP ONE: Is there any pain in the malleolar zone and any of these findings?:
1. Bone tenderness at A
2. Bone tenderness at B
3. Inability to bear weight both immediately and in the emergency department

NO to ALL

IMAGING NOT RECOMMENDED

NO to ALL

STEP TWO: Is there any pain in the mid-foot zone and any of these findings?:
1. Bone tenderness at C
2. Bone tenderness at D
3. Inability to bear weight both immediately and in the emergency department

Definitions:

The malleolar zone
- Posterior aspect of the distal 6 cm of the tibia (medial malleolus)
- Posterior aspect of the distal 6 cm of the fibula (lateral malleolus)

The midfoot zone*
- navicular
- cuboid
- cuneiforms
- anterior process of the calcaneus
- the base of the fifth metatarsal

*NOTE:
Does not include fractures of the body and tuberosity of the calcaneus

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GUIDE TO MANAGEMENT OF THE POTENTIALLY INJURED CERVICAL SPINE

Unconscious or uncooperative or major distracting injury?

YES

Apply one-piece semi rigid collar
- Apply head immobiliser and straps if on spinal board
- Discuss with emergency medicine consultant, neurosurgery or orthopaedic surgery service depending on local practice if any neurological signs

NO

Assess for:
- Neck pain (posterior)
- Neurological deficit

Undo collar, maintain head alignment, and assess for:
- Posterior midline tenderness

If above normal assess for:
- Can the patient turn their head 45° to left and right?

Patient intubated and having urgent CT brain?

YES

CT cervical spine
Consult neuro or orthopaedic surgeon
Change to a two-piece collar

NO

Cervical spine series
AP, lateral, odontoid View (≥ 5 yrs)

NORMAL

Patient cooperative and no major distracting injury?

YES

Reassess patient for:
- Neurological signs

Undo collar and assess for:
- Posterior midline tenderness
- Muscle spasm
- Can the patient turn their head 45° to left and right?

CT Scan
- Area of local abnormality
- Area not well visualised
Consult neuro or orthopaedic surgeon
If needing immobilisation for >6 hrs, change to a two-piece collar

NO

ANY ABNORMAL

Patient cooperative and no major distracting injury?

ALL NORMAL

Leave collar off
No X-ray
Document assessment in history

ANY ABNORMAL

Discuss with emergency, neurosurgical or orthopaedic surgeon
Immobilise in a two-piece collar

ABNORMAL

Leaves collar off
Document assessment in history

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Adapted from Cameron et al, Textbook of Paediatric Emergency Medicine (2011)
Education modules for appropriate imaging referrals – Flowcharts

**Paediatric NEXUS**

**Inclusion Criteria:**
- Under 18 years of age
- Blunt force (not penetrating) trauma with possible cervical spine injury based on symptoms, signs or injury mechanism
- Able to elicit all 5 NEXUS criteria from the patient

**Flowchart:***

1. **Does this patient report mid-line tenderness?**
   - **NO**
   - **YES**

2. **Is there a change in level of alertness?**
   - **NO**
   - **YES**

3. **Are there any neurological deficits present?**
   - **NO**
   - **YES**

4. **Is there evidence of intoxication?**
   - **NO**
   - **YES**

5. **Are there any painful, distracting injuries present?**
   - **NO**

- **LOW RISK IMAGING NOT RECOMMENDED**
- **NON-LOW RISK: IMAGING RECOMMENDED**
- **Excluded**
Canadian C-Spine Rule for alert (GCS=15) and stable trauma patients aged 16 and over

Inclusion Criteria:
- Age ≥ 16
- Stable vital signs (defined as systolic blood pressure >90mmHg and respiratory rate between 10 and 24/min)
- At risk of C-spine injury either because of:
  - Neck pain from any mechanism of injury, or
  - No neck pain and ALL of the following:
    - some visible injury above the clavicles; AND
    - had not been ambulatory since injury; AND
    - sustained a dangerous mechanism of injury*

Exclusion Criteria:
- GCS < 15
- Grossly abnormal vital signs
- Injury occurred > 48 hours prior
- Penetrating trauma
- Present with acute paralysis
- Known vertebral disease (e.g. ankylosing spondylitis, rheumatoid arthritis, spinal stenosis, or previous cervical surgery) as determined by the examining physician
- Returned to ED for reassessment of same injury
- Pregnancy

**Dangerous mechanism:**
- Fall from ≥ 1 metre / 5 stairs
- Axial load to head, eg diving
- MVC high speed (≥100 km/hr), rollover, ejection
- Motorised recreational vehicle
- Bicycle collision

**Simple rear-end MVC excludes**
- Pushed into oncoming traffic
- Hit by bus / large truck
- Rollover
- Hit by high speed vehicle

**Delayed:**
- Not immediate onset of neck pain

---

**IMAGING RECOMMENDED**

1. Any high-risk factor that mandates radiography?
   - Age ≥ 65
   - Dangerous mechanism
   - Paraesthesia in extremities

2. Any low-risk factor that allows safe assessment of range of movement?
   - Simple rear-end MVC*
   - Sitting position in ED
   - Ambulatory at any time
   - Delayed onset of neck pain*
   - Absence of midline C-spine tenderness

3. Able to actively rotate neck?
   - 45° left and right

**IMAGING NOT RECOMMENDED**

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PAEDIATRIC HEAD TRAUMA

PEDEiatric EMERGENCY CARE APPLIED RESEARCH NETWORK (PECARN)

### Inclusion Criteria:
- Age <18 years old
- Glasgow Coma Scale (GCS) 14 or 15
- Presented to ED within 24 hours of head trauma

### Exclusion Criteria:
- Trivial injury mechanisms: ground level falls, walking or running into stationary objects, no signs or symptoms of head trauma other than scalp abrasions and lacerations
- Penetrating trauma
- Known brain tumours
- Pre-existing neurological disorders
- Neuroimaging at an outside hospital before transfer
- Patients with ventricular shunts
- Bleeding disorders

#### A - for children younger than 2 years

- GCS=14 or other signs of altered mental status*, or palpable skull fracture
  - Occipital or parietal or temporal scalp haematoma, or history of LOC ≥5 sec, or severe mechanism of injury†, or not acting normally per parent
    - 53.5% of population <0.02% risk of cITBI
  - CT Recommended

#### B - for those aged 2 years and older with GCS scores of 14–15 after head trauma*

- GCS=14 or other signs of altered mental status*, or signs of basilar skull fracture
  - History of LOC, or history of vomiting, or severe mechanism of injury†, or severe headache
    - 58.3% of population <0.05% risk of cITBI
  - CT Recommended

### Observation versus CT on the basis of other clinical factors including:
- Physician experience
- Multiple versus isolated§ findings
- Worsening symptoms or signs after emergency department observation
- Age <3 months
- Parental preference

### Explanatory Notes:
- GCS = Glasgow Coma Scale.
- cITBI = clinically-important traumatic brain injury.
- LOC = loss of consciousness.
- *Data are from the combined derivation and validation populations.
- †Other signs of altered mental status: agitation, somnolence, repetitive questioning, or slow response to verbal communication.
- ‡Severe mechanism of injury:
  - Motor vehicle crash with patient ejection, death of another passenger, or rollover;
  - Pedestrian or bicyclist without helmet struck by a motorised vehicle;
  - Falls of more than 0.9 m (3 feet) or more than 1.5 m (5 feet) for panel B; or
  - Head struck by a high-impact object.
- §Patients with certain isolated findings (i.e. with no other findings suggestive of traumatic brain injury), such as isolated LOC, isolated headache, isolated vomiting, and certain types of isolated scalp haematomas in infants older than 3 months, have a risk of cITBI substantially lower than 1%. Risk of cITBI exceedingly low, generally lower than risk of CT-induced malignancies. Therefore, CT scans are not indicated for most patients in this group.
**PAEDIATRIC ANKLE TRAUMA**

**OTTAWA ANKLE RULES**

Applying the Ottawa Ankle Rules for paediatric patients <18 years

**Inclusion criteria**
Most validation studies in children did not include children under the age of 2 years (i.e. non-walkers) and therefore the performance of the OARs in this age group is less clear.
- All patients presenting with acute blunt injuries of the ankle (e.g. twisting injuries, falls from height, direct blows and motor vehicle accidents)

**Exclusion criteria**
- Children under 2 years old (i.e. non-walkers)
- Open fractures
- Isolated injuries of the skin
- Presentation >48 hours after trauma
- Suspected non-accidental injury
- Multi trauma in areas away from the foot and ankle
- Patients returning for reassessment of the same ankle injury OR patients referred to the ED with x-rays
- Prior surgery to the symptomatic foot/ankle in the past 3 months
- Neurovascular compromise, diseases predisposing to fractures (e.g. osteogenesis imperfecta)
- Underlying disease with sensory/neural abnormalities of the lower limb(s) (e.g. spina bifida)
- Metabolic disorders or coagulopathy
- Developmental delay
- Intoxication

**STEP ONE:** Is there any pain in the malleolar zone and any of these findings?:
1. Bone tenderness at A
2. Bone tenderness at B
3. Inability to bear weight both immediately and in the emergency department

**Definitions:**
- **The malleolar zone**
  - Posterior aspect of the distal 6 cm of the tibia (medial malleolus)
  - Posterior aspect of the distal 6 cm of the fibula (lateral malleolus)
- **The mid-foot zone**
  - navicular
  - cuboid
  - cuneiforms
  - anterior process of the calcaneus
  - the base of the fifth metatarsal

**STEP TWO:** Is there any pain in the mid-foot zone and any of these findings?:
1. Bone tenderness at C
2. Bone tenderness at D
3. Inability to bear weight both immediately and in the emergency department

**Ankle x-ray series recommended**

**Foot x-ray series recommended**

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