Button Battery or Magnet Ingestion Clinical Guideline

V1.0

July 2021
Summary

Appendix 3 provides a 1-page summary of the guidance for the emergency department.

Figure 1 and Figure 2 may be used as summaries for actions in MIU or Emergency Department respectively.
1. Suspect button battery or multiple magnet ingestion
2. Give honey for battery ingestion if available
3. Send to ED
4. Call ED Red Phone 01872 252153: ATMIST handover

Figure 1 MIU action summary
1. Suspect button battery or multiple magnet ingestion at Triage or ATMIST call

2. Manage ABC: in resus & PERT if airway symptoms / resuscitation required

3. Give honey for possible battery ingestion
   • Rapid Physical examination

4. Emergency x-ray nose to umbilicus unless meets all exclusion criteria. Lateral also for oesophageal FB.

5. If confirmed High-Risk ingestion:
   • Call PERT & gastroenterology consultant & theatre ± ENT consultant

6. IV access & bloods

7. Transfer to theatre for emergency endoscopic removal

Figure 2 ED Action summary
Suspect Button Battery or Magnet ingestion in any child < 16 yrs with any of these symptoms and no history of viral illness:

- Airway obstruction/wheezing
- Drooling
- Vomiting
- Chest discomfort
- Refusal to eat, difficulty swallowing, anorexia
- Haematemesis, epigastric pain
- Any parental suspicion of button battery or magnet ingestion

Figure 3 When to suspect button battery or magnet ingestion

HIGH RISK: any of

- <5 years of age,
- multiple batteries or magnets,
- battery ≥ 20mm diameter in oesophagus
- battery and magnet ingested together
- = TIME CRITICAL

Figure 4 High risk features
In Hours (0800-1800):

- PERT Call 2222
- Call duty gastroenterologist [GOF1] via switchboard.
- Call Tower Theatres 3420: inform of urgent endoscopy requirement needing mobilisation of most suitable anaesthetist and interruption of first available list to facilitate immediate removal of the battery.

Out of hours (1800-0800 / Weekends / Bank Holidays):

- PERT Call 2222
- Inform on call Consultant Gastroenterologist (on call for GI bleeds) via switchboard
- Inform CEPOD consultant 07979 707573 / bleep 3513

**Figure 5 Emergency Contacts**

**Avoiding x-rays: if ALL of these are met no x-ray is needed**

- If the patient is > 12 years
- The battery has been reliably identified based on imprint code or measurement of an identical cell, and the diameter is < 12 mm (assume hearing aid batteries are less than 12 mm).
- The patient is entirely asymptomatic and has been asymptomatic since the battery was ingested.
- Only one battery or magnet was ingested.
- A magnet was not co-ingested.
- There is no history of prior oesophageal surgery, oesophageal stricture/narrowing, motility disorders, or other oesophageal disease.
- The patient (or caregiver) is reliable, mentally competent, and agrees to report symptoms that develop prior to battery passage, or over the subsequent month if passage is not documented, and understands the importance of promptly seeking evaluation for symptoms possibly related to the ingested battery.

**Figure 6 Avoiding x-rays**
1. **Aim/Purpose of this Guideline**

This guideline has been written to cover the uncommon presentation of button battery or multiple magnet ingestion in a child. Our standard procedure would be to transfer children to Bristol Children’s Hospital for endoscopy. As the case of button battery ingestion and in particular impaction in the oesophagus has such a critical time pressure we have agreed locally that the adult Gastroenterologists will perform an emergency endoscopy on a child for this particular emergency. This is because delaying until transfer to Bristol Children’s Hospital could be fatal or result in life altering injury. We have included the situation of multiple magnet ingestion as this can also lead to rapid intestinal perforation and needs early senior decision-making.

2. **The Guidance**

2.1. **When to suspect battery / magnet ingestion:**

2.1.1. Suspect Button Battery / magnet ingestion in any child < 16 yrs with any of these symptoms and no history of viral illness:

- Airway obstruction/wheezing
- Drooling
- Vomiting
- Chest discomfort
- Refusal to eat, difficulty swallowing, anorexia
- Haematemesis, epigastric pain
- Any parental suspicion of button battery ingestion

2.1.2. Note: a history of no batteries in the environment is not always reliable – hearing aids, toys, gadgets and children’s interactive books all contain button batteries and spare batteries are often misplaced. Likewise, small powerful magnets are now commonly sold as children’s toys or jewellery.

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**Data Protection Act 2018 (General Data Protection Regulation – GDPR) Legislation**

The Trust has a duty under the DPA18 to ensure that there is a valid legal basis to process personal and sensitive data. The legal basis for processing must be identified and documented before the processing begins. In many cases we may need consent; this must be explicit, informed and documented. We cannot rely on opt out, it must be opt in.

DPA18 is applicable to all staff; this includes those working as contractors and providers of services.

For more information about your obligations under the DPA18 please see the *Information Use Framework Policy* or contact the Information Governance Team rch-tr.infogov@nhs.net
2.1.3. Metal Detector may help to identify rough location and can exclude low-risk metallic foreign object ingestion, but cannot be used to exclude a button battery or magnet when the child meets one of the above criteria.

2.2. **MIU: If battery or magnet ingestion is suspected:**

2.2.1. Do not induce vomiting.

2.2.2. Administer honey if immediately available and while en route to the ED, if:

- A lithium coin cell may have been ingested (if unknown, assume it is unless it is a hearing aid battery) AND
- The child is 12 months of age or older (honey is not safe in children younger) AND
- The battery was swallowed within the prior 12 hours (because the risk that oesophageal perforation is already present increases after 12 hours)
- **How to dose honey:** Give 10 mL (2 teaspoons) of honey by mouth every 10 minutes for up to 6 doses. Honey is NOT a substitute for immediate removal of a battery lodged in the oesophagus. It slows the development of battery injury but won’t stop it from occurring. Efficacy is based on a 2018 study [3].

2.2.3. Other than giving honey, keep the patient NBM until an oesophageal battery position is ruled out by x-ray.

2.2.4. Organise the most rapid method of transfer to the ED. If the child is seriously unwell or there are concerns about airway obstruction (any of stridor, wheezing, drooling) then transfer must be via 999 ambulance.

2.2.5. Ring the ED Red Phone and provide a “Medical ATMIST” handover – this will be passed to the most senior ED doctor who will coordinate an emergency response.

2.3. **ED: If battery ingestion is suspected:**

2.3.1. **All Staff: This is an emergency – Call PERT (2222) now,** enlist senior help immediately and triage as S3 / Resus priority.

2.3.2. Manage the child in Resus if symptomatic, but do not be fooled by lack of symptoms – serious damage may be occurring: batteries lodged in the oesophagus may cause serious burns in as little as 2 hours. **Do not wait for symptoms to develop.** Patients with a battery in the oesophagus may be fully asymptomatic initially.

2.3.3. Manage ABC. If airway symptoms or GI bleeding – ensure Paediatric Emergency Response Team (PERT) 2222 and refer to Resuscitation section below.

2.3.4. Do not induce vomiting.
2.3.5. Administer honey if immediately available if:
- A lithium coin cell may have been ingested (if unknown, assume it is unless it is a hearing aid battery) AND
- The child is 12 months of age or older (honey is not safe in children younger) AND
- The battery was swallowed within the prior 12 hours (because the risk that oesophageal perforation is already present increases after 12 hours)
  - How to dose honey: Give 10 mL (2 teaspoons) of honey by mouth every 10 minutes for up to 6 doses. Honey is NOT a substitute for immediate removal of a battery lodged in the oesophagus. It slows the development of battery injury but won’t stop it from occurring. (Efficacy is based on a 2018 study [3].)

2.3.6. Other than giving honey, keep the patient NBM until an oesophageal battery position is ruled out by x-ray.

2.3.7. Perform rapid physical examination: check both ear canals and the nasal cavity to exclude battery insertion.

2.3.8. Perform emergency x-ray (to be the next patient in the x-ray room, or portable in Resus for child with airway obstruction):
- If the patient is < 12 years, immediately obtain an x-ray to locate the battery. Do not rely on metal detector to rule out battery ingestion.
- If the patient is > 12 years and the battery diameter is > 12 mm or unknown, immediately obtain an x-ray to locate the battery.
- If the patient is > 12 years and the ingested battery is <12 mm, no x-ray to locate the battery is required if all of the following conditions are met:
  - The patient is entirely asymptomatic and has been asymptomatic since the battery was ingested.
  - Only one battery or magnet was ingested.
  - A magnet was not co-ingested.
  - The battery has been reliably identified based on imprint code or measurement of an identical cell, and the diameter is < 12 mm (assume hearing aid batteries are less than 12 mm).
  - There is no history of prior oesophageal surgery, oesophageal stricture/narrowing, motility disorders, or other oesophageal disease.
  - The patient (or caregiver) is reliable, mentally competent, and agrees to report symptoms that develop prior to battery passage, or over the subsequent month if passage is not documented, and understands the importance of promptly seeking evaluation for symptoms possibly related to the ingested battery.

2.3.9. X-rays obtained to locate the battery should include the entire neck, oesophagus, and abdomen from nose to umbilicus. Batteries located above the range of the x-ray have been missed, as have batteries
assumed to be coins or cardiac monitor electrodes. Obtain both AP and lateral x-rays for batteries in the oesophagus to determine orientation of the positive and negative poles. On the lateral film, the step-off is on the negative side of the battery. (The negative pole has a slightly smaller diameter, fitting within the battery can which forms the positive pole.)

2.4. **ED: High Risk ingestion:**

2.4.1. HIGH RISK: any of <5 years of age, multiple batteries or magnets, battery ≥ 20mm diameter in oesophagus, battery and magnet ingested together = TIME CRITICAL

2.4.2. For emergency endoscopy in theatre LOCALLY.

2.4.3. Aim to remove batteries WITHIN 2 HOURS of ingestion.

2.4.4. In Hours (0800-1800 Mon-Fri):
- Call duty gastroenterologist [GOF1] via switchboard.
- Call Tower Theatres 3420 / 2262: inform of urgent endoscopy requirement needing mobilisation of most suitable anaesthetist and interruption of first available list to facilitate immediate removal of the battery.
- Call anaesthetic team for intubation prior to endoscopy - Bleep 3513
- Senior ENT review if battery / magnet above the clavicle

2.4.5. Out of hours (1800-0800 / Weekends / Bank Holidays):
- Inform on call Consultant Gastroenterologist (for GI bleeds) via switch
- Inform CEPOD consultant 07979 707573 / bleep 3513 for intubation prior to endoscopy
- Senior ENT review if BB above the clavicle

2.4.6. If possible, and if the child is able to swallow, administer sucralfate or honey.

2.4.6.1. Give sucralfate (suspension 1 g/10 mL). 10 mL orally every 10 minutes, up to 3 doses, from the time of x-ray determination that a
battery is lodged in the oesophagus until sedation is given for endoscopy.

2.4.6.2. Honey has comparable efficacy [3] and may be substituted for sucralfate suspension in children 12 months of age or older, dosed as outlined in #2, above.

2.4.6.3. Do not give sucralfate or honey if the battery was possibly in the oesophagus for more than 12 hours.

2.4.7. **Sucralfate or honey administration is not a substitute for emergency battery removal** as these agents slow but do not eliminate tissue damage.

2.4.8. Prepare iv access and send blood samples:
- Crossmatch 4 units of Packed Red Cells (PRC) (x2 samples)
- FBC, Coagulation (PT/APTT/Fibrinogen),
- U+Es, LFTs, Calcium, phosphate,
- Blood gas incl. ionised Calcium

2.4.9. Transfer from ED to Bristol for endoscopy not suitable for these patients due to short therapeutic window.

2.4.10. Consultant-level discussion for time to removal of multiple ingested magnets without batteries.

2.4.11. Other non-time-critical indications should be discussed with Bristol (see Lower Risk ingestion, below.)

**2.5. ED: Resuscitation:**

2.5.1. **A** Maintain airway

2.5.2. Intubate for emergency endoscopy (see RSI) +/- transfer

2.5.3. **B** High flow oxygen 15L/min via face mask as needed pre-intubation

2.5.4. **C** DO NOT DELAY EMERGENCY ENDOSCOPY AWAITING OPTIMAL CONDITIONS

2.5.5. Access: At least one large bore IV access

2.5.6. **IF ANY BLEEDING** (Usually late presentation): MONITOR ACTIVELY & RESUSCITATE

2.5.7. Give tranexamic acid:
- Loading dose: 15mg/kg (max 1g) as bolus
- Maintenance infusion 2mg/kg over 8 hours

2.5.8. **ACTIVATE MAJOR HAEMORRHAGE PROTOCOL**
2.5.9. Send blood samples:
- Crossmatch 4 units of Packed Red Cells (PRC) (x2 samples)
- FBC, Coagulation (PT/APTT/Fibrinogen)
- U+Es, LFTs, Calcium, phosphate
- Blood gas incl. ionised Calcium

2.5.10. Give blood products via blood warmer:
- Group O negative (or O Positive for boys) for immediate use
- 10ml/kg bolus of PRC
- 1:1 ratio of PRC: Fresh Frozen Plasma (FFP)
- 5ml/kg aliquots of each to total 30ml/kg
- (FFP takes 30mins to defrost, PRC alone may be used initially)

2.5.11. Insert Sengstaken tube /balloon catheter at level of injury

2.5.12. **D** Assess & document GCS/pupils/neurology prior to RSI

2.5.13. **E** Maintain normothermia (36-37°C)

**2.6. ED: Lower Risk ingestion:**

2.6.1. If patient does not meet high-risk criteria for local removal they must be discussed with the Paediatric Trauma Team Leader (ED Consultant) at Bristol Children’s Hospital.

2.6.2. Call: 0300 0300 789, choose Option 2

2.6.3. PTTL must conference-call On-call Paediatric Surgery Consultant and may conference-call WATCH transport service for advice on transfer.

2.6.4. They may use TOXBASE or the following flow chart (Figure 7) to help decide (from Trauma Network guideline):
Oesophageal

Emergency endoscopic removal by Local TRAUMA UNIT team
Plan to wake and extubate child at the end of the procedure
Any bleeding:
Call Paediatric Surgeons at PMTC as emergency (use PTTL number 0300 0300 789, Option 2)
Try to achieve stability prior to transfer (see over page)

Gastric/beyond

“GASTRIC” HIGH RISK
< 5 years AND BB ≥20mm
URGENT TRANSFER TO PMTC within 12 hrs (by WATCH if available) for endoscopy within 24hrs

“GASTRIC” LOW RISK
> 5 years AND/OR BB <20mm
Outpatient observation
If failure to pass in stool:
BB ≥20mm Rpt X-ray 48Hr
BB <20mm Rpt X-ray 10-14 days
If child in nappies, note risk of contact burn when BB passed in stool

If persistent GI symptoms or not passed stomach on X-ray:
URGENT REFFERAL PMTC PAEDS SURGERY for urgent endoscopic removal within 24 hrs

Figure 7 Peninsula Trauma Network guideline excerpt for discussion with Paediatric trauma Team Leader
### 3. Monitoring compliance and effectiveness

<table>
<thead>
<tr>
<th>Element to be monitored</th>
<th>Audit of clinical presentation</th>
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<tr>
<td>Lead</td>
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<td>Tool</td>
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<td>Change in practice and lessons to be shared</td>
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### 4. Equality and Diversity

4.1. This document complies with the Royal Cornwall Hospitals NHS Trust service Equality and Diversity statement which can be found in the 'Equality, Inclusion & Human Rights Policy' or the Equality and Diversity website.

4.2. Equality Impact Assessment
The Initial Equality Impact Assessment Screening Form is at Appendix 2.
# Appendix 1. Governance Information

<table>
<thead>
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<th>Document Title</th>
<th>Button Battery Ingestion Clinical Guideline V1.0</th>
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<td>New Document</td>
</tr>
<tr>
<td>Date Issued/Approved:</td>
<td>5&lt;sup&gt;th&lt;/sup&gt; July 2021</td>
</tr>
<tr>
<td>Date Valid From:</td>
<td>July 2021</td>
</tr>
<tr>
<td>Date Valid To:</td>
<td>July 2024</td>
</tr>
<tr>
<td>Directorate / Department responsible (author/owner):</td>
<td>Dr Mark Jadav, Consultant Emergency Physician</td>
</tr>
<tr>
<td>Contact details:</td>
<td>01872 25(2452)</td>
</tr>
<tr>
<td>Brief summary of contents</td>
<td>Actions to take in the presentation of Button Battery Ingestion or magnet ingestion</td>
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<td>Suggested Keywords:</td>
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<td>RCHT ✓ CFT KCCG</td>
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<td>Medical Director</td>
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<td>Approval route for consultation and ratification:</td>
<td>Emergency Department</td>
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<tr>
<td>General Manager confirming approval processes</td>
<td>Jo Floyd</td>
</tr>
<tr>
<td>Name of Governance Lead confirming approval by specialty and care group management meetings</td>
<td>Paul Evangelista</td>
</tr>
<tr>
<td>Links to key external standards</td>
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<td>Related Documents:</td>
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Publication Location (refer to Policy on Policies – Approvals and Ratification):

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<th>Intranet Only</th>
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Version Control Table

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<td>V1.0</td>
<td>Initial issue</td>
<td>Dr Mark Jadav, Consultant Emergency Physician</td>
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This document is to be retained for 10 years from the date of expiry.

This document is only valid on the day of printing

Controlled Document

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### Appendix 2. Equality Impact Assessment

#### Section 1: Equality Impact Assessment Form

<table>
<thead>
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<th>Name of the strategy / policy / proposal / service function to be assessed</th>
<th>Button Battery Ingestion Clinical Guideline V1.0</th>
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<td>Directorate and service area</td>
<td>Is this a new or existing Policy?</td>
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<td>Emergency Department, Urgent, Emergency and Trauma</td>
<td>New</td>
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<tr>
<td>Name of individual/group completing EIA</td>
<td>Contact details:</td>
</tr>
<tr>
<td>Dr Mark Jadav, Consultant Emergency Physician</td>
<td>01872 250314</td>
</tr>
</tbody>
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1. **Policy Aim**  
   Who is the strategy / policy / proposal / service function aimed at?  
   This is pathway to guideline and assessment of patients presenting to RCHT with Button Battery and Magnet Ingestion.

2. **Policy Objectives**  
   To ensure that patients ingesting button batteries or magnets receive the correct care in the correct timeframe.  
   Improve the quality, continuity and coordination of care for the patient by a multidisciplinary team and reduce the risks associated with incorrect management.

3. **Policy Intended Outcomes**  
   To ensure that patients within RCH ingesting button batteries or magnets receive the correct care in the correct timeframe.  
   Improve the quality, continuity and coordination of care for the patient by a multidisciplinary team and reduce the risks associated with incorrect management.

4. **How will you measure the outcome?**  
   As per audit schedule within the policy.

5. **Who is intended to benefit from the policy?**  
   Patients who have ingested button batteries or magnets.

6a). **Who did you consult with?**  
   Workforce | Patients | Local groups | External organisations | Other  
   x  
   b). **Please list any groups who have been consulted about this procedure.**  
   Representatives from ED, Anaesthetics, Paediatrics, General Surgery and Gastroenterology.

6c). **What was the outcome of the consultation?**  
   Agreed
7. The Impact
Please complete the following table. If you are unsure/don’t know if there is a negative impact you need to repeat the consultation step.

Are there concerns that the policy **could** have a positive/negative impact on:

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<tr>
<th>Protected Characteristic</th>
<th>Yes</th>
<th>No</th>
<th>Unsure</th>
<th>Rationale for Assessment / Existing Evidence</th>
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If all characteristics are ticked ‘no’, and this is not a major working or service change, you can end the assessment here as long as you have a robust rationale in place.

I am confident that section 2 of this EIA does not need completing as there are no highlighted risks of negative impact occurring because of this policy.

<table>
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<tr>
<th>Name of person confirming result of initial impact assessment:</th>
<th>Dr Mark Jadav, Consultant Emergency Physician</th>
</tr>
</thead>
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If you have ticked ‘yes’ to any characteristic above OR this is a major working or service change, you will need to complete section 2 of the EIA form available here: **Section 2. Full Equality Analysis**

For guidance please refer to the Equality Impact Assessments Policy (available from the document library) or contact the Human Rights, Equality and Inclusion Lead india.bundock@nhs.net
Appendix 3. Button Battery Ingestion: Initial Management in ED

**RECOGNITION of potential Button Battery ingestion in any child < 16 yrs:**
- Airway obstruction/wheezing
- Drooling
- Vomiting
- Chest discomfort
- Refusal to eat, difficulty swallowing, anorexia
- Hematemesis, epigastric pain

**High risk:**
- PERT CALL 2222
  - <5 years of age
  - Multiple button batteries or magnets
  - Battery ≥20mm diameter in oesophagus
  - Battery and magnet ingested together

**TIME CRITICAL**
*For emergency endoscopy in theatre LOCALLY; aim to remove batteries WITHIN 2 HOURS of ingestion*

**Suspected Button battery ingestion**

Give honey 10 mL every 10 mins if child ≥1 year, lithium coin cell possibly ingested, and ingestion within prior 12 hours. Otherwise, NBM until oesophageal position ruled out.

- **Patient > 12 years**
  - AND Battery ≤12 mm

  Are ALL these conditions met?
  - BB beyond oesophagus
  - Patient is entirely asymptomatic since ingestion
  - Only one BB / magnet ingested
  - Magnet not also ingested.
  - ≤ 12 mm diameter
  - determination is certain
  - No pre-existing oesophageal disease.
  - Patient or caregiver is reliable, mentally competent and agrees to promptly seek evaluation if symptoms develop

  - YES
  - NO

- **Battery in the oesophagus?**
  - CXR+AXR (Nasopharynx to umbilicus, AP and lateral view) immediately to locate battery.

  Batteries in the oesophagus may be asymptomatic initially. Do not wait for symptoms.

  - **YES**
  - **NO**

- **Magnet co-ingested?**
  - Endoscopy/surgery to remove BB regardless of symptoms

- **“Gastric” low risk:**
  - > 5 years AND/OR
  - BB <20mm

- **“Gastric” High risk:**
  - < 5 years AND BB ≥20mm or Multiple Magnets

  Seek advise from PMTC if Urgent transfer to PMTC within 12 hrs (by WATCH if available) for endoscopy within 24hrs is needed

  - **YES**
  - **NO**

- **Outpatient observation.**

  a) Time-critical transfer to PMTC (Bristol) (Trauma unit team)
  Call 03000300789, option 2 to contact PTTL (ED consultant at PTMC) for advice and arrange transfer

  b) Keep nil by mouth

  c) Contact “Trauma & Transfer Consultant” via RCH switch for time-critical transfer

  d) Transfer with appropriate fluids/blood products

  PTTL=Paediatric trauma team leader
  PMTC=Paediatric major trauma centre
  BB=Button Battery
  WATCH=Wales & West Acute Transport for Children
  PERT=Paediatric emergency response team
  ENT=Ear nose throat

**In hours 8am-6pm Monday-Friday:**
- Call duty gastroenterologist via switch
- Call Tower Theatres 3420/2262(cepod): Inform to organise theatre for urgent endoscopy
- Call anaesthetic team for intubation prior to endoscopy
- Bleep 3513
- Senior ENT review if BB above the clavicle

**Out of hours (1800-0800 / Weekends / Bank Holidays):**
- Call duty gastroenterologist via switch (on call for bleeds)
- Inform CEPOD consultant 07979 707573/ Bleep 3513 for intubation prior to endoscopy
- Senior ENT review if BB above the clavicle

**Do not delay emergency endoscopy awaiting optimal conditions**
- A-E assessment - contact PERT team (2222) and if symptomatic move to Resus
- Access: at least one large bore IV access
- Send G+S and fluids for U+E, bone profile, FBC, VBG and coagulation
- If significant bleeding, follow major haemorrhage protocol and contact PMTC for advice and transfer
- Contact WATCH team early if transfer needed