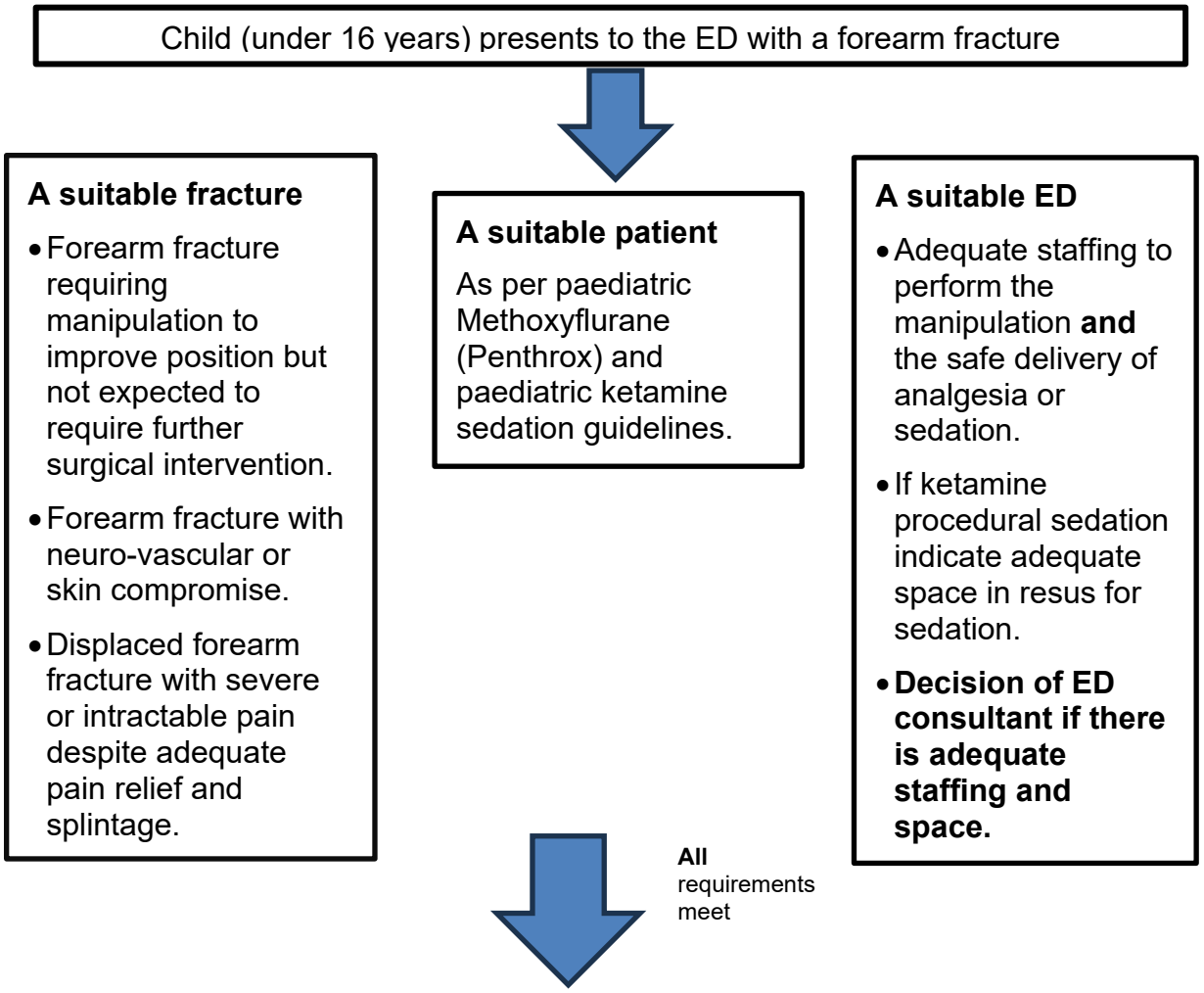
Royal Cornwall Hospitals
NHS Trust

Early Management of Paediatric Forearm Fractures in the Emergency Department Clinical Guideline

V2.0

November 2025

Summary



Procedure for manipulation of paediatric forearm fracture in the ED

1. Initial assessment and analgesia.
2. Documented neuro-vascular limb assessment.
3. Orthogonal x-rays.
4. Decision on analgesia (Penthrox) and/or sedation (Ketamine) required for manipulation.
5. All requirements for a suitable fracture, suitable patient, and suitable department met.
6. Manipulation and application of back-slab
7. Post manipulation x-rays.
8. Post manipulation neuro-vascular limb assessment and documentation.
9. Criteria for discharge all meet
    - If manipulation performed under sedation all sedation discharge criteria meet.
    - Virtual fracture clinic referral completed for orthopaedic consultant review no later than the following morning.
    - Written fracture discharge information and safety netting advice with contact details
    - Adequate plan for analgesia at home.

1. Aim/Purpose of this Guideline

1.1. This guideline aims to improve the quality of care for paediatric patients with forearm fractures in the emergency department. Guidelines published by the British Orthopaedic Association (BOA) and the Royal College Emergency (RCEM) outline standards for the early closed management of paediatric forearm fractures in the emergency department, that avoid the need for admission and general anaesthesia (May 2021).

This guideline outlines local standards for the early management of children with forearm fractures in the emergency department. Manipulation of fractures in ED must only be performed under adequate analgesia and/or sedation.

1.2. This version supersedes any previous versions of this document.

Data Protection Act 2018 (UK General Data Protection Regulation – GDPR) Legislation.

The Trust has a duty under the Data Protection Act 2018 and UK General Data Protection Regulations 2016/679 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.

Data Protection Act 2018 and UK General Data Protection Regulations 2016/679 is applicable to all staff; this includes those working as contractors and providers of services.

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2. The Guidance: Early Management of Paediatric Forearm Fractures in the Emergency Department.

2.1. **Indications**

- Forearm fracture **with angulation or displacement** not expected to require further intervention if satisfactory position obtained post-manipulation (see section 2.3.2).
- Forearm fracture with established neuro-vascular compromise (‘limb threatening injuries’).
- Fractures at risk of developing subacute neurovascular complications **or skin** breach while awaiting definitive surgery, e.g progressive swelling or significant angulation / displacement left overnight prior to surgery the following morning. Decision to be made by the orthopaedic team following review of the patient and radiographs before application of plaster.

- Fractures with severe or intractable pain despite adequate analgesia and splintage if residual deformity also exists. Fractures with limited deformity assess for compartment syndrome and consider removal of all constrictive dressings.

2.2. **Contraindications.**

- Contra-indications to analgesia (methoxyflurane (Penthrox) or ketamine procedural sedation required for manipulation.
- Forearm fractures below the threshold for definitive orthopaedic intervention should not be manipulated in the ED unless neurovascular or skin compromise is present or expected to develop, (or the patient has severe intractable pain despite adequate analgesia and splintage see comment above).
- Forearm fracture types expected to need orthopaedic surgical intervention.
    - Displaced (off-ended) well aligned fractures.
    - Angulated and displaced (off ended) fractures.
    - Fractures involving the growth plate.
    - Monteggia and Galeazzi fractures.
- If ketamine sedation required for manipulation and there is inadequate staffing or space in the emergency department to allow safe sedation, as per the decision of the emergency department consultant in charge of the department.

2.3. **Requirements for manipulation of paediatric forearm fractures in the ED**

2.3.1. A suitable patient

- As per Paediatric Methoxyflurane (Penthrox) and Paediatric Ketamine Procedural Sedation guidelines.

2.3.2. A suitable fracture

- Angulated fractures (greenstick or complete) without displacement, requiring manipulation to improve position and not expected to require further surgical intervention if suitable position achieved post-manipulation.
- Forearm fracture with neuro-vascular compromise (‘limb threatening injuries’).
- Angulated and displaced fractures at risk of developing neurovascular compromise prior to definitive surgery which is not immediate including fractures with threatened skin and fractures with severe or progressive swelling, because this is unpredictable a decision should be made with the orthopaedic team following review of the patient and radiographs before application of plaster.

- Fractures with deformity and severe or intractable pain despite adequate analgesia and splintage. Fractures with limited deformity and severe pain consider a diagnosis of compartment syndrome.

2.3.3. Suitable environment, provisions and expertise

For manipulations being performed with methoxyflurane(Penthrox).

Staffing

- Availability of paediatric nursing staff to assist with delivery of methoxyflurane.
- Availability of competent emergency department or orthopaedic clinician to perform manipulation. Senior emergency department or orthopaedic doctor (registrar, equivalent or above) to be present for manipulation.
- Availability of emergency department practitioner or nurse to apply back-slab.

For manipulations being performed with ketamine procedural sedation.

Resources

- Adequate space in resus for paediatric sedation.

Staffing

- Availability of trained emergency department clinician to perform sedation.
- Availability of paediatric nursing staff to assist with sedation.
- Availability of competent emergency department or orthopaedic clinician to perform manipulation. Senior emergency department or orthopaedic doctor (registrar, equivalent or above) to be present for manipulation.
- Availability of emergency department practitioner or nurse to apply back-slab.

2.4. Procedure for manipulation of paediatric forearm fractures in the emergency department.

1. Child presents with suspected forearm fracture. At the time of initial assessment effective analgesia should be administered and pain scores recorded. Paediatric pain bundles on EPMA should be prescribed.
2. Documented assessment of the limb including status of radial pulse, digital capillary refill time, function of radial, median and ulnar nerves using the existing orthopaedic pro-forma (Appendix 3). Skin integrity also needs documenting.

3. Orthogonal x-rays of the limb should be performed to allow proper diagnosis and planning to determine if a fracture meets criteria for early management in the emergency department (section 2.3.2).

4. Decision on analgesia required for fracture for manipulation with methoxyflurane (Penthrox) or ketamine sedation depending on patient factors.

5. For manipulations performed under ketamine procedural sedation the paediatric ketamine procedural sedation guideline should be followed.

    a. Pre-sedation assessment completed, and no contra-indication to procedural sedation.

    b. Written consent for sedation and manipulation.

    c. All requirements (section 2.3) for manipulation of paediatric forearm fracture met.

    d. Time out as per WHO guideline.

    e. Sedation as per the ketamine procedural sedation guideline.

6. Manipulation to be performed by competent emergency department or orthopaedic clinician. Senior emergency department or orthopaedic doctor (registrar, equivalent or above) to be present for manipulation.

7. Post manipulation x-rays.

8. Post manipulation recorded assessment of neurovascular status of limb.

9. Criteria for discharge following fracture manipulation.

    - Virtual fracture clinic referral completed for orthopaedic consultant review no later than the following morning.

    - Written fracture discharge information.

    - Adequate plan for analgesia at home.

    - If ketamine sedation used all sedation discharge criteria meet.

    - Clear contact details / safety netting advice for concerns post discharge.

3. Monitoring compliance and effectiveness

Information Category	Detail of process and methodology for monitoring compliance
Element to be monitored	Adverse events during manipulation of paediatric forearm fractures E.g. neurovascular damage, skin compromise, complications related to administration of Penthrox or Ketamine. Fractures requiring unplanned further procedures due to inadequate manipulation or subsequent displacement.
Lead	ED paediatric lead Dr.J.Bareham. Orthopaedic paediatric lead Mr.R.Hawkins.
Tool	Periodic ED audit of paediatric forearm manipulation in the emergency department. Serious adverse events reported using DAT.
Frequency	Within 6 months of guideline publication. As serious adverse events occur.
Reporting arrangements	Reported to ED paediatric lead.
Acting on recommendations and Lead(s)	Required changes to practice will be identified and actioned in as rapid timeframe as possible.
Change in practice and lessons to be shared	Required changes to practice will be identified and actioned within as rapid timeframe as possible. A lead member of the team will be identified to take each change forward where appropriate. Lessons will be shared with all the relevant stakeholders.

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 Diversity And Inclusion 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

Information Category	Detailed Information
Document Title:	Early Management of Paediatric Forearm Fractures in the Emergency Department Clinical Guideline V2.0
This document replaces (exact title of previous version):	Early Management of Paediatric Forearm Fractures in the Emergency Department Clinical Guideline V1.0
Date Issued/Approved:	September 2025
Date Valid From:	November 2025
Date Valid To:	November 2028
Directorate/Department responsible (author/owner):	Dr J Bareham, Emergency Department
Contact details:	01872 252452
Brief summary of contents:	This guideline sets local standards for the safe early management of paediatric patients with forearm fractures in the emergency department.
Suggested Keywords:	Forearm fracture, fracture manipulation, procedural sedation, ketamine.
Target Audience:	**RCHT:** Yes **CFT:** No **CIOS ICB:** No
Executive Director responsible for Policy:	Chief Medical Officer
Approval route for consultation and ratification:	Emergency Department Governance group. Trauma and Orthopaedic Governance group.
Manager confirming approval processes:	Johanna Floyd
Name of Governance Lead confirming consultation and ratification:	Paul Evangelista
Links to key external standards:	None required.
Related Documents:	Early Management of the Paediatric Forearm Fracture BOA standard. British Orthopaedic

Information Category	Detailed Information
	Association and The Royal College of Emergency Medicine. May 2021.
Training Need Identified?	Yes. Training on manipulation of paediatric forearm fractures. Training on paediatric procedural sedation. See section 2.4 in the guideline on ketamine procedural sedation for paediatric patients in the emergency department.
Publication Location (refer to Policy on Policies – Approvals and Ratification):	Internet and Intranet
Document Library Folder/Sub Folder:	Clinical / Emergency Department

Version Control Table

Date	Version Number	Summary of Changes	Changes Made by
January 2022	V1.0	Initial issue.	Dr J Bareham, EM Consultant
June 2025	V2.0	Update to guideline, no changes to content and updated to latest Trust template.	Dr J Bareham, EM Consultant

All or part of this document can be released under the Freedom of Information Act 2000.

All Policies, Strategies and Operating Procedures, including Business Plans, are to be kept for the lifetime of the organisation plus 6 years.

This document is only valid on the day of printing.

Controlled Document.

This document has been created following the Royal Cornwall Hospitals NHS Trust The Policy on Policies (Development and Management of Knowledge Procedural and Web Documents Policy). It should not be altered in any way without the express permission of the author or their Line Manager.

Appendix 2. Equality Impact Assessment

Section 1: Equality Impact Assessment (EIA) Form

The EIA process allows the Trust to identify where a policy or service may have a negative impact on an individual or particular group of people.

For guidance please refer to the Equality Impact Assessment Policy (available from the document library) or contact the Equality, Diversity, and Inclusion Team rcht.inclusion@nhs.net

Information Category	Detailed Information
Name of the strategy/policy/proposal/service function to be assessed:	Early Management of Paediatric Forearm Fractures in the Emergency Department Clinical Guideline V2.0
Directorate and service area:	Acute Emergency Medicine, Emergency Department.
Is this a new or existing Policy?	Existing
Name of individual completing EIA (Should be completed by an individual with a good understanding of the Service/Policy):	Dr J Bareham, Emergency Medicine Consultant.
Contact details:	01872 252452

Information Category	Detailed Information
1. Policy Aim - Who is the Policy aimed at? (The Policy is the Strategy, Policy, Proposal or Service Change to be assessed)	To promote the practice of safe early management of paediatric forearm fractures in the emergency department.
2. Policy Objectives	To identify standards required for the safe early management of paediatric forearm fractures in the emergency department.
3. Policy Intended Outcomes	• To improve patient safety and quality of care by setting standards for the safe early management of paediatric forearm fractures in the emergency department. • To identify requirements for early management of patients in the emergency department based on the patient, the fracture and the department. • To minimize the number of patients who need unnecessary inpatient treatment of forearm fractures.

Information Category	Detailed Information
4. How will you measure each outcome?	• Audit process. • Investigation of serious adverse events.
5. Who is intended to benefit from the policy?	• Paediatric patients aged 1 – 16 years who require early management of forearm fractures in the emergency department • All staff involved in the management of paediatric patients with forearm fractures in the emergency department will be aware of the standards expected of their practice
6a. Who did you consult with? (Please select Yes or No for each category)	• Workforce: Yes • Patients/visitors: No • Local groups/system partners: No • External organisations: No • Other: No
6b. Please list the individuals/groups who have been consulted about this policy.	**Please record specific names of individuals/groups:** Representatives in the emergency department, trauma and orthopaedics and anaesthetics.
6c. What was the outcome of the consultation?	Approved
6d. Have you used any of the following to assist your assessment?	**National or local statistics, audits, activity reports, process maps, complaints, staff, or patient surveys:** No.

7. The Impact

Following consultation with key groups, has a negative impact been identified for any protected characteristic? Please note that a rationale is required for each one.

Where a negative impact is identified without rationale, the key groups will need to be consulted again.

Protected Characteristic	(Yes or No)	Rationale
Age	No	Policy for paediatric patients (1-16 years). Patient under 1 year not suitable for procedural sedation in the emergency department which is required for manipulation of forearm fractures.
Sex (male or female)	No	

Protected Characteristic	(Yes or No)	Rationale
Gender reassignment (Transgender, non-binary, gender fluid etc.)	No	
Race	No	
Disability (e.g. physical or cognitive impairment, mental health, long term conditions etc.)	No	Considering mental capacity act and consent issues, consider associated health conditions.
Religion or belief	No	
Marriage and civil partnership	No	
Pregnancy and maternity	No	Additional consideration for pregnant patients.
Sexual orientation (e.g. gay, straight, bisexual, lesbian etc.)	No	

A robust rationale must be in place for all protected characteristics. If a negative impact has been identified, please complete section 2. If no negative impact has been identified and if this is not a major service change, you can end the assessment here.

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.

Name of person confirming result of initial impact assessment: Dr J Bareham, Emergency medicine consultant.

If a negative impact has been identified above OR this is a major service change, you will need to complete section 2 of the EIA form available here:
Section 2. Full Equality Analysis

Appendix 3. CHA4118: Upper Limb Injury Neurovascular Status - Child Health

File within 3rd spine

Place patient sticker **within** this box

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Upper limb injury neurovascular status - Child Health

Date:	Time:
Location:	Examined by:

Sensory

Radial	Ulnar	Median
		
Normal ☐ Abnormal ☐ Absent ☐	Normal ☐ Abnormal ☐ Absent ☐	Normal ☐ Abnormal ☐ Absent ☐

Motor

"Do a thumbs up Radial: Y ☐ N ☐"	"Make a star" Ulnar: Y ☐ N ☐	"Do an OK sign" AIN: Y ☐ N ☐	"Touch your thumb to your little finger" Median: Y ☐ N ☐
			

Vascular

Radial pulse	Capillary refill time	Colour	Capillary refill time
Normal ☐ Weak ☐ Absent ☐	<2s ☐ >2s ☐	Pink ☐ Pale ☐	Warm ☐ Cool ☐

Date: Time: Signature: Designation:

 Paediatric upper limb injury neurovascular status - Trauma & Orthopaedics **CHA4118 V1** Printed 07/2019