

Title:	North West and North Wales Guideline for the Management of Suspected Button Battery Ingestion
Version:	1
Supersedes:	No previous guideline
Application:	The guideline is intended for use by any hospital team caring for infants, children and young people under 16 years age across the Paediatric Critical Care Network in the North West & North Wales region.

Originated /Modified By:	Kate Parkins ¹ & Sarah Stibbards ²
Designation:	Consultant in Paediatric Intensive Care Medicine , North West & North Wales Paediatric Transport Service (NWTS) ¹ Consultant in Emergency Medicine, Alder Hey Children's Hospital & NWTS Consultant ²
Ratified by:	RMCH (Host Trust)
Date of Ratification:	Paediatric Medicines Management Committee (PMMC) on: 07.04.21 Paediatric Policies & Guidelines Committee on: 05.11.21
Ratified by:	AHFT: CDEG (Clinical Development & Evaluation Group)
Date of Ratification:	06.06.2022

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Circulated by:	NWTS North West & North Wales Paediatric Critical Care ODN North West & North Wales Children's Major Trauma ODN North West & North Wales Paediatric Surgical ODN
Dissemination and Implementation:	NWTS Paediatric Critical Care Network circulation lists Children's Major Trauma Network circulation lists Surgery in Children's Network circulation lists
Date placed on RMCH Intranet:	November 2021
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Planned Review Date:	3 years ie January 2025
Responsibility of:	Clinical lead North West & North Wales Paediatric Surgical ODN & NWTS guideline lead consultant

Minor Amendment (If applicable) Notified To:	N/A
Date notified:	N/A

EqIA Registration Number:	2021-14
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1. Detail of Procedural Document

Guideline for Ingestion of Button Batteries by Children - for use by clinical teams managing infants and children in the North West (England) and North Wales region and Isle of Man.

2. Equality Impact Assessment

EqIA Registration Number for RMCH: 2021-14

3. Consultation, Approval and Ratification Process

This guideline was developed with input from:

- Representatives from both paediatric ENT and general surgical consultants at Royal Manchester Children's Hospital and Alder Hey Children's Hospital
- Representatives from both paediatric anaesthetic consultants at Royal Manchester Children's Hospital and Alder Hey Children's Hospital
- Representatives from anaesthetic colleagues across North West (England) & North Wales region (via paediatric surgical network)
- North West (England) & North Wales Paediatric Transport Service (NWTS) - medical & nursing
- Representatives from both Paediatric Intensive Care Units (Royal Manchester Children's Hospital and Alder Hey Children's Hospital) - medical, nursing and paediatric intensive care pharmacists.
- Representatives from North West Children's Major Trauma Network—medical and nursing colleagues from DGHs in region
- Representatives from the District General Hospitals within the North West & North Wales Paediatric Critical Care Operational Delivery Network - medical, nursing and AHP (paediatrics, anaesthetics, adult intensivists and emergency medicine teams)

All comments received have been reviewed and appropriate amendments incorporated.

For ratification process see appendix 1.

4. References and Bibliography

See guidelines.

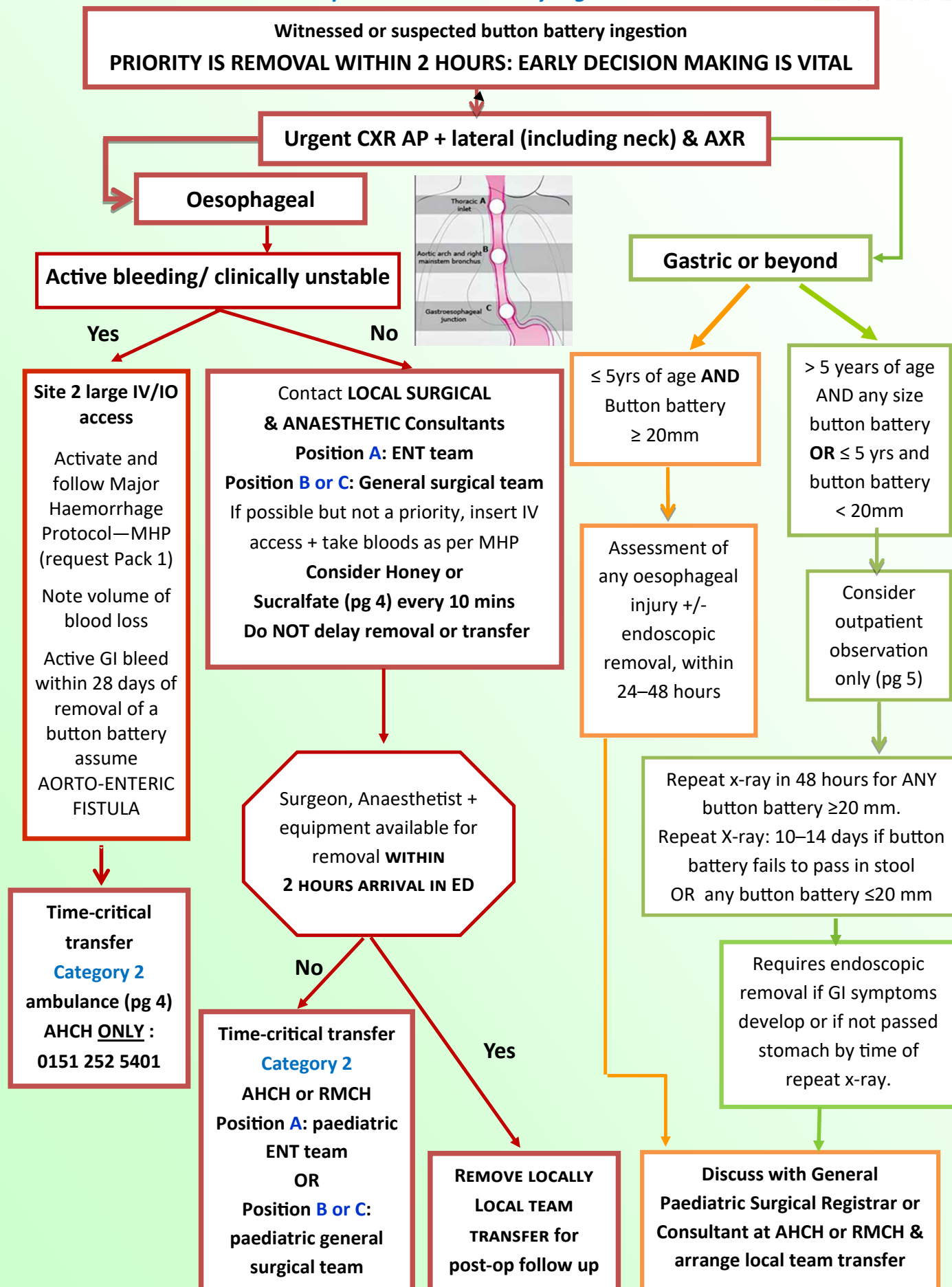
5. Disclaimer

These clinical guidelines represent the views of the North West (England) and North Wales Paediatric Transport Service (NWTS), North West & North Wales Paediatric Critical Care Operational Delivery Network, and North West Children's Major Trauma Network, and were produced after careful consideration of available evidence in conjunction with clinical expertise and experience.

It is intended that trusts within the Network will adopt this guideline and educational resource after review and ratification (including equality impact assessment) through their own clinical governance structures.

The guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient.

Clinical advice is always available from NWTS on a case by case basis. Please feel free to contact NWTS (01925 853 550) regarding these documents if there are any queries.



WHY HONEY OR SUCRALFATE?

From time of x-ray until removal, CONSIDER (but only if it does NOT delay removal or transfer):

HONEY 10 mL every 10 mins (max 6 doses) for those over 1 year OR

SUCRALFATE oral suspension 1 gram every 10 mins (max 3 doses) no age restriction

ONLY use honey or sucralfate when ingestion occurred LESS than 12 HOURS AGO

HONEY is only used for those children older than 12 months (small risk of infant botulism associated with honey).

Use commercial not specialised or artisanal honey.

Other than giving honey or sucralfate, keep NBM until an oesophageal battery position is removed

Honey is administered to coat the battery and provide a protective barrier between mucosa and button battery due to its' high viscosity. Both honey and sucralfate have been shown to effectively prevent the expected button battery-induced pH increase and local generation of hydroxide. This results in protection against deep tissue damage and slows the rate of oesophageal injury prior to endoscopic removal.

LOCAL REMOVAL VS TRANSFER TO TERTIARY CENTRE

It is important that a button battery lodged in the UPPER AIRWAY OR OESOPHAGUS IS REMOVED WITHIN 2 HOURS

BUTTON BATTERY REMOVAL AT LOCAL HOSPITAL:

- Appropriate senior adult surgical or gastroenterology expertise **available within 1-2 hours**
 - Check x-ray position: ENT team required if level A, gen. surgical or adult gastroenterology if B /C
- Appropriate senior anaesthetist
- Appropriate equipment for patient age and size

If **ANY DELAYS** anticipated, organise a **TIME CRITICAL TRANSFER** to AHCH or RMCH

Discuss all potential transfers with the appropriate **paediatric general surgical or paediatric ENT** team at AHCH or RMCH. Check button battery position on x-ray: if at position A discuss with paediatric ENT team; OR position B or C discuss with paediatric general surgical team.

NB if uncertain ask switchboard to conference in both teams.

The paediatric ENT or general surgical team will arrange removal ASAP after arrival in tertiary centre or will request that patient is transferred for review and further management as required.

AMBULANCE REQUEST FOR TIME CRITICAL TRANSFER VIA NORTH WEST AMBULANCE SERVICE = CATEGORY 2

- **Category 2 response time = 18-minute** mean response time and should be used if child is due to have intervention, ie surgical removal of button battery, on arrival at tertiary centre.
- **Category 3:** for any urgent transfers via emergency department for further surgical assessment / review

<https://www.nwas.nhs.uk/services/professionals/emergency-ambulance/>

For further information on organising inter-hospital transfers with NWAS. The code assigned is based on clinical presentation and not location of patient. All requests must be placed on the basis of clinical need.

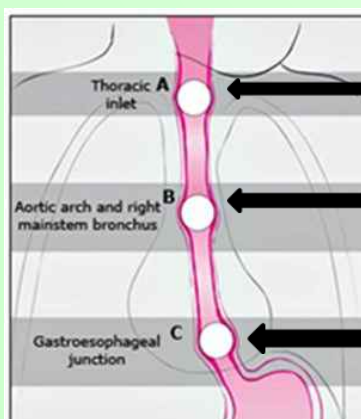
AMBULANCE REQUEST FOR TIME CRITICAL TRANSFER VIA WELSH AMBULANCE SERVICE: follow local policy

IF ANY DELAY IS ANTICIPATED eg ambulance NOT arrived within 20 minutes: escalate the call to the senior clinician on duty for either NWAS or Welsh ambulance service, especially if the child is unstable or bleeding.

TEAM COMPOSITION:

- Always use **STOPP tool** / document (<https://nwts.nhs.uk/guidelines>) for all paediatric transfers
- Complete a risk assessment prior to any transfer; if any delay repeat prior to transfer
- Joint decision should be made by paediatric and anaesthetic consultants on team composition
- Any potential airway concerns require an anaesthetic escort
- NWTS can provide advice on transfer when required 08000 84 83 82

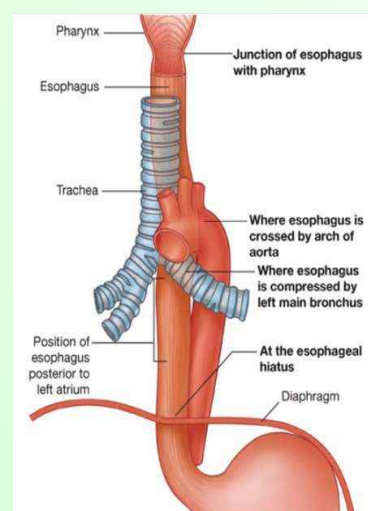
- **Any child** who has ingested a button battery is **TIME CRITICAL EMERGENCY**
- **Ingestion of button batteries can kill even if the child is asymptomatic**
- **There may be no history of foreign body ingestion (20-40% patients)**
- Presentation with **acute airway obstruction**: call ENT registrar at RMCH or AHCH **IMMEDIATELY**.
- **Organise time critical anaesthetic transfer** (page 4) to RMCH or AHCH. If life-threatening hypoxia is present, discuss with NWTS (+ conference call with paed ENT teams) for further advice
- **Consider the possibility** of battery ingestion in those with:
 - Acute airway obstruction (stridor); drooling; wheezing or other noisy breathing
 - Vomiting; abdominal pain
 - Chest pain or discomfort
 - Difficulty swallowing
 - Decreased appetite or refusal to eat; or coughing, choking or gagging with eating or drinking
- **Suspect** button battery ingestion in **any presumed "coin"** or other foreign body ingestion
- **Children at greatest risk are:**
 - ◊ Those younger than 6 years of age
 - ◊ Ingested battery ≥ 20 mm diameter
 - ◊ Multiple batteries ingested
- Larger diameter button battery (≥ 20 mm) means an increased likelihood of oesophageal impaction, and the lithium composition causes increased voltage delivery leading to severe necrotic tissue damage.
- Types of injuries sustained have included tracheoesophageal fistula, oesophageal perforation, oesophageal strictures, vocal cord paralysis from recurrent laryngeal nerve injury, pneumothorax, aorto-enteric fistula, mediastinitis, and cardiac arrest
- Be aware that oesophageal perforation and fistulae into trachea or major blood vessels may be delayed for up to 28 days after removal of a button battery
- Oesophageal strictures may not manifest for weeks to months after ingestion of a button battery
- **Symptoms may develop after a button battery has been passed in stool—ie no evidence on x-ray**
- Passage of a button battery to the stomach alone cannot be used as a criterion that the child is free from a potentially catastrophic underlying injury; the button battery may have delayed passage through oesophagus.
- Larger batteries (≥ 20 mm) in the stomach should be checked by x-ray and removed if in place after >48 hours
- CXR (AP and lateral including the neck) and AXR should be examined carefully. Check for the double halo sign on AP views and the "step off" sign on lateral views, which help distinguish the poles of a button battery from regular coins. Beware that the step-off may not be seen if the battery is thin or if the lateral film is not precisely perpendicular to the plane of the battery.



70% upper oesophageal sphincter (upper cricopharyngeus muscle)

20% at level of aortic arch

10% lower oesophageal sphincter



GENERAL DISCHARGE ADVICE

Advise parents to bring their child back to Emergency Department **IMMEDIATELY** for urgent review if they have:

- Difficulty in breathing
- Features of intestinal obstruction (e.g. persistent vomiting, distended tender abdomen)
- Blood stained vomiting
- Melaena ie “sticky, black and [usually] runny faeces/poo”
- Abdominal pain / gastritis
- Parental concern about a change in their child’s eating patterns e.g. refusing food or fluids

These symptoms may develop after the battery has passed through the intestine (in stool) and should warrant full medical review and discussion with regional paediatric gastroenterology and/or surgical team.

Prior to discharge always check capability of parents/guardians to provide appropriate care for their child. Always ensure onward referral for support to address any unmet needs identified, eg via local children’s services, has been completed.

It is important to investigate circumstances around ingestion of button battery in all age groups.

Any potentially vulnerable children or young people must be referred to the local safeguarding team.

Consider possibility of attempted suicide in the older child or adolescent, and referral to CAMHS.

REFERENCES:

<https://www.toxbase.org/poisons-index-a-z/b-products/battery/>

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Brumbaugh DE, Colson SB, Sandoval JA, et al. **Management of button battery-induced haemorrhage in children.** J Pediatr Gastroenterol Nutr 2011;52:585–9.

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Tanaka J, Yamashita M, Kajigaya H. **Oesophageal electrochemical burns due to button type lithium batteries in dogs.** Vet Hum Toxicol 1998; 40:193–6.

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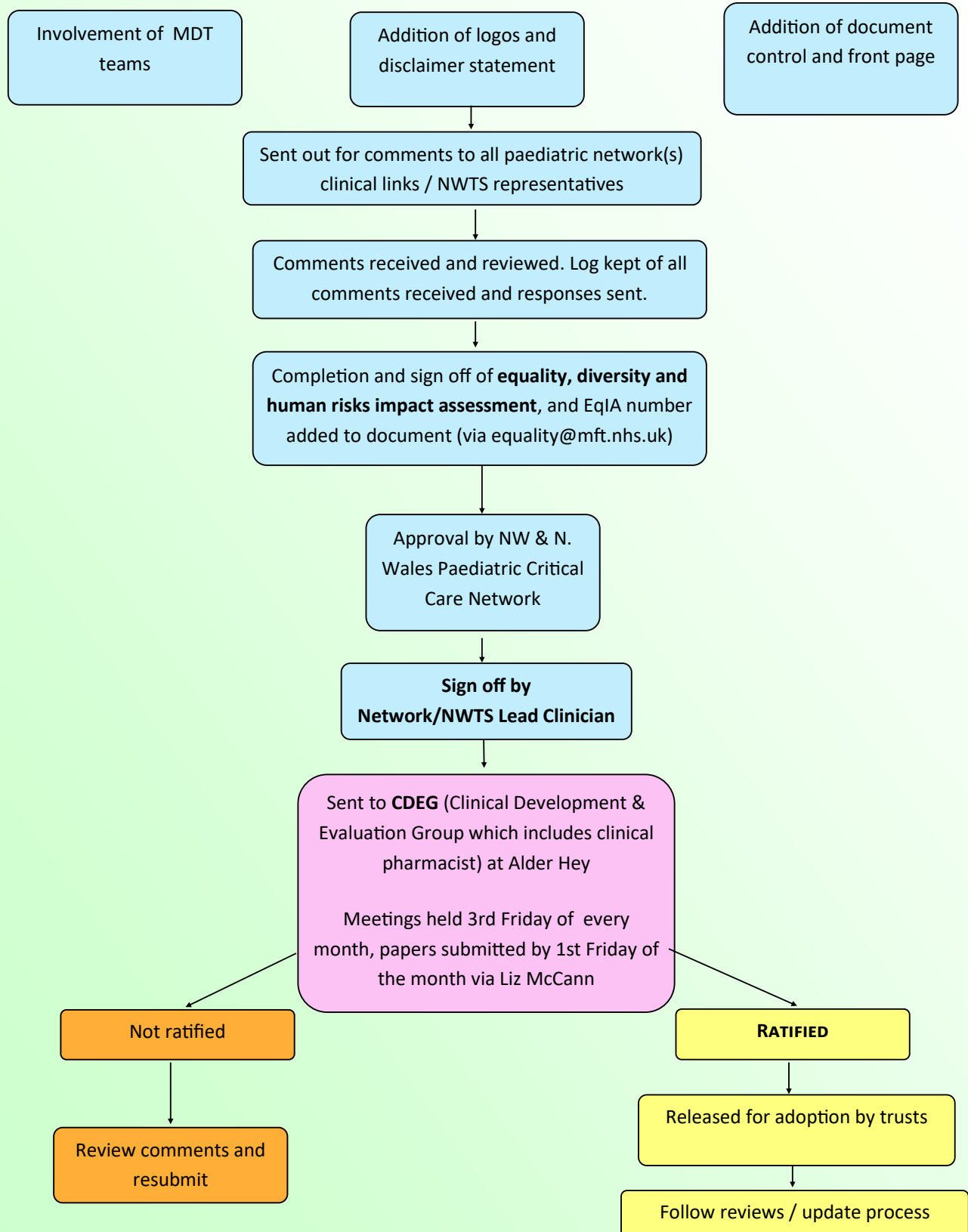
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Ratification of Guidelines at RMCH





Ratification of Guidelines at Alder Hey



Resources

www.crashcall.net - for intubation drugs / sedation regime / inotrope doses

Contact numbers:

NWTS (North West & North Wales Paediatric Transport Service) - 08000 84 83 82

Trauma Team Leader (TTL) Numbers:

Royal Manchester Children's Hospital ED Major Trauma Number - 0161 701 9191

Alder Hey Children's Hospital ED Major Trauma Number - 0151 252 5401

Switchboard Numbers:

Royal Manchester Children's Hospital - 0161 276 1234

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Paediatric ENT team, Royal Manchester Children's Hospital

Paediatric general surgical teams, Alder Hey Children's Hospital (AHCH)

Paediatric ENT team, Alder Hey Children's Hospital

PICU, Royal Manchester Children's Hospital

PICU, Alder Hey Children's Hospital

North West (England) and North Wales Paediatric Critical Care Operational Delivery Network

North West (England) & North Wales Children's Major Trauma Network

North West (England) & North Wales Paediatric Surgical Network

Next Review Due: November 2024

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Please visit NWTS website for the most up to date version of this guideline: www.nwts.nhs.uk