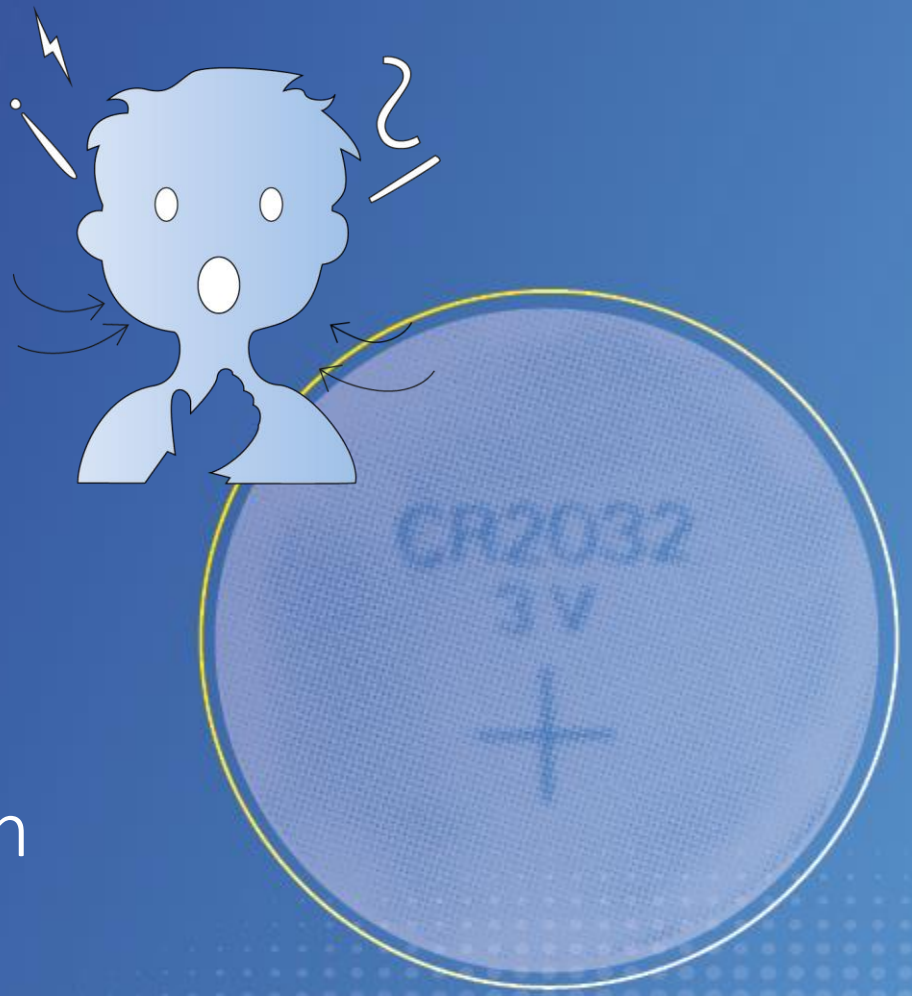
Button Batteries Ingestions

Risks and opportunities of action



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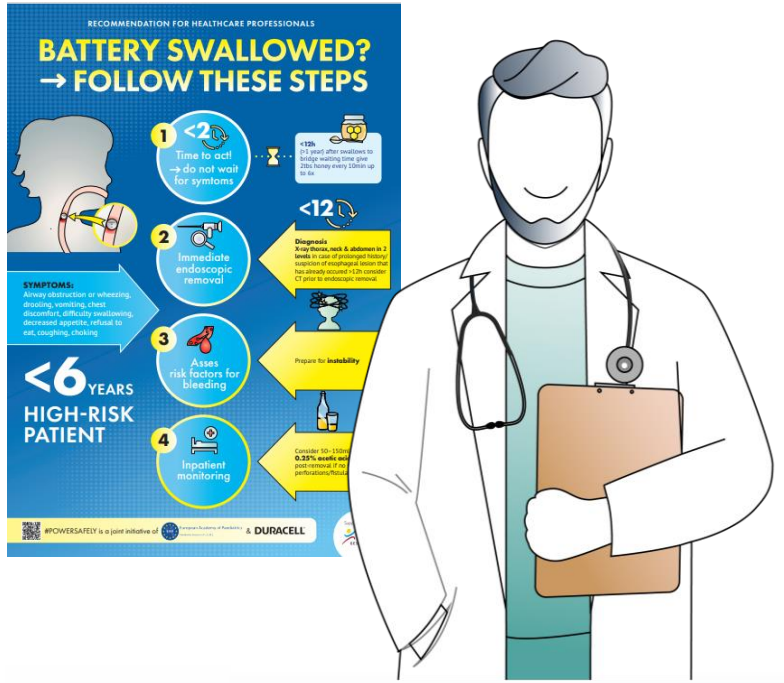
Objective & target audience



Presentation for Healthcare professionals

- to raise awareness
- to provide information about detection/first aid & consecutive treatment
- to advise on preventive action

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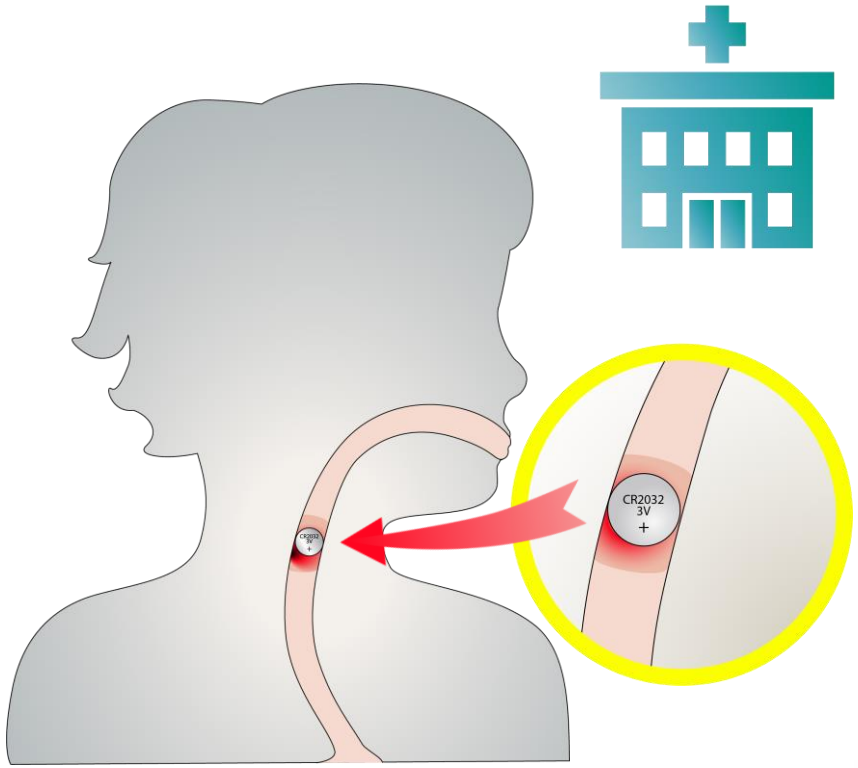
Relevance

- Size like a coin, easily swallowed
  but can get stuck in esophagus, especially with a diameter of 20 mm
- Significant increase of devices in households which use Lithium-Coin cells
- 7–25% of foreign body ingestions are battery ingestions → reported 7-fold increase in relative risk of severe morbidity in the last 20 years*
- Highest risk <6 years (peak at 1 year)

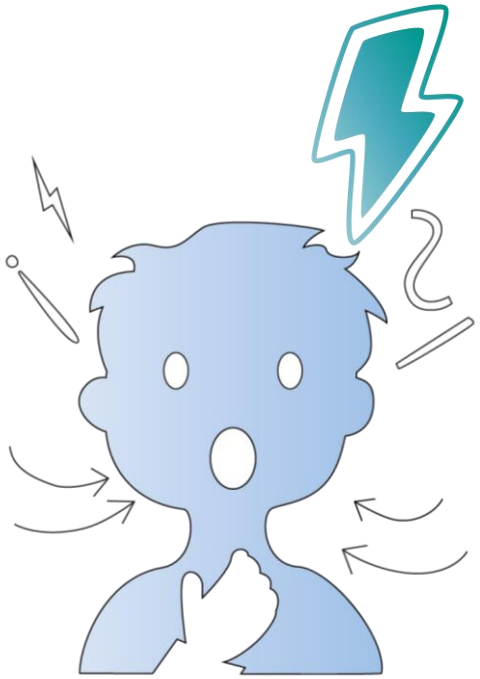
*Source: ESPGHAN Position paper, data form 2019, based on research in the USA

Complications



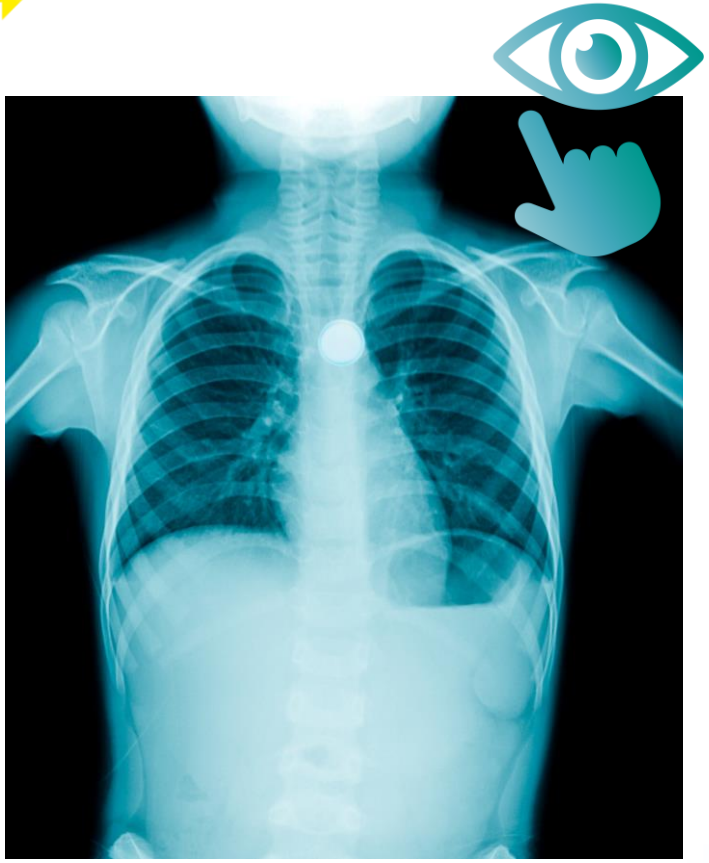
- Local pressure necrosis
- Electrolysis leads to hydroxide ion formation, pH rise, tissue liquefaction and necrosis, fistula formation, massive hemorrhage if vessel damaged
- Respiratory tract: most common in the nasal cavity (16% of complications)
- Most complications occur after unwitnessed ingestions with delayed diagnosis

Typical symptoms



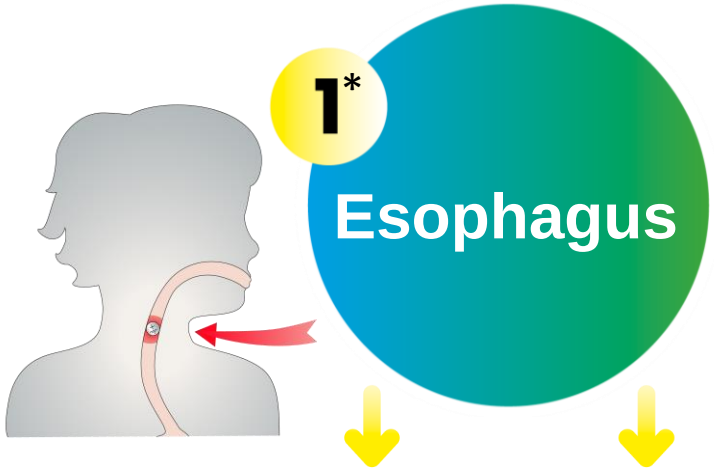
Witnessed ingestions (acute)	Unwitnessed ingestions
Vomiting	Hematemesis/hemoptysis
Drooling	Melena
Dysphagia	Abdominal pain
Odynophagia	Weight loss
Irritability	Chest pain
Coughing	Cough
Stridor	Fever
Shortness of breath	Sore throat
	Limited neck movement

Imaging



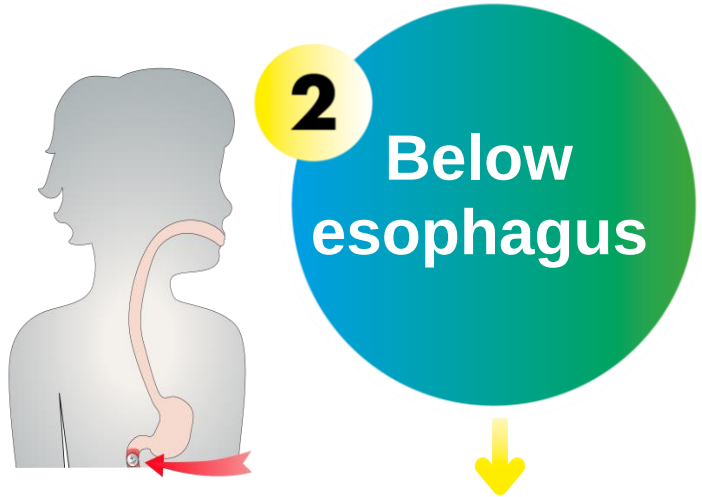
- Localize battery by 2-view X-ray of entire neck, chest, abdomen (anterior-posterior and lateral)
- Halo (double ring) can distinguish battery from a coin (not always possible)
- Longer history, suspected tissue damage: CT to identify tissue damage/complications
- MRI ONLY AFTER battery removal

Opportunities of action (overview)



Early diagnosis
Remove instantly

Delayed diagnosis (>12h)
CT scan to evaluate injury



Early/delayed diagnosis

Asymptomatic:
Repeat X-ray in 7 to 10 days

No passage:
Removal

Symptomatic:
Removal

*Typically Li-Coin cells with 20mm diameter

Therapeutic steps

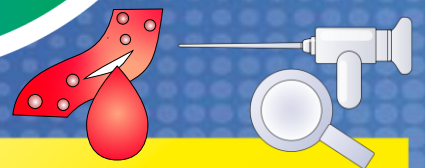
1 <2

Esophageal impaction: remove battery without delay

Children <1 year: Consider providing honey or sucralfate (up to 12h) while waiting for endoscopic removal

2 >12

Delayed diagnosis



CT scan to evaluate possible tissues/vascular injury before endoscopy for removal and evaluate tissue damage

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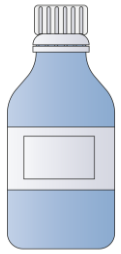
Strategies to mitigate injury

Honey per os

(potential to reduce injury severity by electrolysis and neutralization of generated hydroxide)

10 mL every 10 minutes
(max. 6 doses)



Sucralfate per os

10 mL every 10 minutes
(max. 3 doses)

Neutralization of accumulated tissue hydroxide

No signs of perforation

50 to 150 mL 0,25 % sterile acetic acid

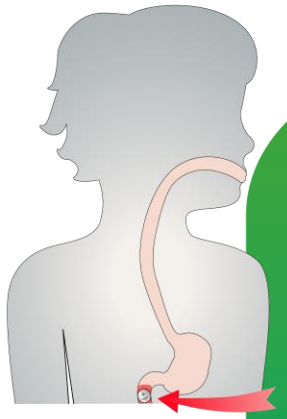
(based only on a small study in 6 children)

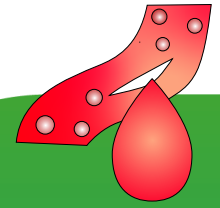
Therapeutic steps

- **Immediately remove battery** located in the esophagus by endoscopy (even if the patient has eaten)
- **Inspect mucosa** for injury extent, depth and location and direction of the negative pole (induces most damage)
- **Mucosal damage:**
  - Nasogastric tube to maintain patency of the lumen and provide liquids/feeds
  - Patient should not eat (NPO)
  - Severe damage: MRI imaging AFTER battery removal, surgical consultation

Opportunities of action

(location beyond esophagus)





- even beyond the stomach, necrosis of the esophagus and surrounding tissues is an ongoing process leading to fistulization
- esophageal injuries can lead to death

<12

Early/delayed diagnosis

Asymptomatic

- repeat X-ray in 7 to 14 days
  (if not excreted with stooly)
- prepare for surgical removal
  (if battery remains in abdomen)

Symptomatic

- gastroscopy
- surgery

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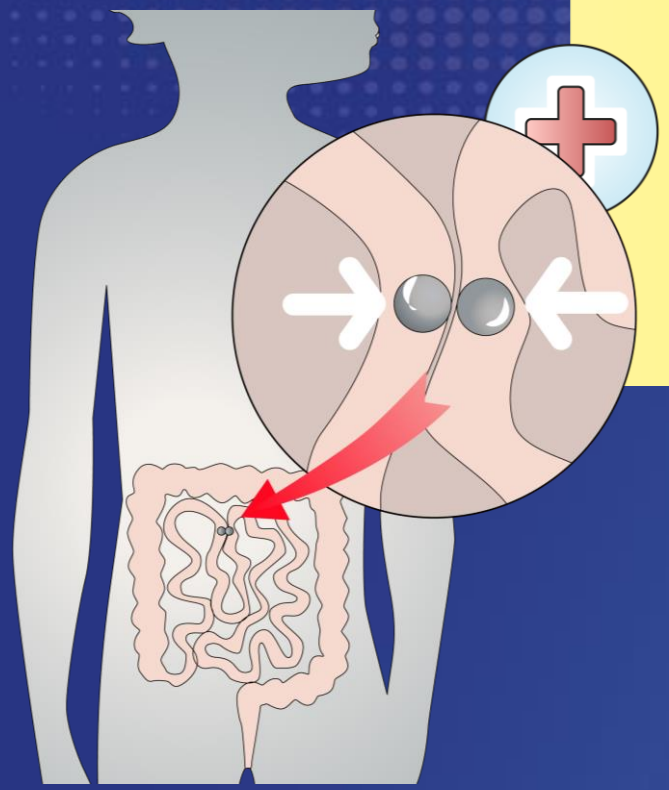
Co-ingestion of a magnet



- Entrapment of stomach or intestinal wall between battery and magnet may lead to tissue necrosis
- When the magnet has already passed the stomach

Asymptomatic
(and no prior esophageal disease)

Outpatient observation
(sensitive control of position of foreign bodies)

Otherwise

Removal

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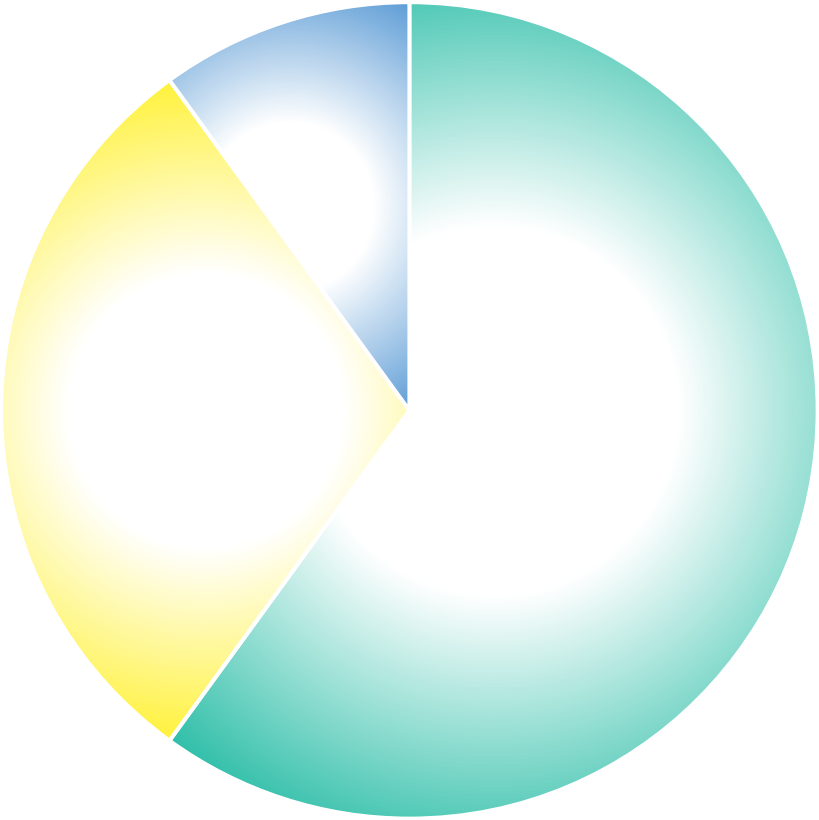
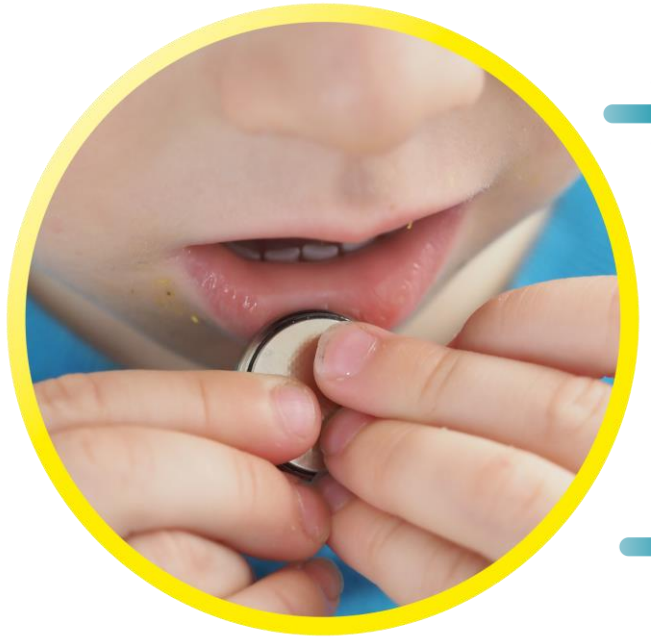
Sources of ingested button batteries*

- 60% directly taken from electrical devices
- 30% from loose batteries
- 10% from battery package



* Source: ESPGHAN Position paper: Diagnosis, Management, and Prevention of BB Ingestion in Childhood, data from 2019

Preventive options



- Child safe battery packaging
  - Secure battery package (especially when already open) with strong adhesive tape, keep out of reach and sight of children
- Child safe battery compartments of devices, secure with strong adhesive tape
- Coating of batteries with offensive taste

Raise public awareness

- Inform families and the public
- Develop and implement national prevention strategies
- Involve key stakeholders
  (media, medical professionals, regulators, industry)
- Enhance vigilance, encourage prompt pediatric hospital care with suspected ingestion
- Consider #POWERSAFELY campaign in your country

References

- **Diagnosis, Management, and Prevention of Button Battery Ingestion in Childhood: A European Society for Paediatric Gastroenterology Hepatology and Nutrition Position Paper** (ESPGHAN) J Pediatr Gastroenterol Nutr. 2021 Jul 1;73(1):129-136. doi: 10.1097/MPG.0000000000003048. PMID: 33555169. Authors: Mubarak A, Benninga MA, Broekaert I, Dolinsek J, Homan M, Mas E, Miele E, Pienar C, Thapar N, Thomson M, Tzivinikos C, de Ridder L.
- **EAP position statement: Button battery ingestion in children: Never Again!** Joint Statement by EAP, EPBA, ESPGHAN, ESPO, EUPSA, FISPGHAN, Kidsafe

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- Cornelia Sekulin, München

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