RISK OF SERIOUS INJURY FROM BATTERY INGESTION: WHAT DOCTORS NEED TO KNOW

Dear AAP Member:

The National Electrical Manufacturers Association (NEMA) is working with the National Capital Poison Center (NCPC) to alert doctors, parents and electronic product manufacturers to potentially fatal or debilitating injuries caused by ingestion of 3 volt lithium coin cells (also called lithium button batteries). The most serious injuries are usually associated with 20 mm diameter lithium button batteries (between the size of a US penny and nickel). A photo example and a listing of popular sizes are shown below.

<table>
<thead>
<tr>
<th>Popular sizes</th>
<th>CR 2016</th>
<th>CR 2025</th>
<th>CR 2032</th>
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<td>The recommendations of this letter apply to any 3 volt CR or BR type lithium coin battery.</td>
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As use of lithium button batteries in electronic devices has grown, the NCPC has noticed an increase in ingestion incidents that involve them, particularly among children younger than 4 years. Some ingestions have led to serious injury and even death, in large part due to an electrical current from the battery generating hydroxide through an electrolysis reaction that occurs when the battery is in contact with tissue fluids. The hydroxide which forms causes alkaline burns and perforations of the esophagus. Serious injuries can occur in as little as two hours. Complications include tracheoesophageal fistulas, esophageal perforation, esophageal strictures, mediastinitis, vocal cord paralysis, tracheal stenosis, spondylodiscitis, or exsanguination from fistulation into a large blood vessel. These complications may not develop for days or weeks following battery removal.

Most button batteries pass through the gut uneventfully and are eliminated in the stool. However, sometimes batteries get “hung up” in the esophagus and cause problems. A battery that is stuck in the esophagus is especially likely to cause tissue damage. When a battery is swallowed, it is impossible to know whether it will pass through or hang up in the esophagus, although ingestion of a larger diameter battery (20 mm or so) in a younger child (< 4 years) increases the risk. In making an x-ray diagnosis, it is important to look for the characteristics that distinguish a battery from a coin. Here are two important differences that are usually evident with proper x-ray orientation and resolution.

MAKE X-RAY DIAGNOSIS AND REMOVE FAST

Sample X-rays

<table>
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<tr>
<th>Button Battery: Step</th>
<th>US Nickel: No Step</th>
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<td>Note Gap Due to Plastic Seal</td>
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Button Battery

US Nickel
If a battery ingestion is suspected, physicians should consult the detailed treatment guideline found at www.poison.org/battery/guideline.asp or call the National Battery Ingestion Hotline at 202-625-3333 for guidance. In summary:

1. Keep the patient NPO until an esophageal battery position is ruled out by x-ray.
2. If the patient is asymptomatic, take up to 5 minutes to determine the identification number from the package or a matching battery. (Consult the National Battery Ingestion Hotline at 202-625-3333 for assistance in battery identification.)
3. Obtain an immediate x-ray for all children ≤12 years who have ingested a battery (for older children and adults, check the guideline for specific indications). **Batteries in the esophagus may cause serious burns in just 2 hours.** Do not wait for symptoms to develop. Patients may be asymptomatic initially, or may have vomiting, cough, decreased appetite, drooling, stridor, dysphagia, fever or hematemesis. On x-ray, look for the double-rim (AP view) and step-off (lateral view) to distinguish a battery from a coin.
4. **Batteries in the esophagus must be removed immediately.** Endoscopic removal is preferred as direct visualization of the esophagus determines subsequent treatment. Expect esophageal perforations and fistulas involving the trachea or major vessels to be delayed up to 18 days after battery removal and monitor aggressively for these complications; esophageal strictures may not manifest for weeks to months post ingestion.
5. Allow batteries to pass spontaneously if they have passed beyond the esophagus and no clinical indication of significant gastrointestinal injury is evident. Retrieval is indicated only if a magnet is coingested, symptoms develop, or a large diameter battery (≥15 mm) fails to pass the pylorus in 4 days. Manage all other batteries beyond the esophagus at home with regular diet and activity. Confirm passage by stool inspection or consider repeating radiographs if passage is not documented in 10-14 days.

We encourage both patients and physicians to call the National Battery Ingestion Hotline at the National Capital Poison Center at 202-625-3333 for consultation about button batteries. Expert advice is available 24/7.

Button batteries may also cause permanent injury when they are placed in the nose or the ears. Young children and the elderly are particularly at risk. Symptoms to watch for are pain and/or a discharge from the nose or ears. Avoid using nasal or otic drops until a battery in the ear or nose is ruled out on exam, as these fluids accelerate injury if a battery is involved.

Battery and device manufacturers, in cooperation with the National Capital Poison Center, the US Consumer Product Safety Commission and others are taking steps to address this hazard through prevention, including strengthening warnings and securing battery compartments. We welcome any questions or feedback you may have. In the meantime, you can find additional information at:

- **US Consumer Product Safety Commission**
- **National Capital Poison Center**
  www.poison.org/battery

Sincerely,

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