Queensland Injury Surveillance Unit

Disc battery injury:

A logistics and prevention challenge

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Summer Steer: 4yo who swallowed lithium battery taken to hospital three times before death, Queensland inquest hears

By Jo Skinner and Bruce Atkinson

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PHOTO: Four-year-old Summer Steer was the first Australian child to die after swallowing a "button" battery. (ABC News: supplied)




Injuries due to disc batteries

- Well described in medical literature from late 1970's
- Severe injury associated with battery becoming lodged in one position
- **Any battery** with more than 1.2V of charge
- 3V 2cm batteries associated with highest risk: size and charge
- Production of NaOH ions at the anode (negative pole)
- Caustic injury with local erosion through tissue
- Damage continues even after battery removal
- Pattern of injury due to:
  - Charge
  - direction battery facing
  - **location (oesophageal)**
  - Duration (> 1 hour)

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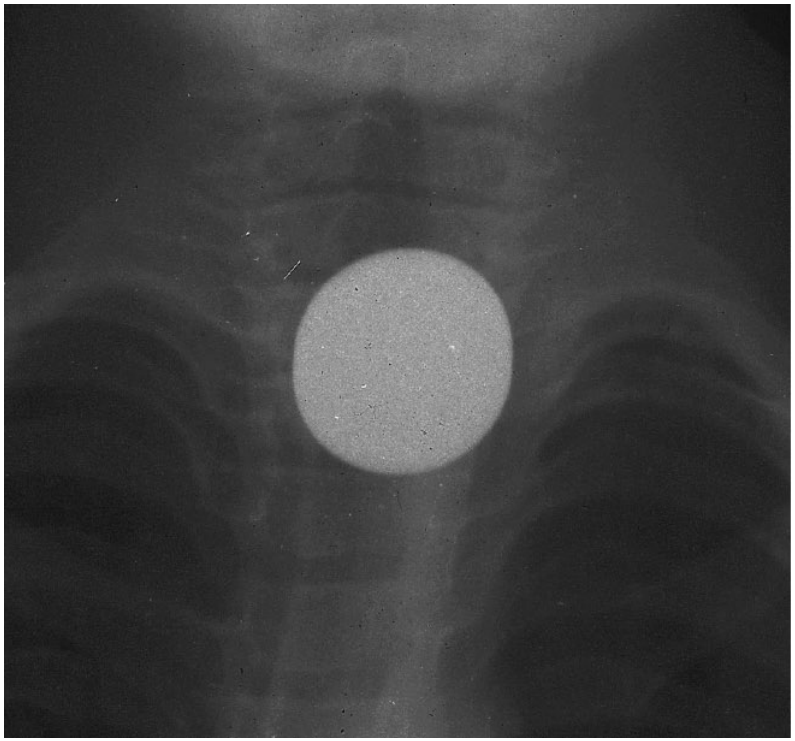
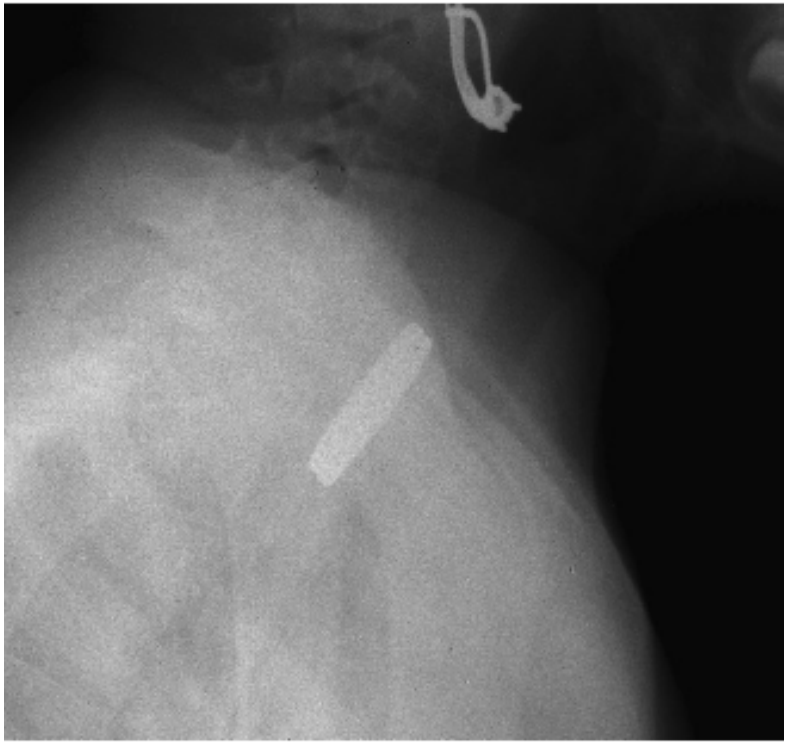
How do children present?

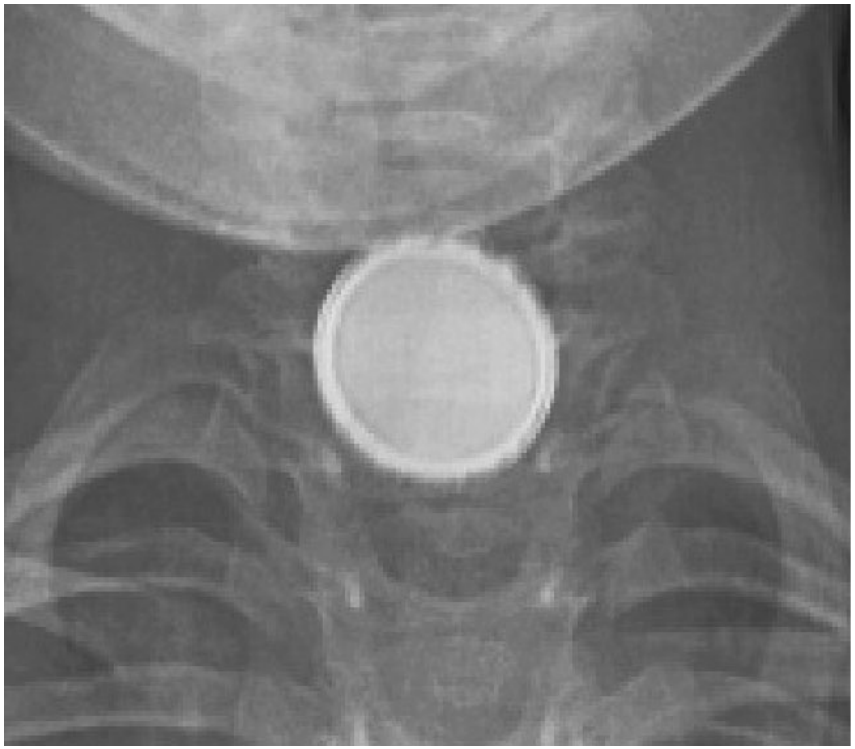
- Battery missing
- Seen to have been playing with one
- Parents heard a gulp, cough or choking episode
- Self-reported by child (older)
- **Occult cases: Very non-specific and presentation/ diagnosis often delaye**d
  - Partial food refusal: (can still vomit, take soft food/ fluids)
  - Drooling
  - Mimic croup
  - Chest pain
  - Upper GI bleeding (venous: melaena/ arterial: haematemesis)
  - Mimic epistaxis
  - Ear/ nasal discharge

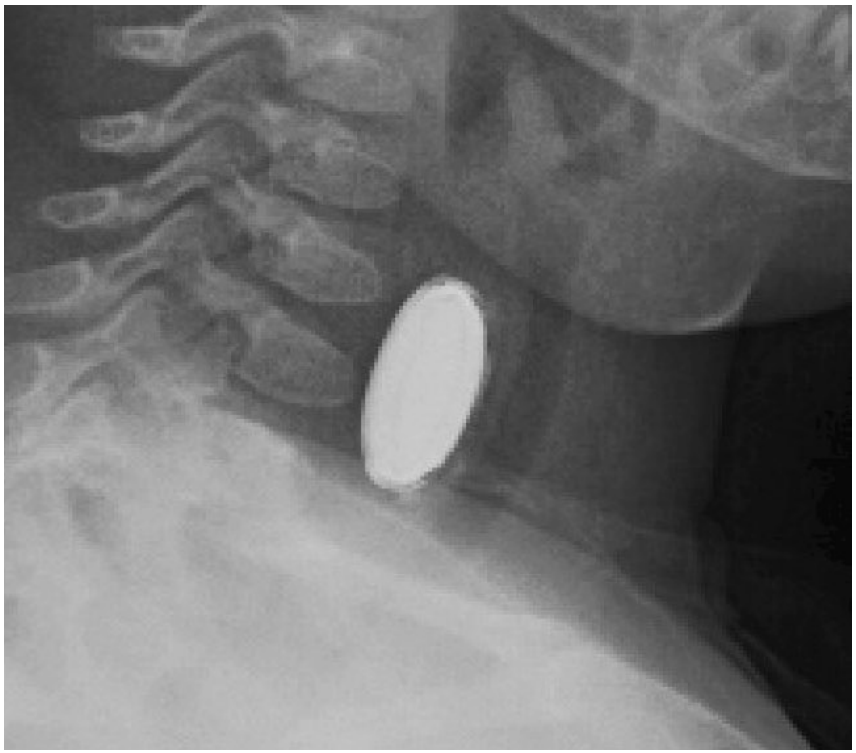
Antero-posterior and lateral x-rays





Antero-posterior and lateral x-rays with a different penetration





Identification in health data

- Not identified in the inpatient data:
  - ICD 10 not specific enough for battery FB
  - W 80.2: choking/ inhaling battery: 0 cases

- Not always identified in ED data
  - Triage text search can identify cases where ingestion/ insertion suspected at triage and 'battery' mentioned
  - Occult cases (severe cases) under-reported using this method:
    - Non-specific presentation: drooling, chest infection
    - Co-incidental diagnosis using X-ray

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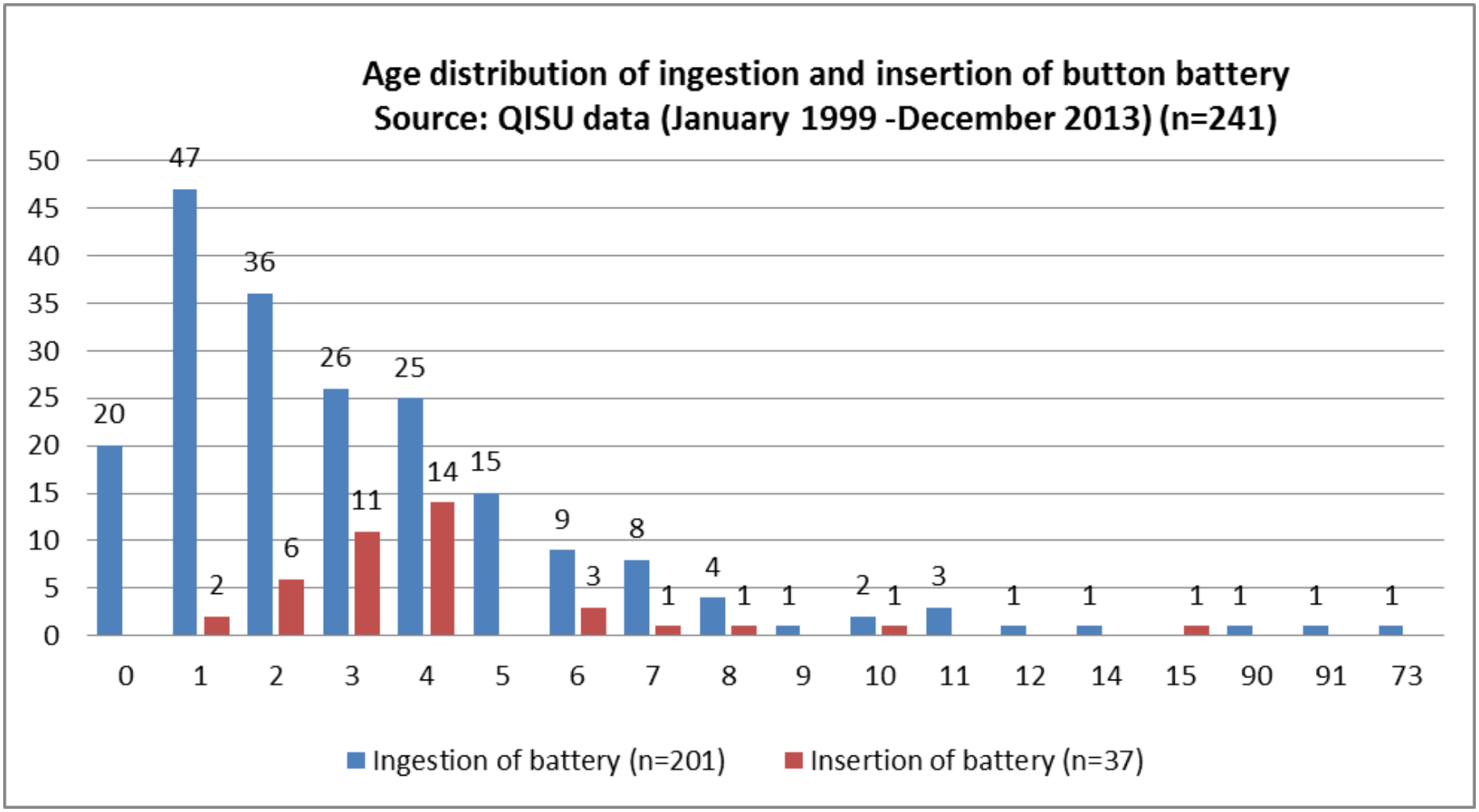
Who does it affect?



What product are they for?

Source of Battery	Age																	Total
	0	1	2	3	4	5	6	7	8	9	10	11	12	14	15	73	90	91	
Unspecified	8	22	20	19	25	10	8	5	2		3	1		1	1		1		126
Watch	5	11	9	9	6	3	2	2	3	1		1	1						53
Hearing aid	1	4	8	5	2			1								1		1	23
Toy	3	5	3	3	2	1	1												18
Torch / bike light / laser light		2				1						1							4
Calculator	1	3																	4
Clock			2		1														3
Pen		1			1														2
Package	1				1														2
Remote control				1			1												2
Computer					1														1
Key ring								1											1
Candle		1																	1
Lamp	1																		1
Total	**20**	**49**	**42**	**37**	**39**	**15**	**12**	**9**	**5**	**1**	**3**	**3**	**1**	**1**	**1**	**1**	**1**	**1**	**241**




How do children access disc batteries?

- Loose:
  - Purchased loose
  - After removed from product by adult (table, benchtop)
  - Discarded (floor, bin, storage container)
- Battery packaging: not required to be child resistant
- Product:
  - Loose battery within product packaging
  - Accessible battery compartment
  - Broken product/ battery compartment
  - Compartment not resecured
- Ingested whole product: torches, hearing aids

- 3V batteries still have sufficient charge (1.5V) when spent to cause damage

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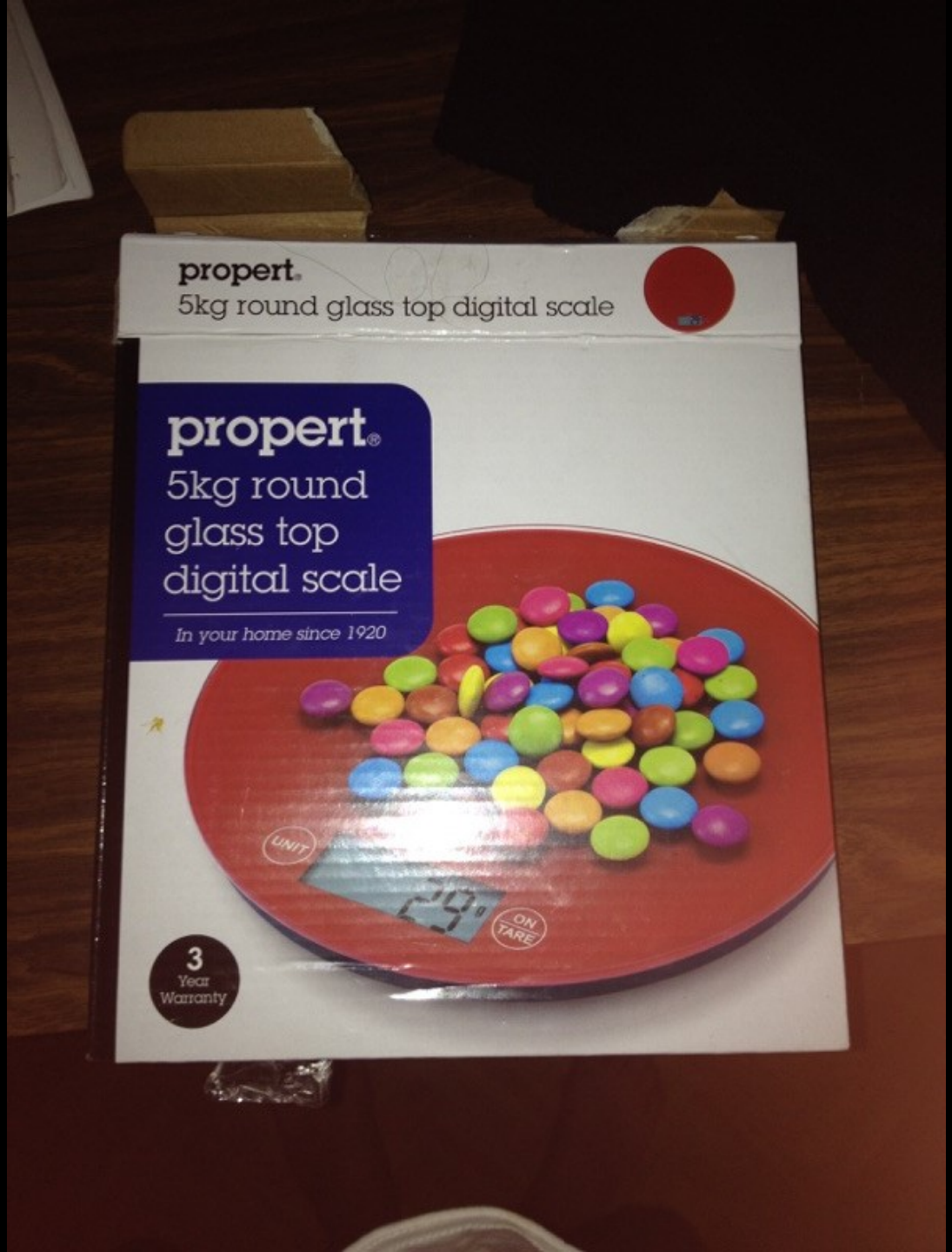
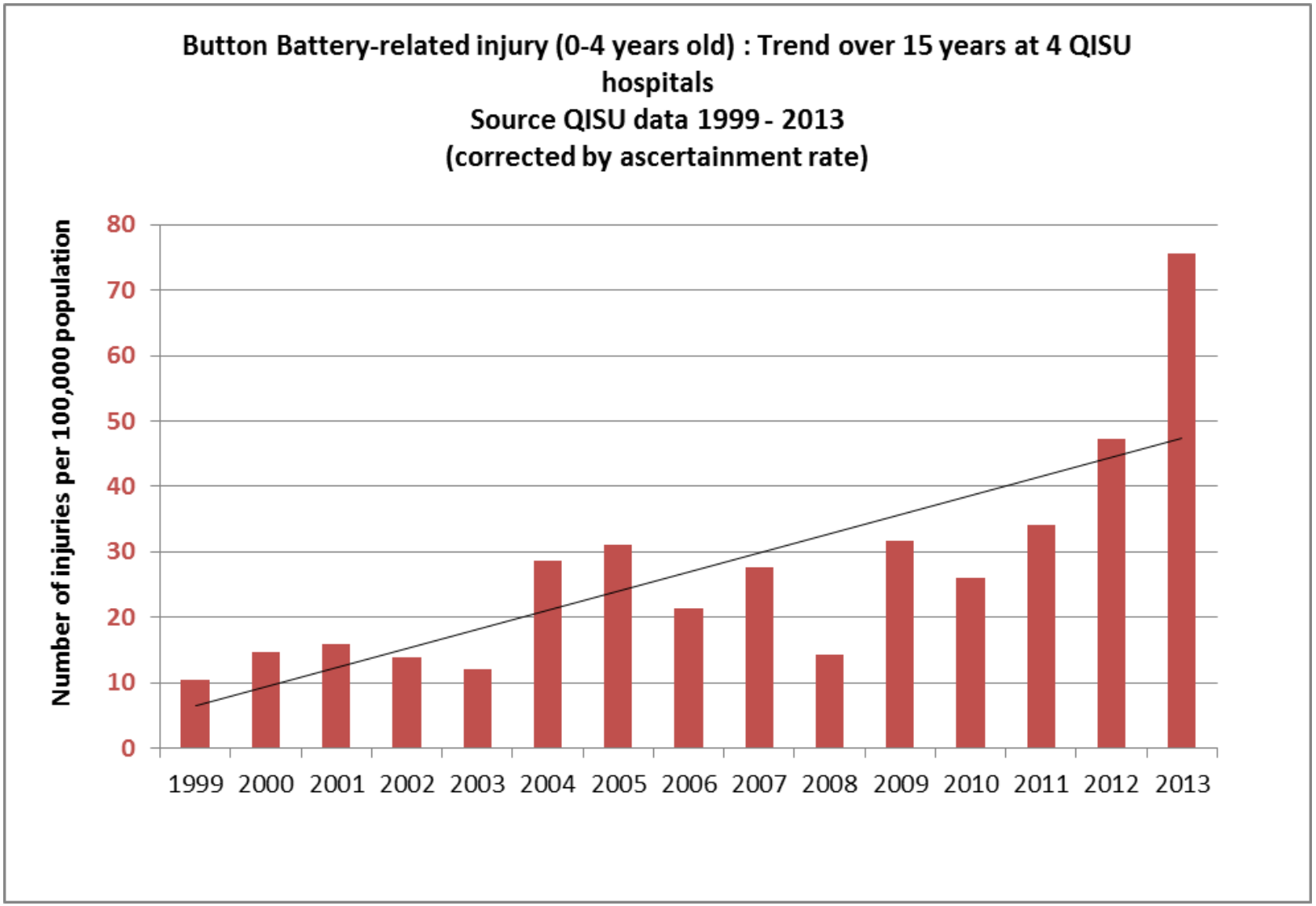

propert
5kg round glass top digital scale
propert
5kg round glass top digital scale
In your home since 1920
UNIT
ON TARE
3 Year Warranty

Trend data


Button Battery-related injury (0-4 years old) : Trend over 15 years at 4 QISU hospitals
Source QISU data 1999 - 2013
(corrected by ascertainment rate)
Number of injuries per 100,000 population
80
70
60
50
40
30
20
10
0
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013

National Poisons Centre

- NBI hotline: Dr Toby Litovitz
- http://www.poison.org/battery/guideline

- Combination of hotline reports plus case reports in literature and media reports internationally:
  - 48 fatalities (majority vascular fistulae)
  - 188 severe cases

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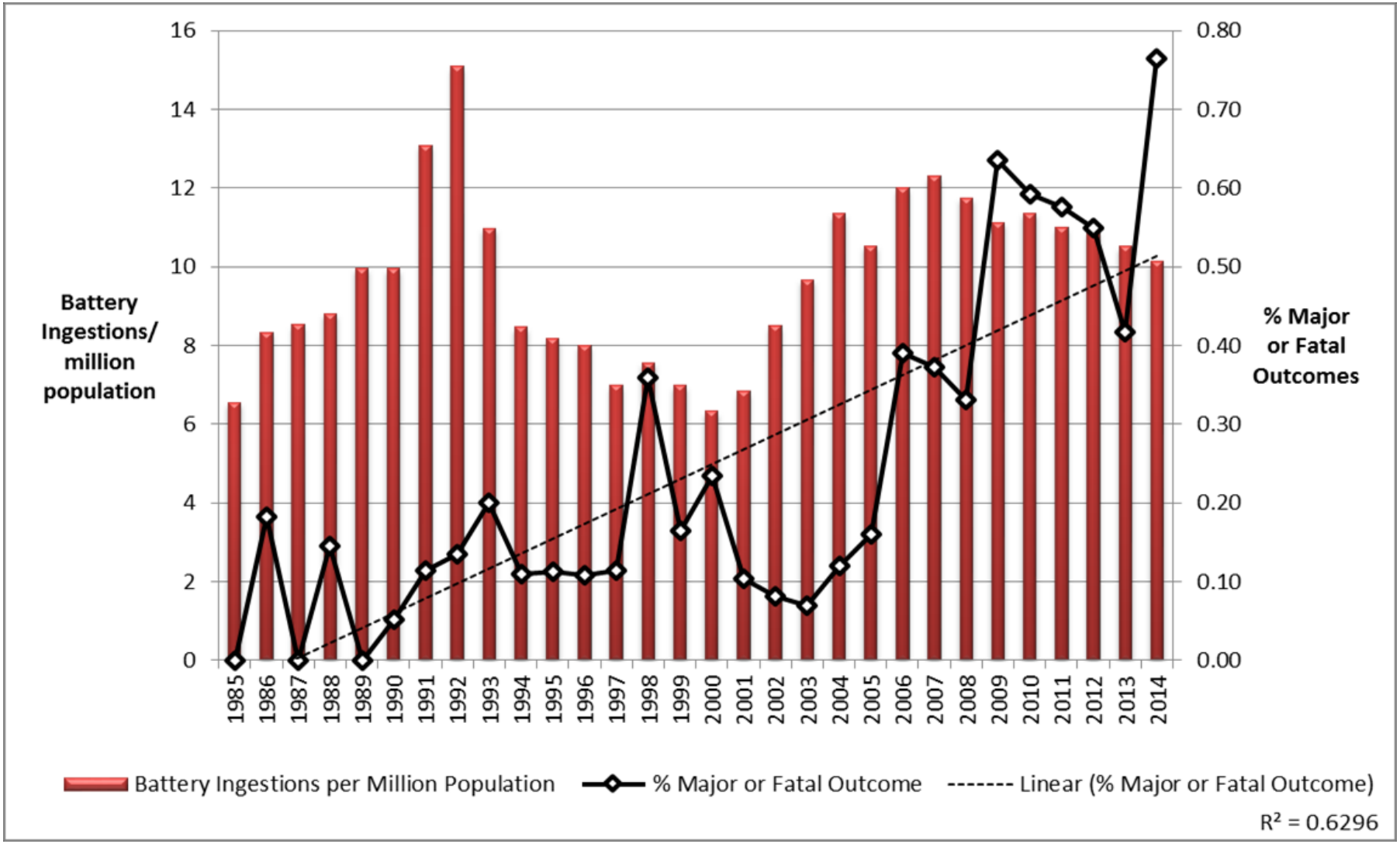
US trend data: NBIH major/ fatal



Head 'almost fell off'

BATTERY HORROR

PETER HALL

THE family of a baby who suffered spinal damage after swallowing a button battery is suing two hospitals for delays in its removal.

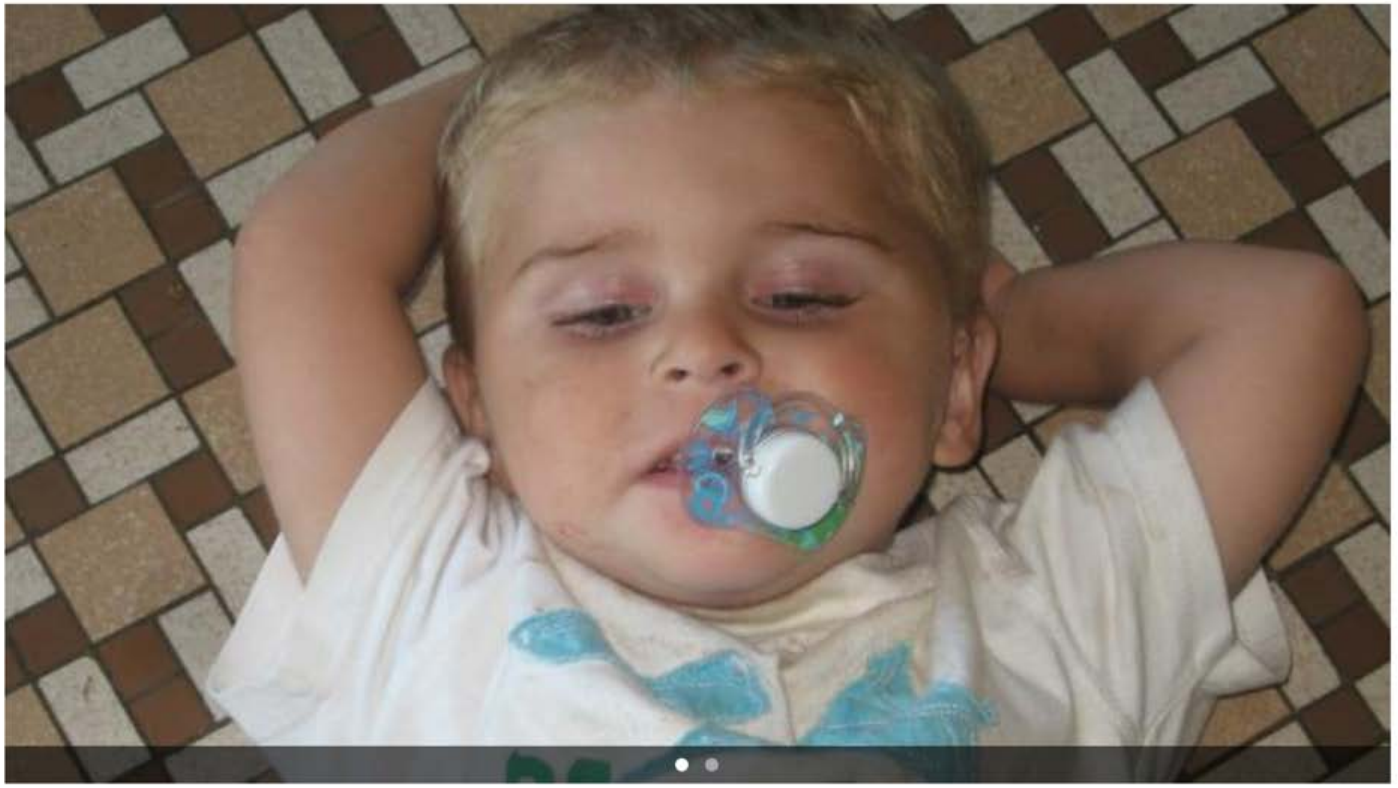
The far north Queensland family is pursuing legal action against Mossman Hospital and Cairns Base Hospital over what it says was a medical nightmare in which the health system showed "no sense of urgency".

It claims the hospitals failed to identify and extract the battery in time to avoid life-long injury to the boy.

The family, represented by Shine Lawyers, claims critical delays occurred when a radiologist mistook the circular battery for a shirt button.

After it was finally removed, post-operative care allegedly was slow to detect that three of the baby's vertebrae had suffered severe damage and had collapsed.

He was then airlifted to the Royal Children's Hospital in Brisbane where he spent up to six months in a body cast. The boy can now walk but will have limited movement for life.



Far North Queensland boy Oscar, pictured as a toddler, was lucky to survive after swallowing a lithium battery. Picture: supplied

Head of the Medical Negligence department at Shine Lawyers, Bill King, said that the child had sustained permanent spinal damage because of hospital failures.

"Medical professions need to be aware of the serious legal repercussions that can result should they fail to detect and respond to the ingestion of such dangerous foreign materials," he said.

The litigation further highlights the danger of lithium batteries, first revealed at an inquest earlier this month into the death of four-year-old Summer Steer on the Sunshine ...

A battery nearly killed our son

LOUISE BURKE | January 26, 2012, 3:00 am

Share

A battery nearly killed our son




Current issues

- Exposure, particularly to 2cm batteries increasing
- Batteries accessed pre, in and post product
- Range of different products
- Only toys are regulated
- Proportion of occult/ severe cases increasing
- Medical delays can contribute to disability
  - Diagnostic
  - Radiologic
  - Transport/ management
- Death can occur weeks after battery removal

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Medical management

- Recognising occult cases:
  - Who to X-ray: http://www.qisu.org.au/modcorefrontend/upload/Disc-Batteries-QISU.pdf
  - Patient safety notices
- Incorporating battery information into clinical guidelines:
  - FB, Upper GI bleeding, Epistaxis
- Development of clinical pathways to expedite treatment:
  - Triage: cat 2
  - Radiology: what to X-ray, who to call if battery seen
  - Theatre: fasting protocols?, bypass procedures?
  - Retrieval

Strategies: prevention

- Awareness:
  - Public awareness: social media
  - Medical identification
- Voluntary guidelines being developed for/by industry
  - Secure battery compartments
  - Child resistant packaging
  - Labelling
- Horizontal battery standard:
  - ANY product that contains a disc battery needs to be robustly constructed and have a secure compartment
- Battery recycling initiative: child resistant disposal containers
- Novel ideas to prevent kids from swallowing them/ damage

And we need better data!

- Poisons Information Centres proposed as first point of call for advice
- Consistent management to protocol with specialist assistance
- Will capture majority of less severe cases

- APSU proposal to collect data on **severe cases**
- ENT, Paediatric gastroenterologists, Paediatric surgeons
- Will include inserted and ingested batteries

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Questions/ comments?

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