Multicenter EHR Study · PEDSnet · 2023–2026

E-bike and E-scooter Injuries Managed in Pediatric Health Systems

PEDSnet a pediatric learning health system

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OBJECTIVE To examine recent trends in rates and severity of pediatric **e-bike and e-scooter** injuries across US pediatric health systems, compared with non-motorized devices.

+33%/qtr
Growth in **e-bike** injury rates — vs +2% for non-motorized bikes
IRR 1.33 (95% CI 1.28–1.39)

+15%/qtr
Growth in **e-scooter** injury rates — vs +4% for non-motorized scooters
IRR 1.15 (95% CI 1.12–1.19)

2×
High-severity injuries: e-bikes 8% vs bikes 4%; e-scooters 5% vs scooters 2%
P<.001 for bikes and for scooters

44%
of e-scooter injuries (and **24%** of e-bike injuries) were in children **under 12**
well under the legal driving age for other motorized vehicles

13,307 injury encounters · **6** pediatric health systems · **13** quarters · Jan 2023 – Mar 2026 · **5** device types

Background

- Use of **e-bikes and e-scooters** has risen rapidly, including among children.
- Multicenter data on pediatric injury trends, severity, and device differences remain limited.
- New **ICD-10-CM external cause codes** now make these injuries identifiable in EHRs.
- We used PEDSnet to examine trends and severity, benchmarked against non-motorized devices.

Methods

1. **Data source**
   PEDSnet EHR data (OMOP-based CDM); 6 institutions with consistent external cause code use (4 excluded for sparse use)
2. **Population**
   Patients <18 y with ED, urgent care, or inpatient care, Jan 2023 – Mar 2026
3. **Exposure**
   E-bike, e-scooter, non-motorized bike, non-motorized scooter, or skateboard external cause codes
4. **Events**
   ED → admission merged into one episode; 90-day washout separates new injuries from follow-up
5. **Rate**
   Patients with device injury ÷ all patients with acute care that quarter, per 10,000

Injury severity scale

Low
ED or urgent care only

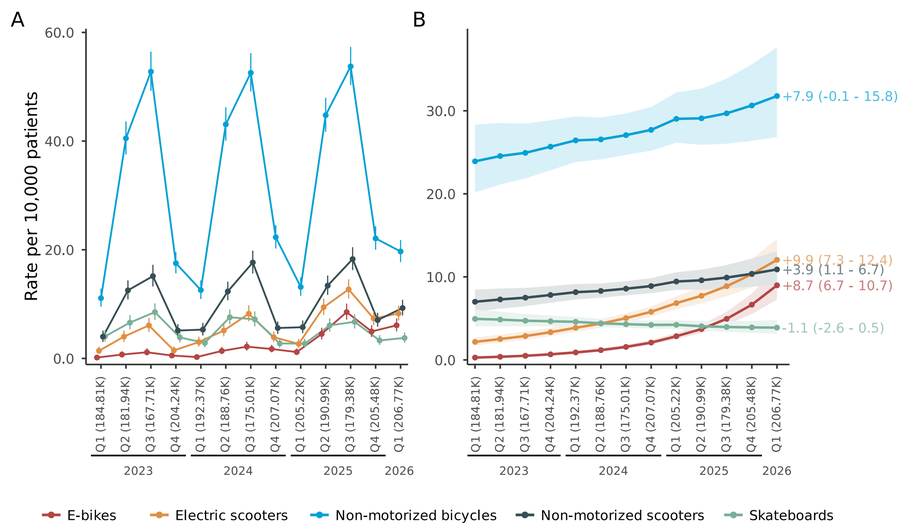
Moderate
Hospitalized, no ICU care or severe injury

High
ICU-level care, or major neurologic, vascular, thoracic, abdominal/pelvic, or neck injury; traumatic amputation; severe crush; fracture requiring operative fixation

Statistical model

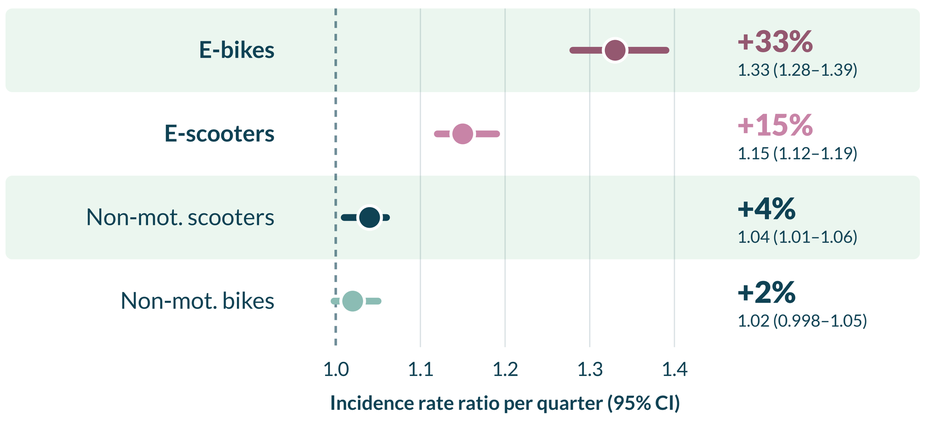
- Negative binomial regression of quarterly counts, offset by log(denominator)
- **device × quarter** + annual **sin/cos** Fourier term + **site** fixed effects
- Seasonal model chosen by lower AIC/BIC
- χ^2 / Fisher's exact for categories; Kruskal-Wallis for age

Injury rates are rising — fastest for electric devices



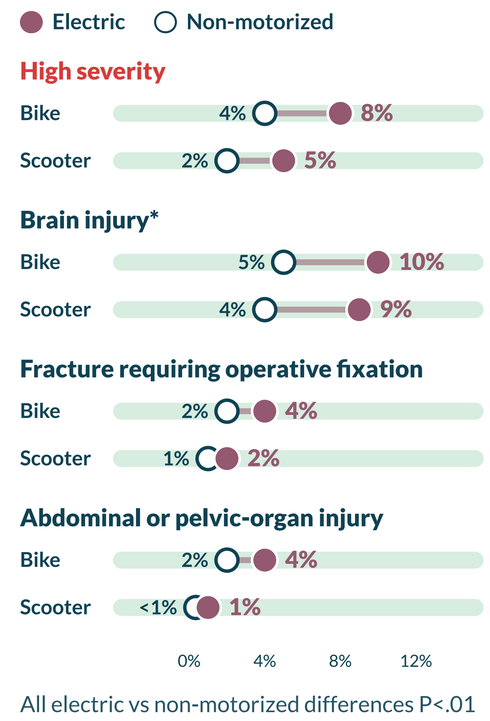
A Observed quarterly rate per 10,000 patients with acute care, pooled across sites (95% Poisson CI). **B** Negative binomial fitted trend, seasonally and site-adjusted (95% CI band); labels give absolute rate change over the study period.

Proportional growth per quarter



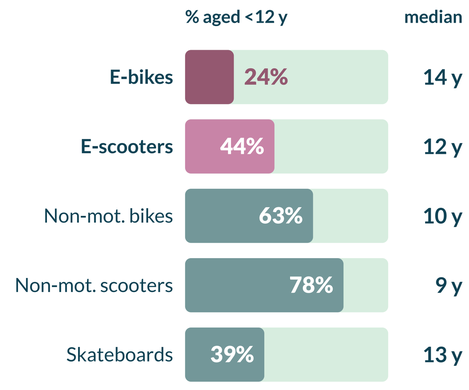
Absolute increase per 10,000 was similar for e-bikes (+8.7) and non-motorized bikes (+7.9; CI crosses 0), but higher for e-scooters (+9.9) than non-motorized scooters (+3.9). **Proportional growth was far larger for electric devices.**

Electric devices: more high-severity injuries



All electric vs non-motorized differences P<.01 (χ^2 test). *Includes concussion without loss of consciousness.

Many riders are young children



Cohort characteristics

DEVICE	N	MALE	AGE, MEDIAN (IQR)	HOSPITALIZED
E-bikes	**642**	**85%**	**14 (12–15)**	**17%**
E-scooters	**1,396**	**70%**	**12 (10–14)**	**12%**
Non-motorized bikes	7,572	74%	10 (7–13)	14%
Non-motorized scooters	2,460	61%	9 (6–12)	14%
Skateboards	1,237	74%	13 (10–15)	10%
Overall	**13,307**	**72%**	**11 (7–14)**	**13%**

Limitations

- Relies on recently introduced ICD-10-CM external cause codes; inconsistent adoption across sites over time may partly explain rising rates.
- Denominators are acute-care encounters, not person-time of device exposure, so per-device riskiness cannot be inferred.

What this means

- Pediatric **e-bike and e-scooter injuries are rising fast** and **are more likely to be severe** than non-motorized injuries.
- Quarterly-refreshed multicenter EHR data can flag emerging **injury trends ahead of national surveillance**.
- 1 in 10 injured e-bike riders had a **brain injury** — possibly reflecting higher speeds and lower helmet use.
- Findings support **injury prevention and legislative action**, especially for young children.

PARTICIPATING PEDSNET SITES

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References available on request.

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