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## Summary

**Background** Children presenting to the emergency department with anaphylaxis typically receive at least one dose of epinephrine and are observed in the emergency department or monitored for recurrent (biphasic anaphylaxis) or persistent symptoms on hospital wards for variable durations before discharge is considered safe. We aimed to calculate the incidence rate and timing of repeat epinephrine dosing to determine the observation threshold at which the cumulative incidence of repeat epinephrine was less than 2% for every 1 h increase in observation time.

**Methods** This multicentre, retrospective cohort study across 30 emergency departments in the USA and one emergency department in Canada included children aged 6 months to 17 years who, according to electronic medical records, presented to one of the participating emergency departments with an acute allergic reaction that was treated with intramuscular, subcutaneous, or intravenous epinephrine before arrival at the emergency department or in the emergency department between Jan 1, 2016, and Dec 31, 2019. We excluded patients who had no documentation of symptoms or examination findings before presenting to the emergency department, were transferred from outside health-care facilities, had reactions secondary to medications administered in the emergency department, or had comorbidities requiring tailored management decisions. Demographics, medical history, and emergency department revisits within 72 h of discharge were extracted from electronic medical records. The primary outcome was the time from first to last administration of epinephrine. For patients on intravenous epinephrine infusions, the relevant time interval was from infusion initiation to discontinuation. Kaplan–Meier analyses were used to compare time to last epinephrine dose by initial reaction severity, stratified by respiratory and cardiovascular involvement (no respiratory or cardiovascular involvement, respiratory but no cardiovascular involvement, and cardiovascular involvement).

**Findings** Of 7717 patients with ICD-10 Clinical Modification codes for anaphylaxis, 5641 were eligible for inclusion (median age 7·9 years [IQR 3·3–13·1]; 2475 [43·9%] female; 3166 [56·1%] male). Of the 5139 patients who reported