

Frequency and Risk Factors of Acute Kidney Injury During Diabetic Ketoacidosis in Children and Association With Neurocognitive Outcomes. Sage R. Myers, Nicole S. Glaser, Jennifer L. Trainor et al.

JAMA Network Open. 2020;3(12):e2025481.

BACKGROUND: Acute kidney injury (AKI) occurs commonly during diabetic ketoacidosis (DKA) in children, but the underlying mechanisms and associations are unclear.

OBJECTIVE: To investigate risk factors for AKI and its association with neurocognitive outcomes in pediatric DKA.

DESIGN, SETTING: This cohort study was a secondary analysis of data from the Pediatric Emergency Care Applied Research Network (PECARN) Fluid Therapies Under Investigation in DKA Study, a prospective, multicenter, randomized clinical trial comparing fluid protocols for pediatric DKA in 13 US hospitals.

PARTICIPANTS: Included DKA episodes occurred among children age younger than 18 years with blood glucose 300 mg/dL or greater and venous pH less than 7.25 or serum bicarbonate level less than 15 mEq/L requiring intravenous insulin therapy.

MAIN OUTCOMES AND MEASURES: AKI occurrence and stage were assessed using serum creatinine measurements using Kidney Disease: Improving Global Outcomes (KDIGO) criteria.

ACADEMIC P.E.A.R.L.S

Pediatric Evidence And Research Learning Snippet



Acute Kidney Injury During Diabetic Ketoacidosis and Association With Neurocognitive Outcomes

Result: Among 1359 DKA episodes the mean [SD] patient age was 11.6 [4.1] years; 727 [53.5%] were girls; 651 patients had [47.9%] with new-onset diabetes

- AKI occurred in 584 DKA episodes (43.0%), and 553 of these episodes (94.7%) presented with AKI at diagnosis of DKA

- A total of 252 AKI events (43%; 95%CI, 39%–47%) were stage 2 or 3.

- AKI was more common among children with previously diagnosed diabetes compared with those with new onset (odds ratio [OR], 2.67; 95%CI, 2.14–3.34; $P < .001$) on univariate analysis and these children had more severe dehydration compared to non-AKI group. Multivariable analyses identified older age, higher initial serum urea nitrogen, higher heart rate, higher glucose-corrected sodium and glucose concentrations and lower pH as variables associated with AKI.

- Children with AKI, compared with those without, had lower scores on tests of short-term memory during DKA and lower mean (SD) IQ scores 3 to 6 months after recovery from DKA ($p = .005$).

Discussion: This study highlights a high incidence of Acute kidney injury (AKI) in children with severe DKA and can present even at diagnosis of DKA. Factors like older age of the child, previously diagnosed diabetes, higher BUN, higher corrected Na, higher glucose concentration, higher heart rates and lower pH were associated with acute kidney injury. Children with AKI had higher frequencies of subtle cognitive impairment during DKA, and deficits in IQ were evident in children with AKI after DKA recovery compared with children without AKI suggesting that concurrent kidney and cerebral injury were associated with a common process.

Key message: AKI may occur more frequently in children with greater acidosis and circulatory volume depletion in DKA and may be part of a pattern of multiple organ injury involving the kidneys and brain. Children with AKI had higher frequencies of subtle cognitive impairment during DKA, and deficits in IQ were evident in children with AKI even after months following DKA

EXPERT COMMENT



“High incidence of acute kidney injury occurs in severe DKA. Renal functions and urine output should be monitored closely in severe DKA and appropriately treated. Further studies are needed to evaluate & analyze the multiple organ injuries (esp brain & kidney) in severe DKA”

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Reference :

Myers SR, Glaser NS, Trainor JL, et al. Frequency and Risk Factors of Acute Kidney Injury During Diabetic Ketoacidosis in Children and Association With Neurocognitive Outcomes. JAMA Netw Open. 2020;3(12):e2025481. doi:10.1001/jamanetworkopen.2020.25481

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