



Emergency Medical Abstracts



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## Clinical effects of balanced crystalloids vs saline in adults with diabetic ketoacidosis: a subgroup analysis of cluster randomized clinical trials

Self WH, Evans CS, Jenkins CA, et al. *JAMA Netw Open*. 2020;3(11):e2024596.

### SUMMARY:

- In patients with diabetic ketoacidosis (DKA), insulin and IV fluids are critical components of initial management. Normal saline (NS) is the most commonly used fluid and is recommended in many current practice guidelines for DKA treatment.
- Because NS can lead to metabolic acidosis when multiple liters are administered, some physicians have suggested that switching to a balanced crystalloid solution may be prudent.
- In this subgroup analysis of 2 large pragmatic, cluster randomized clinical trials, the authors compare balanced crystalloids vs saline for the acute management of adults with DKA.
- Two trials were conducted—the Saline Against Lactated Ringer's or Plasma-Lyte in the Emergency Department (SALT-ED) trial and the Isotonic Solutions and Major Adverse Renal Events Trial (SMART)—to compare NS vs lactated Ringer solution (LR) or Plasma-Lyte.
- The trials randomized patients to only the type of fluid used; all other aspects of management, including the volume of fluid, insulin dosage, and electrolyte repletion, were decided by the treating provider.
- The primary outcome was the time to DKA resolution, on the basis of established American Diabetes Association criteria, and the secondary outcome was the duration of IV insulin administration.
- In the original sample, 172 patients had an ICD-10 diagnosis of DKA, as confirmed by laboratory/medical-record review.
- Adherence to the assigned crystalloid type was high. By total volume, 85.3% of the crystalloid administered in the balanced crystalloids group was balanced crystalloids (almost 100% LR), and 96.7% of the crystalloid administered in the saline group was saline.
- The groups appeared similar at baseline in important aspects such as DKA severity, laboratory-test values, and renal function.
- The time to DKA resolution was shorter in the balanced crystalloids group than the NS group (13.0 vs 16.9 hours), as was the time on IV insulin (9.8 vs 13.4 hours).
- Most clinical outcomes were the same (with an exception of less hypokalemia with balanced fluids).
- Four RCTs have been published on this topic; despite being very small, they all also found that LR is superior (in terms of faster resolution) to NS in patients with DKA.
- This study has all the same strengths (immediate randomization in the ED and strong adherence to the assigned fluid type) and limitations (non-blinded design) of the original trials, but has some additional limitations associated with subgroup analyses (some patients with DKA might have been missed because of the ICD-10-based identification strategy, and the chance of type 1 error might have increased).



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FULL ARTICLE: <https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2772993>

**EDITOR'S COMMENTARY:** In this subgroup analysis of the SMART and SALT-ED trials, patients with DKA who received balanced crystalloid resuscitation had an absolute reduction of about 4 hours and a relative reduction of approximately 20%-30% in the time to DKA resolution and discontinuation of insulin infusion. Although this study was not a trial, and there was no change in clinical outcomes, this study provides some of the most compelling evidence to date that LR should be used over NS in patients with DKA. Professional organizations still recommend NS, but stay tuned.

**RELATED SEGMENTS:**[EM:RAP 2018 July: Critical Care Mailbag - DKA](#)[CorePendium: Diabetic Ketoacidosis](#)