
Balanced Crystalloids Versus Normal Saline in Critically ill Adults: A Systematic Review and Meta-Analysis with Trial Sequential Analysis

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Abstract

Background: Both balance solution and normal saline are commonly used for fluid therapy in critically ill patients. However, the association of the type of crystalloid solution and patient outcomes remains inconclusive.

Methods: We searched Pubmed, Embase, and Cochrane Central Register from inception through January 2022. Randomized trials comparing balanced crystalloids to normal saline for non-perioperative fluid resuscitation in adult critically ill patients were included. The primary outcome was 30-day mortality. A trial sequential analysis (TSA) was performed to assess the effect of the fluids on outcomes. The secondary outcomes included the incidence of acute kidney injury (AKI), renal replacement therapy (RRT), and other pre-specified outcomes.

Results: Tens RCTs were identified, including a total of 36,233 participants. There was no significant difference in 30-day mortality (relative risk (RR)=0.95, 95% confidence interval [CI], 0.89 to 1.02, $I^2=0$), the incidence of AKI (RR=0.95, 95% CI, 0.90 to 1.01, $I^2=0$), and RRT (RR=0.93, 95% CI, 0.86 to 1.01, $I^2=13$). However, balanced crystalloids demonstrated a significantly lower mean chloride difference than normal saline (MD -1.95, 95% CI, -3.45 to -0.45, $I^2=99$). There was no mortality difference in subgroups of sepsis and traumatic brain injury. TSA confirmed the absence of effect on 30-d mortality and incidence of AKI.

Conclusions: In critically ill patients, balanced crystalloids did not decrease 30-day mortality, nor the incidence of AKI and RRT. However, the data in specific subgroups of patients were underpowered and further studies are required.

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Keywords: balanced crystalloid; isotonic saline; kidney failure; death; intravenous fluid

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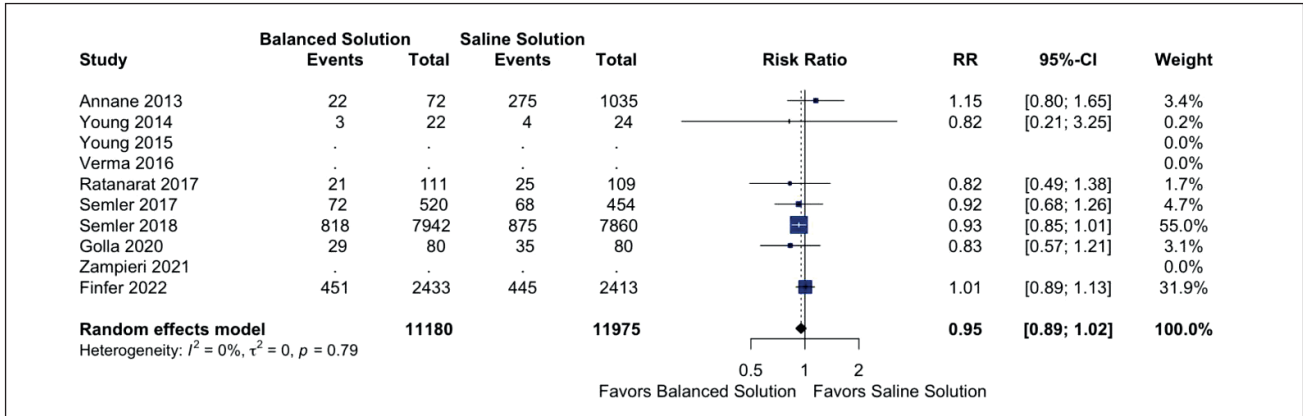


Figure 1

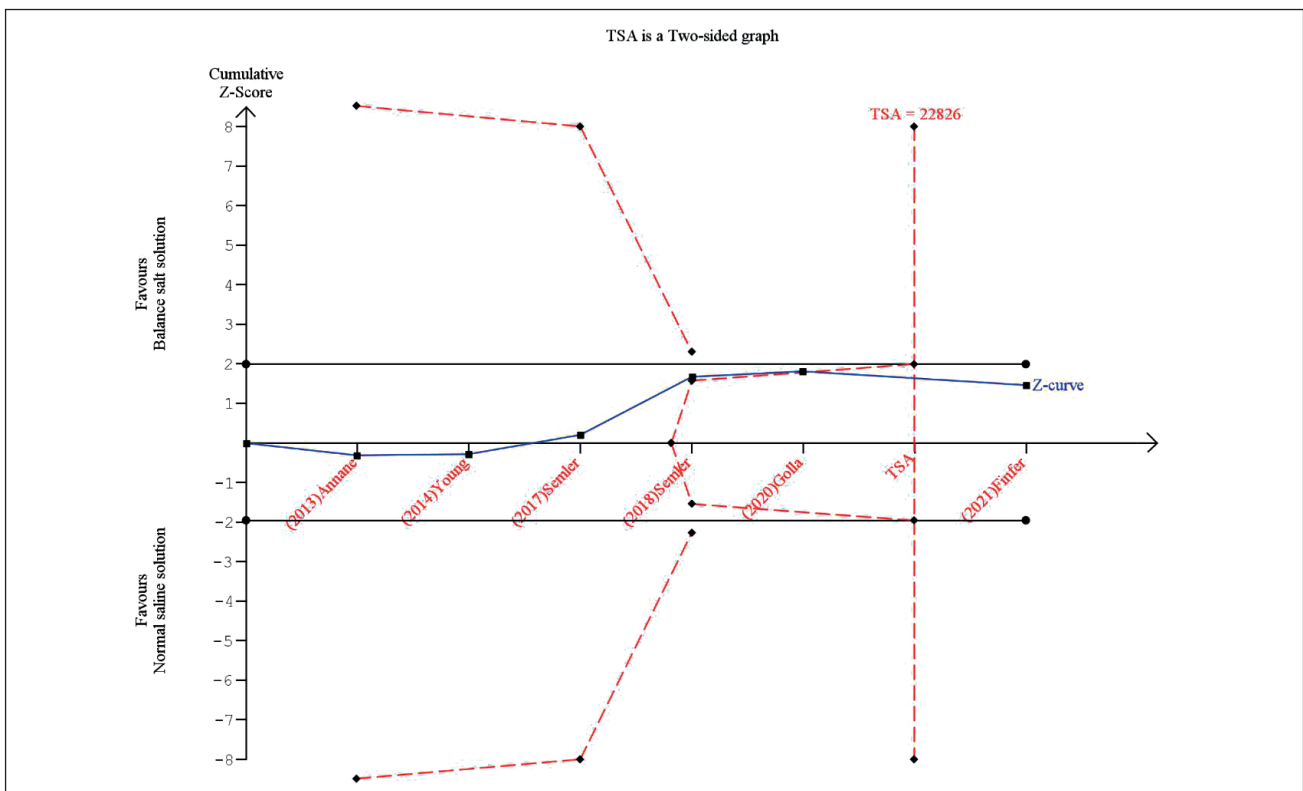


Figure 2

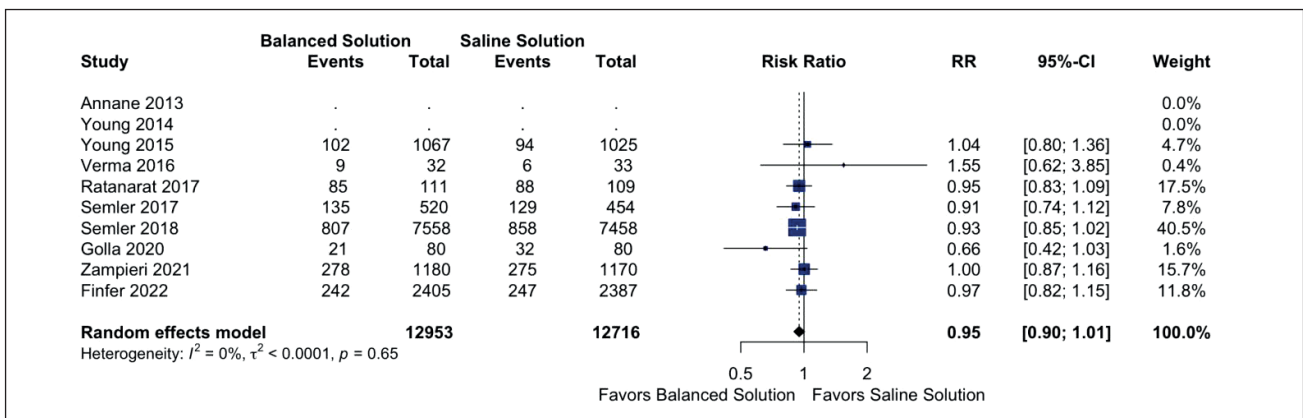


Figure 3