



The BaSICS Study

Key Article

Zampieri FG, Machado FR, Bion RS, et al. Effect of intravenous fluid treatment with a balanced solution vs 0.9% saline solution on mortality in critically ill patients. The BaSICS randomized trial. JAMA. 2021. Published online August 10, 2021.

Background

- IVFs routinely used in the care of critically ill patients.
- Traditionally, patients have received 0.9% NS for resuscitation, maintenance IVFs, and to deliver medications.
- Recent observational studies and unblinded cluster-randomized trials have suggested that balanced crystalloids may have better outcomes.
- Although it is unclear, one proposed mechanism for better outcomes with balanced crystalloids may be due to less chloride concentrations than 0.9% NS.
- There remains insufficient evidence from large randomized multicenter trials comparing 0.9% NS to balanced crystalloids.

Objective

- To assess whether the administration of a balanced solution (Plasma-Lyte 148) during the ICU stay compared with NS would improve 90-day mortality in critically ill patients.

Study

- Investigator-initiated, randomized clinical trial
- Conducted in 75 ICUs in Brazil
- The study was a factorial trial that assessed:
 - Effect of fluid type (balanced vs saline solution)
 - Effect of 2 different infusion speeds
- Patients
 - Included
 - Admitted to an ICU
 - Needed at least 1 fluid expansion at the discretion of the attending physician
 - Were not expected to be discharged the next day
 - Met at least 1 of the following:
 - Older than 65 years of age
 - Had hypotension (MAP < 65 mm Hg or SBP <90 mm Hg) or pressors
 - Sepsis
 - Required NIV or MV for at least 12 hours
 - Early signs of kidney dysfunction
 - Cirrhosis or acute liver failure
 - Excluded

- AKI who required or who were expected to require RRT within 6 hours after admission
 - Severe electrolyte disturbance (Na < 120 mmol/L or > 160 mmol/L)
 - Death considered imminent within 24 hours
 - Suspected or confirmed brain death
 - Those receiving palliative care
- Randomization – patients randomized to receive either 0.9% NS or balanced solution
- Interventions
 - Fluids supplied in identical 500 ml bags
 - Physicians, patients, and those who assessed outcomes blinded to assigned treatment
 - Overall patient management left to the discretion of the attending physician
- Primary Outcome
 - 90-day survival
- Secondary Outcomes
 - Need for RRT up to 90-days after enrollment
 - Occurrence of AKI
 - SOFA score assessed at a continuous value and individual components at days 3 and 7
 - Number of days not requiring MV within 28 days
- Tertiary Outcomes
 - ICU and hospital mortality
 - ICU and hospital LOS
- Pre-specified Subgroups
 - Patients with sepsis vs. without sepsis
 - Patients with KDIGO < 2 vs. those with KDIGO stage 2 or greater
 - Surgical vs. nonsurgical patients
 - Patients with TBI vs. without TBI
 - Patients with APACHE II Scores < 25 vs. those with Scores greater than or equal to 25

Results

- Total of 11,052 patients randomized from 75 ICUs
- Ultimately, 10,520 patients included in the analysis (5,230 randomized to balanced solutions; 5,290 randomized to saline solution)
- Patient characteristics well balanced
 - 48% admitted to the ICU after elective surgery (22% from the ED)
 - 68% received a crystalloid fluid bolus before ICU admission (45% received > 1 L)
 - 61% had hypotension or pressure use
 - 44% required MV
- Interventions
 - Patients in both groups received a median of 1.5 L of fluid during the first day of enrollment
 - Accumulated median fluid during the first 3 days was 4.1 L
- Primary Outcome: 90-day mortality
 - Balanced solution group: 26.4%
 - 0.9% NS group: 27.2%
 - HR 0.97 (95% CI 0.90 to 1.05) p=0.47
- Secondary Outcomes
 - Only 2 were found to be statistically significant

- SOFA Score at 7 days different for the balanced solution group (median difference 0.27) mostly due to a higher neurologic SOFA score
- Tertiary Outcomes
 - No difference in ICU/hospital mortality or ICU/hospital LOS between groups
- Subgroup Analysis
 - Statistically significant interaction between presence of TBI, fluid type, and 90-day mortality
 - Balanced solution group: 31.3% mortality
 - 0.9% NS group: 21.1% mortality

Limitations

- High number of elective surgical admissions to the ICU
- Overall lower mortality for study patients than initially planned/designed. Patients had lower illness severity scores
- Patients received a relatively small amount of IVFs
 - 1.2 L on the first ICU day
 - 2.9 L during the first 3 days
- Almost 70% received IVFs before enrollment, of which 45% had > 1 L
 - Very small differences in chloride levels between groups
 - May speak to overall small amount of IVFs given or composition of IVFs given prior to enrollment
- Only evaluated Plasma-Lyte 148
 - 0.9% NS pH = 5.4
 - Plasma-Lyte 148 pH = 5.5
 - LR pH = 6.5
 - Plasma-Lyte pH = 7.4

Take Home Points

- “Among critically ill patients requiring fluid challenges, the use of a Plasma-Lyte 148 compared with 0.9% NS did not significantly reduce 90-day mortality”.
- Mortality higher in the pre-specified subgroup analysis of those with TBI who received Plasma-Lyte 148
- Difficult to draw conclusions about patients who need high-volume resuscitation