

The authors noted some validity concerns for the included studies as well as significant heterogeneity when the studies were combined. Additional limitations mentioned were that the studies included all patients being 12 years or older, different levels of experience with intubations between clinicians and pre-hospital providers, all but one study having fewer than 100 patients in their sample size, absence of analysis of different complications, and the use of the railroaded bougie method instead of a preloaded bougie (i.e., use of a preloaded bougie has demonstrated better success rates in recent studies). The authors state there is a multiplicity of clinical factors that contribute to the success rate of ETI regardless of the use of bougie or stylet. They found no statistically significant difference between ETI with a bougie or stylet, including the success rate of ETI during the first attempt, the duration of intubation, and the rate of esophageal intubation. They conclude that the two methods of intubation are similar and that choice of method should be left to individual comfort and experience.

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Comment: This is the first meta-analysis comparing the use of bougie to stylet during endotracheal intubation. No differences were found for all outcomes between the two approaches, however there were methodological concerns for the included studies and significant heterogeneity, not only in the individual study methods but also the results. Additionally, only 2 of the included studies included emergency department patients, which limits the applicability for emergency physicians.

□ THE RESTRICTIVE IV FLUID TRIAL IN SEVERE SEPSIS AND SEPTIC SHOCK (RIFTS): A RANDOMIZED PILOT STUDY.



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The ideal amount of intravenous (IV) fluids to give septic patients is still controversial despite extensive research into the topic. Currently, it is generally accepted that initially these patients benefit from a 30 mL/kg bolus, however guidelines regarding further fluid resuscitation are less elucidated. Furthermore, there has been some research to suggest too much IV fluid resuscitation could worsen outcomes.

The goal of this study was to compare restrictive IV fluid resuscitation to standard care in adult patients with severe sepsis and septic shock over the first 72 hours of treatment. Patients either in the emergency department or the medical ICU were identified if they either met the Sepsis 2 International Consensus Criteria for sepsis or the treating physician determined their primary medical problem was caused by severe sepsis or septic shock. Exclusion criteria included receiving more than 60 mL/kg IV fluids prior to randomization, being diagnosed with another disease process that could explain their current clinical picture other than sepsis, having a fluid wasting disease process, being diagnosed with a disease process that required high volume fluid resuscitation, requiring emergent

surgery or extracorporeal membrane oxygenation, or being incarcerated or pregnant. The primary outcome measured was 30-day all-cause mortality. Secondary outcomes measured were 60-day all-cause mortality, intensive care unit (ICU) length of stay (LOS), hospital LOS, ventilator free days, ventilator hours, vasopressor free days, vasopressor hours, electrolyte abnormalities, and adverse events (myocardial infarction, acute kidney injury, organ failure, repeat intubations, disseminated intravascular coagulation, acute limb ischemia). Patients were randomized into the two groups by a computer-based program and group assignments were concealed from the researchers but not from the treating physicians. The fluid restrictive group was only allowed to have 60 mL/kg of resuscitative IV fluids over the first 72 hours of treatment. The control group could receive any amount of resuscitative fluids the physician deemed appropriate for their treatment. Fluid volumes from medications, vasopressors, blood products, or other similar infusions were not restricted and were not considered part of the resuscitative fluids.

Five hundred and thirteen adult patients were identified over a 14-month period. Four hundred patients were excluded before randomization and 4 additional patients were found to have an exclusion criterion after randomization, leaving 109 patients in the analysis. The restrictive IV fluid group received a significantly lower volume of resuscitative IV fluids (47.1 vs 61.1 mL/kg, 95% CI[3.5-24.5], $p=0.01$) compared to the usual group under an intention to treat analysis, but with no significant difference in either 30 or 60 day mortality, organ failure, vasopressor free days, vasopressor duration of use, ventilator free days, or LOS in the ICU or hospital. Although there was no difference in the number of ventilator-free days, the restrictive group did see a statistically significant decrease in the number of hours they required mechanical ventilation (16.8 vs 37.8 hours, $p=0.02$).

Several limitations were discussed. Sample size was small and patients and physicians were not blinded to treatment group. Given the lack of blinding, the authors speculated the Hawthorn effect may have influenced care since the restrictive group received statistically significantly less non-resuscitative fluids even though those fluids were not restricted in the protocol. Additionally, there was no baseline measurement of fluid status. Lastly, even the control group in this study received less fluids overall compared to other similar studies investigating fluid resuscitation in septic patients, so it is possible that both study groups could actually be considered restrictive.

The authors concluded that in this pilot study, restrictive IV fluid resuscitation did not show detrimental outcomes in septic patients, with a potential decrease in the number of hours patients require mechanical ventilation.

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Comment: This study suggests that septic patients may have a similar mortality and morbidity with a smaller volume of IV fluids. There were several flaws, however, that limit our applicability of this study to clinical practice. Most notably, the study

was not powered to detect superiority for the majority of their outcomes. Additionally, subjects in this study received less overall fluids than subjects in other major studies on fluid resuscitation. Truly restricting fluids for septic patients can be very challenging given that these patients often receive numerous

other infusions, such as intravenous vasopressors, electrolyte replacement, and antibiotics. While the RIFTS trial gives us hope that we can safely limit crystalloid fluid resuscitation, we would suggest continuing your current practice until results of currently ongoing larger trials are available.