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Fluid resuscitation in children with severe infection and sepsis: a systematic review and network meta-analysis

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ADMINISTRATIVE INFORMATION

Support - Dazhou center hospital.

Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 10 October 2024 and was last updated on 10 October 2024.

INTRODUCTION

Review question / Objective The aim of this study is to investigate the relationship between different fluid resuscitation methods and the prognosis of children. The selected research method was a randomized controlled trial.

Condition being studied Fluid resuscitation in children with severe infection and sepsis. Two researchers (Chun Liu and Binglin Song) independently extracted data from eligible studies. The extracted data included basic study information (e.g., name of the first author, date of publication), number of patients, type of resuscitation fluid used, mortality in different time periods, and number and type of adverse events. Any disagreements were resolved by discussion and consensus with the third researcher (Xiaomei Yang).

METHODS

Participant or population Studies evaluating septic shock and/or shock and serious infection in children under 18 years of age.

Intervention maintenance therapy only (no excessive fluids, maintenance fluids only).

Comparator Balanced Crystalloids (BC) 、normal Saline (Saline), albumin (Alb), hydroxyethyl starch (HES), Dextran, and Gelatin.

Study designs to be included Randomized controlled trial.

Eligibility criteria 1. Studies evaluating septic shock and/or shock and serious infection in children under 18 years of age. 2. At least one of the experimental groups used fluid resuscitation (e.g., the control experiment between the maintenance group and the colloid group, the

maintenance group and the crystalloid group, the colloid group and the crystalloid group, and different types of crystalloid liquid preparations); 3. The study population should be children diagnosed with serious infection; 4. Extract the required data from the original study.

Information sources PubMed、Embase、Web of Science.

Main outcome(s) All-cause mortality: We counted deaths at different time points; if a study reported results at multiple time points, we selected the longest observation.
(2) Adverse events: hypersensitivity (fever, chills, rash, etc.), pulmonary edema and dyspnea caused by infusion.

Quality assessment / Risk of bias analysis Cochrane evaluation methods.

Strategy of data synthesis Through network meta-analysis, odds ratio was used as the effect analysis statistic for binary data, and mean difference was used as the effect analysis statistic for continuous data, both of which provided 95% confidence intervals . A random effects network meta-analysis model was used to synthesize the effect sizes of the studies . In doing so, the variance of the random-effect distribution (i.e., heterogeneous variance) was taken into account to assess the extent to which treatment effects varied between and within studies. Moreover, in a network meta-analysis, the amount of heterogeneity is first assumed to be the same for all treatment comparisons . Statistical assessment of inconsistency was performed in R (version 4.3.1) using the Rjags package (Martyn Plummer, Coventry, UK), and network plots were drawn to identify comparative relationships between different interventions. The convergence degree of the model was judged by drawing the Brooks-Gelman-Rubin diagnostic map, trajectory map, and density map. The ranking probability map was drawn and the area under the cumulative ranking probability map was calculated to obtain the optimal intervention. The surface under the cumulative ranking curve (SUCRA) and the average rank were analyzed. SUCRA values and ranking charts were used to present the ranking of each intervention in the different outcomes. The implication of the SUCRA value is to show the percentage of effectiveness achieved for each intervention with the assumed best intervention, which is seen as ideal and without uncertainty. In general, SUCRA values can be interpreted as a probability, with higher values indicating better treatment effects.

Subgroup analysis Separate subgroup analyses were performed for balanced crystalloids (BC), normal Saline (Saline), albumin (Alb), maintenance therapy only (no excessive fluid, maintenance fluid only), hydroxyethyl starch (HES), Dextran, and Gelatin.

Sensitivity analysis In a network meta-analysis, the amount of heterogeneity is first assumed to be the same for all treatment comparisons. Statistical assessment of inconsistency was performed in R (version 4.3.1) using the Rjags package (Martyn Plummer, Coventry, UK), and network plots were drawn to identify comparative relationships between different interventions.

Country(ies) involved China.

Keywords "Septicemia", "liquid ball", "child", "malaria", "Severe infection".

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