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# Appendix 1: Search strategy

|  |  |
| --- | --- |
| ***Fluid overload-related search terms*** | “fluid”, “balance”, “balance, water-electrolyte”, “water electrolyte balance”, “fluid balance”, “balance, fluid”, “electrolyte balance”, “balance, electrolyte”, “overload”, “accumulation”, “retention”, “homeostasis”, “autoregulation” “edema”, “edemas, cardiac”, “cardiac edemas”, “cardiac edema” |
| ***Cardiac surgery-related search terms*** | “cardiac surgery”, “heart surgery”, “surgery, thoracic”, “surgery, cardiac”, “surgery heart”, “procedure, cardiovascular surgical”, “surgical procedure, cardiovascular”, “surgical procedures, cardiovascular”, “cardiovascular surgical procedure”, “procedures, cardiovascular surgical”, “heart-lung bypass”, “bypass, heart-lung”, “bypasses, heart-lung”, “heart lung bypass”, “heart-lung bypasses”, “bypass, cardiopulmonary”, “bypasses, cardiopulmonary”, “cardiopulmonary bypasses” |
| ***Pediatric-related search terms*** | “pediatric”, “pediatrics”, “infants, newborn”, “newborn infant”, “newborn infants”, “newborns”, “newborn”, “neonate”, “neonates”, “child”, “children”, “adolescents”, “adolescence”, “teens”, “teen”, “teenagers”, “teenager”, “youth”, “youths”, “congenital heart defect”, “defect, congenital heart”, “heart, malformation of”, “defects, congenital heart”, “heart abnormalities”, “heart defect, congenital”, “abnormality, heart abnormalities, heart”, “heart abnormality”, “congenital heart defects” |
| ***Clinical outcome-related search terms*** | “acute kidney injuries “kidney injuries, acute”, “kidney injury, acute”, “acute renal injury”, “acute renal injuries”, “renal injuries, acute”, “renal injury, acute”, “renal insufficiency, acute”, “acute renal insufficiencies”, “renal insufficiencies, acute”, “acute renal insufficiency”, “kidney insufficiency, acute”, “acute kidney insufficiencies”, kidney insufficiencies, acute”, “acute kidney insufficiency”, “kidney failure, acute”, “acute kidney failures”, “kidney failures, acute”, “acute renal failure”, “acute renal failures”, “renal failures, acute”, “renal failure, acute”, “acute kidney failure”, “mortality”, “mortalities”, “mortality, excess”, “excess mortalities’, “mortalities, excess”, “excess mortality”, “death rate”, “death rates”, “rate, death”, “rates, death”, “mortality rate”, “mortality rates”, “rate, mortality”, “rates, mortality”, “stay length”, “stay lengths”, “hospital stay”, “hospital stays”, “stay, hospital”, “stays, hospital”, “care unit, intensive”, “care units, intensive”, “intensive care unit”, “unit, intensive care”, “units, intensive care”, “artificial respiration”, “artificial respirations”, “respirations, artificial”,  “ventilation, mechanical”, “mechanical ventilations”, “ventilations, mechanical”, “mechanical ventilation”, “surgical wound infections”, “wound infections, surgical”, “infection, surgical wound”, “surgical site infection”, “infections, surgical site”, “surgical site infections”, “wound infection, postoperative”, “wound infection, surgical”, “Infection, postoperative wound”, “infections, postoperative wound”, “postoperative wound infections”, “wound infections, postoperative”, “postoperative wound infection” |
| ***Inclusion criteria*** | Prospective cohort studies, retrospective cohort studies, prospective case-control studies, population-based studies and randomized controlled trials reporting the effects of postoperative fluid overload in pediatric patients undergoing cardiac surgery |
| ***Exclusion criteria*** | Review articles, animal studies, *in vitro* studies, small case series (<10 patients), case reports, conference proceedings, abstracts, letters to the editor without peer review, unpublished cohorts, studies not reporting any postoperative outcome |

### **Suppl. Table 1.** Search strategy

# Appendix 2: Study outcomes

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Year; Author** | **Fluid overload level** | **Number of patients** | **Mortality** | **AKI** | **Stage 3 AKI** | **RRT** | **Hospital stay (days)** | **ICU stay (days)** | **Mechanical ventilation  (days)** | **Duration of inotropes** | **Infection** | **Composite poor outcome** |
| 2017; Delpachitra | <5% | 128 | 31 | - | - | - | 17.33±16.5 | 7.33±7.5 | 93  (34–225) | - | - | - |
| ≥5% | 51 | 13 | - | - | - | 24.67±19.83\* | 15±13.7\* | 211  (97–539)\* | - | - | - |
| 2014; Hassinger | <5% | 68 | - | 23 | 0 | - | 6.5±2.27 | 5.83±3.03 | 1 (1–1) | 3 (3-4) | - | - |
| ≥5% | 30 | - | 13\* | 4\* | - | 11.2±6.23\* | 9.02±5.1\* | 1 (1–5.25)\* | 5 (4-5)\* | - | - |
| 2013; Hazle | <10% | 34 | - | - | - | - | - | - | - | - | - | 9 |
| 10-20% | 12 | - | - | - | - | - | - | - | - | - | 5\* |
| >20% | 3 | - | - | - | - | - | - | - | - | - | 3\* |
| 2016; Lex | <5% | 1367 | 42 | - | - | - | - | - | - | - | - | - |
| 5-10% | 120 | 30\* | - | - | - | - | - | - | - | - | - |
| >10% | 33 | 18\* | - | - | - | - | - | - | - | - | - |
| 2017; Mah | <10% | 41 | 1 | 18 | 1 | - | 17±9.99 | 11±7.68 | - | - | - | - |
| 10-20% | 55 | 4\* | 32 | 2 | - | 18±9.14 | 11±6.85 | - | - | - | - |
| >20% | 21 | 4\* | 16 | 3\* | - | 31.33±23.06\* | 24±25.44\* | - | - | - | - |
| 2016; Park | <7.2% | 46 | - | 14 | - | - | - | - | - | - | - | - |
| ≥7.2% | 174 | - | 78\* | - | - | - | - | - | - | - | - |
| 2015; Piggot | <15% | 69 | 0 | - | - | - | 39 | - | 8 | - | - | - |
| ≥15% | 26 | 8\* | - | - | - | 76\* | - | 25\* | - | - | - |
| 2014; Seguin | <2.7% | 63 | 1 | 11 | 1 | 0 | - | 4.5±3.1 | 2.7±2.2 | - | 11 | - |
| 2.7-7.1% | 65 | 1 | 26\* | 1 | 0 | - | 4.9±2.6 | 3.2±2.3 | - | 9 | - |
| >7.1% | 65 | 2 | 32\* | 6\* | 3 | - | 11.7±7.9\* | 7.6±8.6\* | - | 21\* | - |
| 2016; Wilder | <16% | 298 |  |  |  |  | 16.33±10.43 | 7.33±3.72 | - | - | - | 7 |
| ≥16% | 136 |  |  |  |  | 22±11.99 | 12±8.24\* | - | - | - | 14\* |

**Suppl. Table 2.** Outcomes of the included studies.   
*Continuous data presented as mean ± standard deviation or median (interquartile range); \*p-value <0.05  
 AKI: acute kidney injury; ICU: intensive care unit*

# Appendix 3: Restricted cubic splines graphs (reference=0%)



**Suppl. Figure 1.** Restricted cubic splines graph of mortality with the reference value to be set at 0% (no fluid overload).



**Suppl. Figure 2.** Restricted cubic splines graph of acute kidney injury with the reference value to be set at 0% (no fluid overload).



**Suppl. Figure 3.** Restricted cubic splines graph of hospital stay with the reference value to be set at 0% (no fluid overload).



**Suppl. Figure 4.** Restricted cubic splines graph of intensive care unit stay with the reference value to be set at 0% (no fluid overload).