

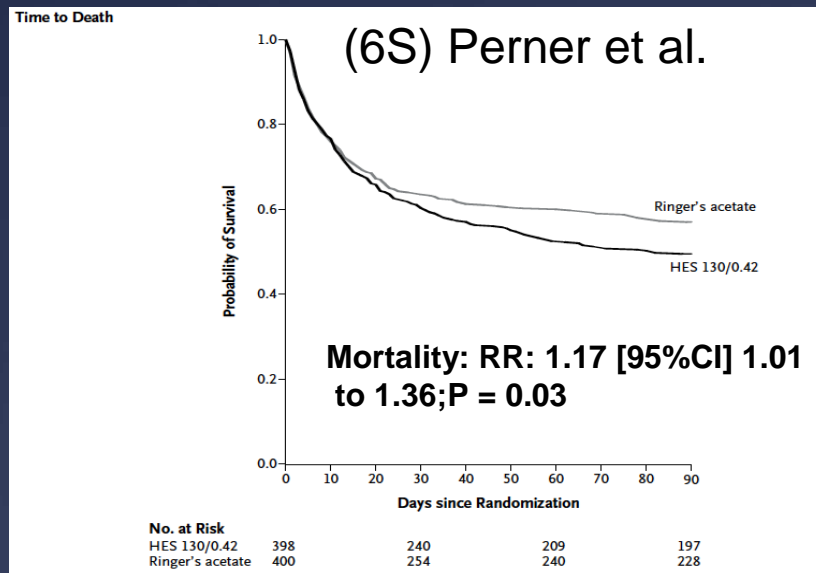
# Colloid versus Crystalloid Solutions for Volume Replacement: A Systematic Review of Randomized Controlled Trials.

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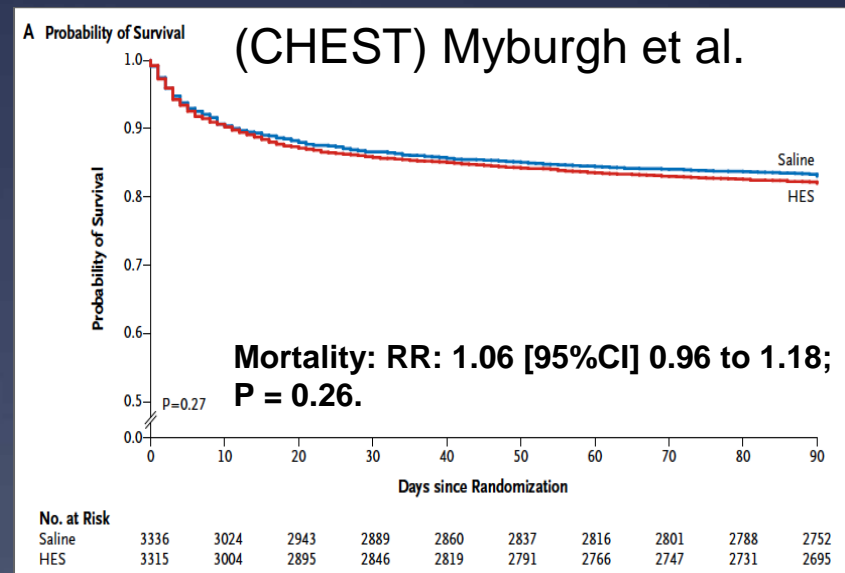
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# Background

- Peri-operative use of fluid replacement in cardiac surgery can exceed 5litres and could potentially double over the course of hospital stay.
- The choice of fluid therapy dictates clinical outcomes.
- Mounting evidence, that new generation HES raises risk of mortality and morbidity.



**(RRT) RR 1.35; 95%CI, 1.01 to 1.80; P = 0.04**



**(RRT) RR 1.21; 95% CI, 1.00 to 1.45; P = 0.04**

# Objective

**To undertake an up-to-date systematic review to establish the risks of HES versus alternative volume replacement solutions.**

# Methods

## Inclusion criteria:

RCT's comparing colloids vs. crystalloids or colloids vs. colloids in adult patients in trauma, post surgical and critical care setup, and reporting Mortality, Sepsis, MI, CVA, AKI, ARF, RRT and LOS.

## Exclusion criteria:

- Non-RCT studies.
- Reviews.
- Trials comparing albumin.
- Pediatric and transplant populations.

## Analysis:

The meta-analysis was performed in line with Cochrane Collaboration and the Quality of Reporting of Meta-analyses guidelines.

# Results

# Schematic of search results

Medline search: 7571  
Embase (Ovid): 3011  
Cochrane review: 568  
DARE: 7  
Total: 11,157

Excluded: Animal,  
Non-RCT, Pediatric,  
Transplant: 11042

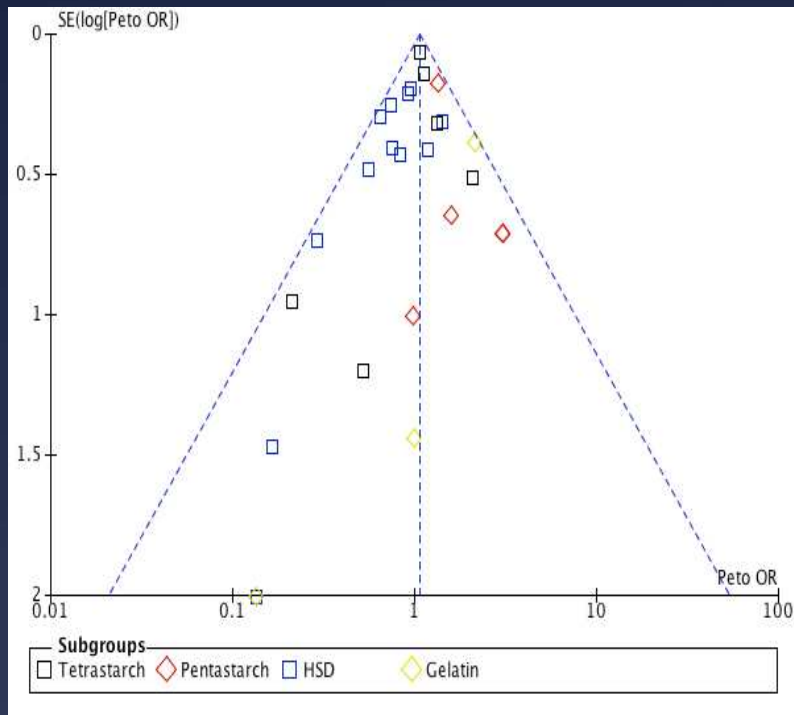
Studied independently  
assessed for suitability: 114

Excluded: Albumin,  
Reviews, No outcome  
of interest. 66

Studies included in the final  
analysis: 48

# Quality assessment of Included RCT's

## Publication Bias (Funnel plot) Comparison: Colloid vs. Crystalloids, Outcome: Mortality

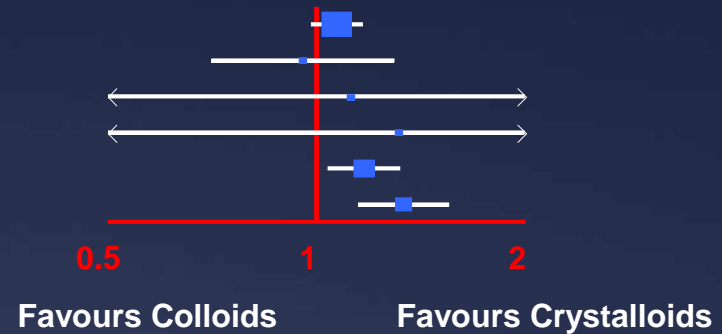


# Colloids vs. Crystalloids

## Outcomes

## OR(95% CI)

Mortality	1.07(0.98,1.16)
Sepsis	0.95(0.7,1.29)
CVA	1.21(0.32,4.56)
Myocardial infarction	1.45(0.24,8.75)
AKI	1.17(1.03,1.32)
RRT	1.33(1.14,1.55)



## Outcomes

## MD(95% CI)

ICU Stay(1)	0.40(0.39,0.4)
Hospital stay(2)	0.20(0.19,0.20)



(1) I<sup>2</sup> : 84%, (2) I<sup>2</sup> : 66%

# Tetrastarch vs. Crystalloids

## Outcomes OR(95% CI)

Mortality	1.11(1.00,1.2)
AKI	1.13(0.99,1.28)
→ RRT	1.25(1.06,1.48)

## Outcomes MD(95% CI)

→ ICU Stay(1)	0.40(0.39,0.4)
→ Hospital stay(2)	0.20(0.19,0.2)

(1) I<sup>2</sup> : 93%, (2) I<sup>2</sup> : 66%



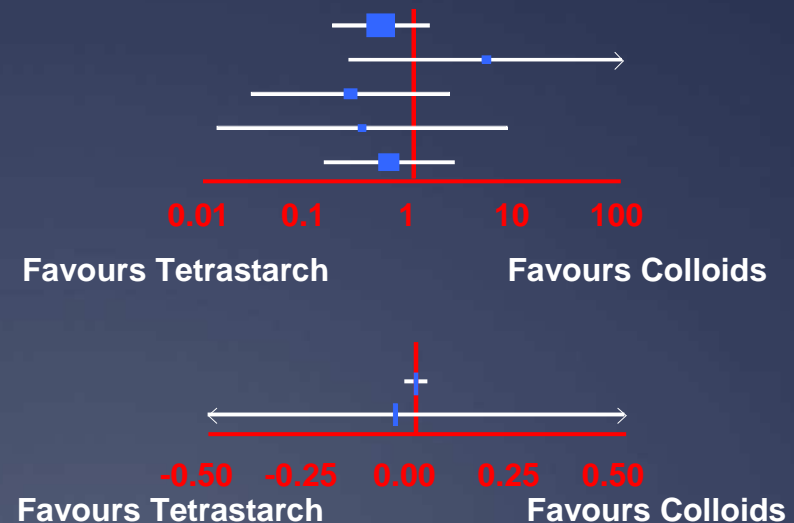
# Tetrastarch vs. Colloids

## Outcomes OR(95% CI)

Mortality	0.48(0.16,1.44)
CVA	5.0(0.23, 106)
Myocardial infarction	0.25(0.02,2.2)
AKI	0.32(0.01,8.0)
RRT	0.58(0.13,2.5)

## Outcomes MD(95% CI)

ICU Stay	0.00(-0.01,0.01)
Hospital stay	-0.05(-0.9,0.8)



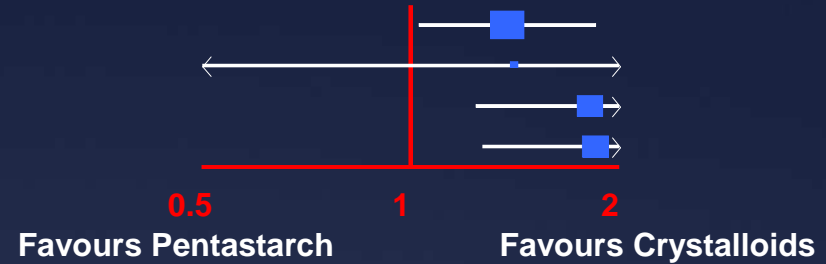


# Pentastarch vs. Crystalloids

## Outcomes

## OR(95% CI)

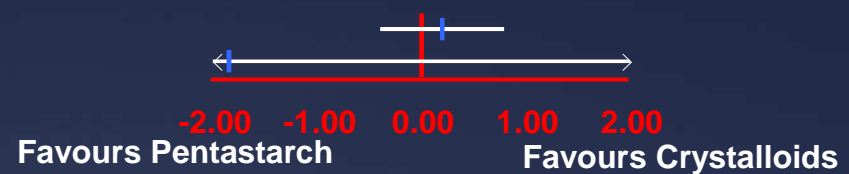
➔ Mortality	1.37(1.02,1.8)
➔ CVA	1.50(0.2,9.1)
➔ AKI	1.81(1.2,2.6)
➔ RRT	1.84(1.2,2.6)



## Outcomes

## MD(95% CI)

ICU Stay	0.10(-0.19,0.4)
Hospital stay	-1.58(-5.6,2.4)

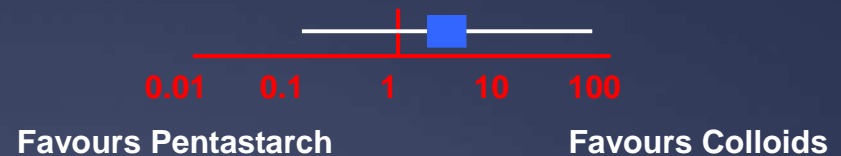


# Pentastarch vs. Colloids

## Outcomes

## OR(95% CI)

Mortality	2.94(0.11,73)
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## Outcomes

## MD(95% CI)

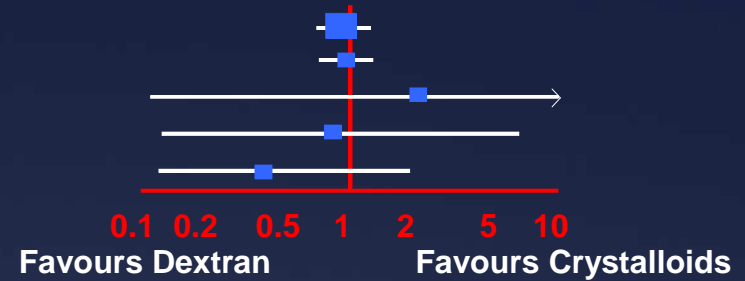
➔ ICU Stay	-2.3(-4.2,-0.3)
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# Dextran vs. Crystalloids

## Outcomes *OR(95% CI)*

Mortality	0.87(0.7,1.0)
Sepsis	0.95(0.7,1.2)
CVA	2.7(0.11,67.6)
Myocardial infarction	0.89(0.12,6.5)
AKI	0.48(0.12,1.9)



## Outcomes *MD(95% CI)*

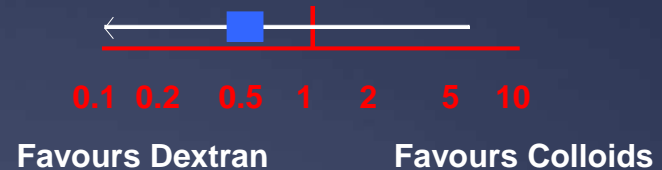
ICU Stay	1.32(-0.7,3.3)
Hospital stay	1.86(-10.2,13.9)



# Dextran vs. Colloids

## Outcomes *OR(95% CI)*

Myocardial infarction	0.47(0.0,5.6)
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## Outcomes *MD(95% CI)*

ICU Stay	0.29(-0.12,0.7)
Hospital stay	1.0(-0.16,2.16)



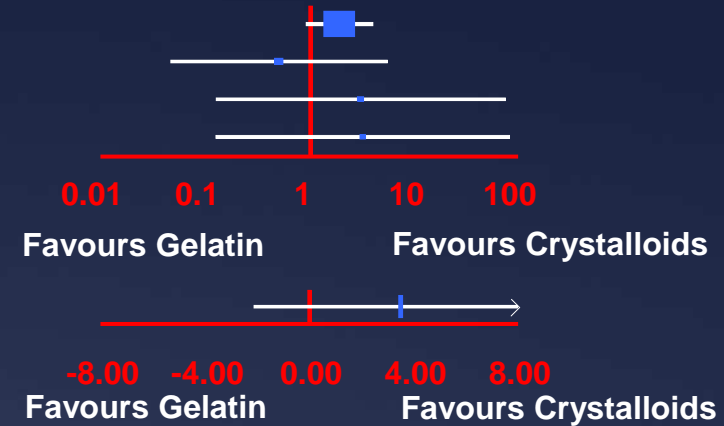
# Gelatin vs. Crystalloids

## Outcomes *OR(95% CI)*

Mortality	1.8(0.8,4.0)
CVA	0.49(0.04,5.5)
Myocardial infarction	3.0(0.12,74.3)
AKI	3.1(0.12,82.1)

## Outcomes *MD(95% CI)*

Hospital stay	3.5(-2.1,9.15)
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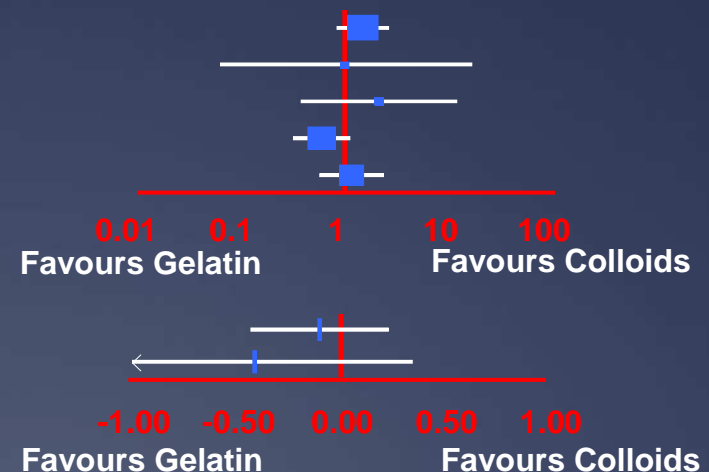
# Gelatin vs. Colloids

## Outcomes *OR(95% CI)*

Mortality	1.49(0.8,2.6)
CVA	1.0(0.0,17)
Myocardial infarction	2.14(0.3,12.1)
AKI	0.60(0.3,1.14)
RRT	1.16(0.5,2.4)

## Outcomes *MD(95% CI)*

ICU Stay	-0.10(-0.4,0.2)
Hospital stay	-0.4(-1.1,0.3)



# Conclusions

- ❖ There was significant publication bias and a high number of poor quality RCT's.
- ❖ In-spite of these limitations, colloid use is associated with increased risk of AKI and RRT.
- ❖ These effects are most noticeable with new generation HES, esp. Tetra starch and Penta starch.
- ❖ The safety of Dextrans and Gelatins should be tested in a large well conducted RCT.
- ❖ This meta-analysis advocates crystalloids for both volume replacement and resuscitation.