Supplementary Table 1. Search strategy for MEDLINE In-Process & Other Non-Indexed Citations and MEDLINE (Ovid platform run March 25, 2019)

Medline 1946 – 2019 January 19

Query	Search Term	Results
1	Isotonic Solutions/	8333
2	isotonic Solution*.ti,ab,kw.	1335
3	Fluid Therapy/	18986
4	fluid therap*.ti,ab,kw.	3406
5	fluid resuscitation.ti,ab,kw.	4683
6	rehydration/	18986
7	rehydration.ti,ab,kw.	7756
8	crystalloid/	1476
9	balanced crystalloid*.mp.	186
10	balanced solution*.mp.	185
11	acetic acid plus gluconate sodium plus magnesium chloride plus potassium chloride plus sodium chloride/	0
12	plasma-lyte.mp.	145
13	plasmalyte.mp.	130
14	ringer's lactate solution/	0
15	ringer's solution/	939
16	ringer*.mp.	14122
17	(acetate or gluconate or malate or lactate*).mp.	319729
18	16 and 17	5510
19	(hartmann* and solution*).mp.	336
20	or/1-15,18-19	39828
21	Randomized Controlled Trials as Topic/	122173
22	randomized controlled trial/	478564
23	Random Allocation/	98192
24	Double Blind Method/	150280
25	Single Blind Method/	26469
26	clinical trial/	515289
27	clinical trial, phase i.pt.	18736
28	clinical trial, phase ii.pt.	30288
29	clinical trial, phase iii.pt.	14794
30	clinical trial, phase iv.pt.	1680
31	controlled clinical trial.pt.	92989
32	randomized controlled trial.pt.	478564
33	multicenter study.pt.	247407
34	clinical trial.pt.	515289
35	exp Clinical Trials as topic/	323433
36	or/21-35	1283416
37	(clinical adj trial$).tw.	328485
38	((singl$ or doubl$ or treb$ or tripl$) adj (blind$3 or mask$3)).tw.	162507
39	PLACEBOS/	34281
40	placebo$.tw.	202744
41	randomly allocated.tw.	25912
42	(allocated adj2 random$).tw.	29045
43	or/37-42	583118
44	36 or 43	1522304
45	case report.tw.	273368
46	letter/	1020484
47	historical article/	350457
48	or/45-47	1629527
49	44 not 48	1487929
50	20 and 49	5273
51	limit 50 to english language	4810
52	Limit 51 to yr="1974-Current"	4784

Supplementary Table 2. Main outcome of interest from included studies.

First author, year	Main outcomes of interest
Plasmalyte vs Ringer's Lactate	
Ramanathan, 1984	• Significant increase in lactate in both groups with no significant difference between groups
Hadimioglu, 2008	• No significant change in pH • Significant increase in lactate concentration in Ringer's Lactate group
Shin, 2011	• Hyperlactatemia occurred in both groups and was higher in the Ringer's Lactate group • No significant correlations between peak lactate concentration and liver function tests or hospital length of stay
Hasman, 2012	• No significant effect on acid-base status • No significant changes in potassium or chloride
Chaussard, 2020	• No difference in base excess, pH, bicarbonate, chloride or strong ion difference
Plasmalyte vs Ringer's Lactate vs Sterofundin vs Kabilyte	
Kumar, 2017	• No significant difference in pH, potassium, chloride, bicarbonate or base excess between all groups
Plasmalyte vs Ringerfundin	
Zadák, 2010	• No difference in chloride, potassium, creatinine or plasma pH
Uvizl, 2017	• No significant differences in pH • No significant changes in base excess, actual bicarbonate or standard bicarbonate
Plasmalyte vs Hartmann's	
Ratcliffe, 1988	• Hyperlactatemia occurred in all prime groups during bypass and was highest in the Hartmann's prime group • No significant difference in chloride or potassium
Weinberg, 2015	• No significant difference in standard base excess, pH or bicarbonate • Significantly higher chloride and lactate in Hartmann's solution group • Significantly fewer complications and a shorter duration of hospital stay in Plasmalyte group
Weinberg, 2018	• Significantly higher lactate and chloride in Hartmann's solution group • No significant difference in base excess, bicarbonate and total weak acids • Complications and intensive care unit and hospital length of stays were similar
Plasmalyte vs Sterofundin	
Benoit, 2016	• No significant change in chloride, actual strong ion difference or base excess
Ringer's Lactate vs Ringerfundin/Ringer's Acetate	
Attalla, 2005	• Significant increase in lactate in Ringer's Lactate group compared to Ringer's Acetate • No difference in pH, bicarbonate or base excess between groups
Galas, 2009	• Significant increase in bicarbonate and base excess in the Ringerfundin group • Significantly greater chloride in Ringer's Lactate group and a lower clearance of lactate • No differences in strong ion gap and effective strong ion difference between groups
Vichitvejpaisal, 2014	• No change in strong ion difference
Rawat, 2018	• No difference in rate of correction of metabolic acidosis between groups
Pfortmueller, 2019	• No difference in the occurrence of metabolic acidosis • No difference in hemodynamic stability between groups, hospital length of stay or acute kidney injury
Ringers's Lactate vs Sterofundin	
Rajan, 2017	• Significantly higher lactate in Ringer's Lactate group • Significantly lower pH in Ringer's Lactate group • No difference in potassium, chloride or bicarbonate
Joseph, 2020	• No difference in pH, lactate, base excess, chloride or potassium between groups
Ringer's Lactate vs Balanced Ringers	
Kiss, 2012	• Significant increase in the newborns' postoperative lactate levels 1 hour after delivery with no difference between groups • No change in pH between groups
Ringer's Lactate vs Novel Solution	
Scotti, 2015	• Significant decrease in base excess in Ringer's Lactate group with no change in the novel solution group • Reduction in base excess and strong ion difference in Ringer's Lactate group associated with an

	increase in both chloride and lactate
Ringer's Lactate vs Normosol-R	
King, 2020	• Significantly higher potassium in Ringer's Lactate group • No difference in base excess, pH or lactate between groups
Ringer's Acetate vs Ringer's Bicarbonate	
Shimada, 2005	• No differences in the pH or base excess
Bicarbonate Balanced Fluid vs Conventional Balanced Fluid	
Omar, 2018	• Significant improvement in eGFR (sCr) in bicarbonate balanced fluid • No differences in ICU renal replacement utilization, ICU length of stay, ICU mortality and 28 day mortality

Supplementary Table 3. Risk of bias summary using Cochrane Risk of Bias Tool. Symbols represent high (-), unclear (?), or low (+) risk of bias.

First author, year	Sequence Generation	Allocation concealment	Blinding of outcome assessors	Blinding of participants and personnel	Incomplete outcome data	Selective outcome reporting	Other sources of bias
Ramanathan, 1984	?	-	-	-	+	-	+
Ratcliffe, 1988	?	?	-	-	-	-	+
Attalla, 2005	?	-	-	?	+	+	+
Shimada, 2005	?	-	-	-	-	-	+
Hadimioglu, 2008	+	-	+	+	+	+	+
Galas, 2009	?	-	-	-	-	+	-
Zadak, 2010	+	-	-	-	-	-	?
Shin, 2011	+	-	-	-	-	-	+
Hasman, 2012	+	+	-	+	-	+	?
Kiss, 2012	?	?	-	-	-	-	?
Vichitvejpaisal, 2014	?	-	-	-	-	-	+
Scotti, 2015	-	-	-	-	-	?	-
Weinberg, 2015	+	+	-	+	-	+	+
Benoit, 2016	?	-	?	-	-	-	-
Kumar, 2017	+	-	-	?	+	+	+
Rajan, 2017	+	?	-	-	+	+	+
Uvizl, 2017	?	-	-	-	-	-	+
Omar, 2018	?	-	-	-	-	-	-
Rawat, 2018	?	-	-	-	-	?	-
Weinberg, 2018	+	+	+	+	+	+	?
Pfortmueller, 2019	+	+	+	+	+	?	+
Chaussard, 2020	+	+	-	+	-	+	+
Joseph, 2020	?	-	?	?	-	?	-
King, 2020	?	-	-	-	+	+	-

Supplementary Table 4. GRADE evidence summary for Plasmalyte vs any other balanced crystalloid.

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Plasmalyte	Comparator	Relative (95% CI)	Absolute (95% CI)		
Post infusion change in chloride												
8	randomised trials	serious [a]	serious [b]	not serious	not serious	none	267	268	-	MD **0.83 lower** (1.64 lower to 0.03 lower)	⊕⊕◯◯ LOW	IMPORTANT
Post infusion change in base excess												
9	randomised trials	serious [c]	serious [d]	not serious	not serious	none	286	287	-	MD **0.65 higher** (0.25 higher to 1.05 higher)	⊕⊕◯◯ LOW	IMPORTANT
Post infusion change in pH												
8	randomised trials	serious [e]	not serious	not serious	serious [f]	none	278	278	-	MD **0** (0.01 lower to 0.01 higher)	⊕⊕◯◯ LOW	IMPORTANT
Post infusion change in lactate												
8	randomised trials	serious [g]	serious [h]	not serious	not serious	none	216	216	-	MD **0.46 lower** (0.87 lower to 0.05 lower)	⊕⊕◯◯ LOW	IMPORTANT
Post infusion change in potassium												
5	randomised trials	serious [i]	serious [j]	not serious	serious [f]	none	182	182	-	MD **0.04 higher** (0.07 lower to 0.15 higher)	⊕◯◯◯ VERY LOW	IMPORTANT

CI: Confidence interval; **MD:** Mean difference

Explanations

a. 6 of 8 studies had high risk of bias stemming from: lack of blinding (5/8), lack of complete outcome reporting (3/8), loss to analysis (2/8) and abstract only (1/8)
b. substantial heterogeneity with I2 = 64%
c. 7 of 9 studies were judged to have a high risk of bias stemming from: lack of blinding (6/9), lack of complete outcome reporting (2/9), loss to analysis (2/9) and abstract only (1/9)
d. moderate heterogeneity with I2 = 59%
e. 5 of 8 studies were judged to have a high risk of bias stemming from: lack of blinding (6/8), lack of complete outcome reporting (4/8) and loss to analysis (2/8)
f. wide confidence interval that does not exclude benefit or harm
g. 6 of 8 studies were judged to have a high risk of bias stemming from: lack of blinding (6/8), lack of complete outcome reporting (3/6) and loss to analysis (3/8)
h. considerable heterogeneity with I2 = 91%
i. 4 of 5 studies were judged to have a high risk of bias stemming from: lack of blinding (4/5), lack of complete outcome reporting (2/5) and loss to analysis (1/5)
j. moderate heterogeneity with I2 = 52%

Supplementary Table 5. GRADE evidence summary for Plasmalyte vs Hartmann's solution.

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Plasmalyte	Hartmann's solution	Relative (95% CI)	Absolute (95% CI)		
Post infusion change in chloride												
3	randomised trials	serious [a]	not serious	not serious	serious [b]	none	65	65	-	MD **1.69 lower** (2.59 lower to 0.8 lower)	⊕⊕◯◯ LOW	IMPORTANT
Post infusion change in base excess												
2	randomised trials	serious [c]	serious [d]	not serious	serious [b,e]	none	55	55	-	MD **0.63 higher** (1.24 lower to 2.49 higher)	⊕◯◯◯ VERY LOW	IMPORTANT
Post infusion change in pH												
2	randomised trials	serious [c]	serious [f]	not serious	serious [b,e]	none	55	55	-	MD **0** (0.03 lower to 0.02 higher)	⊕◯◯◯ VERY LOW	IMPORTANT
Post infusion change in lactate												
3	randomised trials	serious [a]	serious [g]	not serious	serious [b,e]	none	65	65	-	MD **0.23 lower** (0.89 lower to 0.42 higher)	⊕◯◯◯ VERY LOW	IMPORTANT
Post infusion change in potassium												
1	randomised trials	serious [h]	not serious	not serious	serious [b,e]	none	30	30	-	MD **0.2 lower** (0.44 lower to 0.04 higher)	⊕⊕◯◯ LOW	IMPORTANT

CI: Confidence interval; **MD:** Mean difference

Explanations

a. 2 of 3 studies were judged to have a high risk of bias stemming from: lack of blinding, lack of complete outcome reporting and loss to analysis
b. small number of patients contributing to this outcome, below optimal information size
c. 1 of 2 studies were judged to have a high risk of bias stemming from: lack of blinding and lack of complete outcome reporting
d. substantial heterogeneity with I2 = 76%
e. wide confidence interval
f. moderate heterogeneity with I2 = 59%
g. substantial heterogeneity with I2 = 74%
h. single included study was judged to have a high risk of bias stemming from: lack of blinding and lack of complete outcome reporting

Supplementary Table 6. GRADE evidence summary for Plasmalyte vs Ringer's Lactate.

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Plasmalyte	Ringer's Lactate	Relative (95% CI)	Absolute (95% CI)		
Post infusion change in chloride												
4	randomised trials	serious [a]	serious [b]	not serious	serious [c]	none	132	132	-	MD **0.8 lower** (2.02 lower to 0.42 higher)	⊕◯◯◯ VERY LOW	IMPORTANT
Post infusion change in base excess												
6	randomised trials	serious [d]	not serious	not serious	not serious	none	161	161	-	MD **0.84 higher** (0.52 higher to 1.16 higher)	⊕⊕⊕◯ MODERATE	IMPORTANT
Post infusion change in pH												
5	randomised trials	serious [e]	serious [f]	not serious	not serious	none	147	147	-	MD **0.01 higher** (0.01 lower to 0.02 higher)	⊕⊕◯◯ LOW	IMPORTANT
Post infusion change in lactate												
5	randomised trials	serious [e]	serious [g]	not serious	not serious	none	131	131	-	MD **0.69 lower** (1.32 lower to 0.05 lower)	⊕⊕◯◯ LOW	IMPORTANT
Post infusion change in potassium												
4	randomised trials	serious [a]	serious [h]	not serious	serious [c]	none	132	132	-	MD **0.08 higher** (0.04 lower to 0.2 higher)	⊕◯◯◯ VERY LOW	IMPORTANT

CI: Confidence interval; **MD:** Mean difference

Explanations

a. 3 of 4 studies were judged to have a high risk of bias stemming from: lack of blinding, lack of complete outcome reporting and loss to analysis
b. substantial heterogeneity with I2 = 72%
c. wide confidence margin
d. 5 of 6 studies were judged to have a high risk of bias stemming from: lack of blinding, lack of complete outcome reporting and loss to analysis
e. 4 of 5 studies were judged to have a high risk of bias stemming from: lack of blinding, lack of complete outcome reporting and loss to analysis
f. substantial heterogeneity with I2 = 73%
g. considerable heterogeneity with I2 = 95%
h. moderate heterogeneity with I2 = 46%

Supplementary Table 7. GRADE evidence summary for Plasmalyte vs Sterofundin.

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Plasmalyte	Sterofundin	Relative (95% CI)	Absolute (95% CI)		
Post infusion change in chloride												
2	randomised trials	serious [a]	serious [b]	not serious	serious [c,d]	none	70	71	-	MD **0.74 higher** (3.07 lower to 4.54 higher)	⊕◯◯◯ VERY LOW	IMPORTANT
Post infusion change in base excess												
2	randomised trials	serious [a]	not serious	not serious	serious [c,d]	none	70	71	-	MD **0.09 higher** (0.17 lower to 0.35 higher)	⊕⊕◯◯ LOW	IMPORTANT
Post infusion change in pH												
1	randomised trials	serious [e]	not serious	not serious	serious [c,d]	none	20	20	-	MD **0** (0.02 lower to 0.02 higher)	⊕⊕◯◯ LOW	IMPORTANT
Post infusion change in lactate												
1	randomised trials	serious [e]	not serious	not serious	serious [c,d]	none	20	20	-	MD **0.07 higher** (0.38 lower to 0.51 higher)	⊕⊕◯◯ LOW	IMPORTANT
Post infusion change in potassium												
1	randomised trials	serious [e]	not serious	not serious	serious [c,d]	none	20	20	-	MD **0.02 higher** (0.19 lower to 0.23 higher)	⊕⊕◯◯ LOW	IMPORTANT

CI: Confidence interval; **MD:** Mean difference

Explanations

a. 2 of 2 studies were judged to have a high risk of bias stemming from: lack of blinding, lack of complete outcome reporting and limited information available for assessment
b. substantial heterogeneity with I2 = 85%
c. small number of patients contributing to this outcome, below optimal information size
d. wide confidence interval
e. study judged to have a high risk of bias stemming from lack of blinding

Supplementary Table 8. GRADE evidence summary for Plasmalyte vs Ringerfundin.

Certainty assessment							№ of patients		Effect		Certainty	Importance
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Plasmalyte	Ringerfundin	Relative (95% CI)	Absolute (95% CI)		
Post infusion change in pH												
1	randomised trials	serious [a]	not serious	not serious	serious [b,c]	none	56	56	-	MD **0.01 lower** (0.04 lower to 0.02 higher)	⊕⊕◯◯ LOW	IMPORTANT

CI: Confidence interval; **MD:** Mean difference

Explanations

a. single included study was judged to have a high risk of bias stemming from: lack of blinding and lack of complete outcome reporting
b. small number of patients contributing to this outcome, below optimal information size
c. wide confidence interval