



IV Fluids

Crystalloids

Crystalloid solutions are the bedrock of IVF.



Crystalloid solutions are the standard solutions used for fluid replacement and maintenance.

Two types:



Balanced solutions:

- ➔ Ringers,
- ➔ Hartmanns,
- ➔ Plasma-lyte

Crystalloid solutions are salt solutions.

SALINE

3% NS

→ 0.9% NS

0.45% NS

0.225% NS

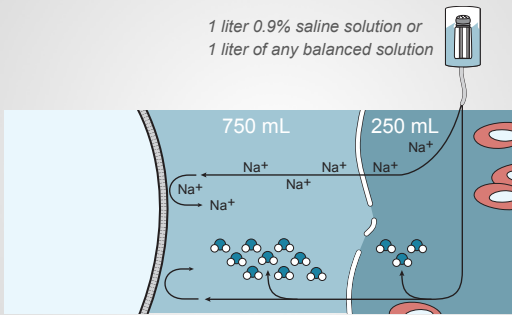
BALANCED SOLUTION

Ringer's Lactate

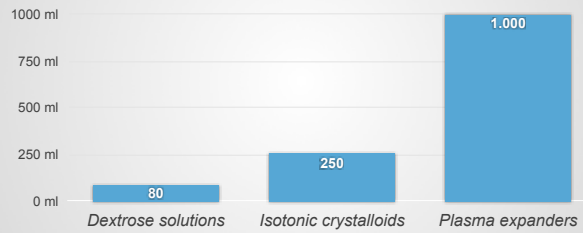
Hartman's Solution

Plasma-lyte

1 liter 0.9% saline solution or
1 liter of any balanced solution



Volume remaining in the plasma space



Saline is the most commonly used IVF

- ➔ Volume resuscitation
- ➔ Hypotonic saline for maintenance fluids
 - ➔ often mixed with dextrose solutions
- ➔ 3% saline for hyponatremia

0.9% NaCl is 0.9g of NaCl per 100 mL

9,000 mg NaCl per liter

sodium 11 Na 22.990	chlorine 17 Cl 35.453
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$9,000 \text{ mg} / 58.4 = 154 \text{ mmol of NaCl per liter}$

154 mmol of Na

154 mmol of Cl

WHO recommends less than 2 g (87 mmol) of dietary sodium a day

0.9% at 100 ml/hour



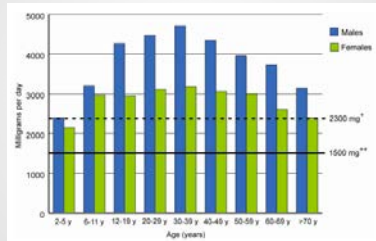
5:40 until WHO

at 100 ml/hour



3.7 days of WHO sodium

WHO recommends less than 2 g of dietary sodium a day



Sodium 870 mg/240 mL

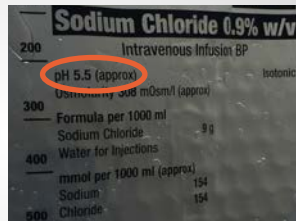
Sodium 3625 mg/L ÷ 23 mg/mmol

Sodium 157 mmol/L

Sodium in 0.9% NS is 154

0.9% NaCl pH 5.5

100x



non-anion gap metabolic acidosis

Balanced solutions

electrolyte	Ringers lactate	Hartmann's solution	Plasma-Lyte	Sterofundin	0.9% NaCl
sodium	130	131	140	140	154
potassium	4	5	5	4	
chloride	109	111	98	127	154
lactate	28	29			
acetate			27	24	
gluconate			23		
calcium	3	4		2.5	
magnesium			1.5	1	
pH	6.5	6.5	7.4		5.5

PRELIMINARY
COMMUNICATION

Association Between a Chloride-Liberal vs Chloride-Restrictive Intravenous Fluid Administration Strategy and Kidney Injury in Critically Ill Adults

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Context Administration of traditional chloride-liberal intravenous fluids may precipitate acute kidney injury (AKI).

Objective To assess the association of a chloride-restrictive (vs chloride-liberal) intravenous fluid strategy with AKI in critically ill patients.

Design, Setting, and Patients Prospective, open-label, sequential period pilot study of 760 patients admitted consecutively to the intensive care unit (ICU) during the control period (February 18 to August 17, 2008) compared with 773 patients admitted

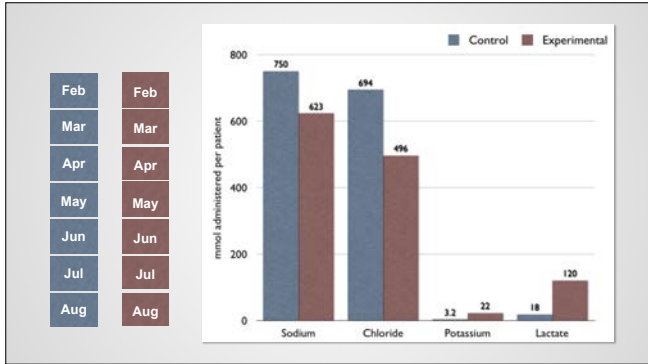


Table 3. Incidence of Acute Kidney Injury Stratified by Risk, Injury, Failure, Loss, and End-Stage (RIFLE) Serum Creatinine Criteria

RIFLE class	No. (%) [95% CI] of Patients ^a		P Value
	Control Period (n = 760)	Intervention Period (n = 773)	
Risk	71 (9.0) [7.2-11.0]	57 (7.4) [5.5-9.0]	.16
Injury	48 (6.3) [4.5-8.1]	23 (3.0) [1.8-4.2]	.002
Failure	57 (7.5) [5.6-9.0]	42 (5.4) [3.8-7.1]	.10
Injury and failure	105 (14) [11-16]	65 (8.4) [6.4-10.0]	<.001

^aThe control period was from February 18 through August 17, 2008, and the intervention period was from February 18 through August 17, 2009.

Cr rises more than doubles

Need for acute dialysis:

- ➔ 78 patients during control
- ➔ 49 with the low chloride bundle (P=0.005)

More data is needed

PRELIMINARY
COMMUNICATION



Association Between a Chloride-Liberal vs Chloride-Restrictive Intravenous Fluid Administration Strategy and Kidney Injury in Critically Ill Adults

The screenshot displays a PubMed search result for the study. The title is "Association Between a Chloride-Liberal vs Chloride-Restrictive Intravenous Fluid Administration Strategy and Kidney Injury in Critically Ill Adults". The authors listed are "JAMA". The abstract text is partially visible, starting with "We performed a randomized clinical trial to compare the association of a liberal chloride (LC) intravenous fluid strategy with a restrictive chloride (RC) intravenous fluid strategy in critically ill adults. The primary endpoint was the incidence of acute kidney injury (AKI) at 30 days. The secondary endpoint was the incidence of AKI at 90 days. The study was conducted in a tertiary care center. The results showed that the LC strategy was associated with a higher incidence of AKI at 30 days compared with the RC strategy. The results also showed that the LC strategy was associated with a higher incidence of AKI at 90 days compared with the RC strategy. The study was limited by its retrospective design and the lack of blinding. The results suggest that a restrictive chloride intravenous fluid strategy may be associated with a lower incidence of AKI in critically ill adults. Further studies are needed to confirm these findings." The search results also show the journal name "JAMA", the year "2019", and the volume and page numbers "321(16):1853-1861".