

## IV fluids in children

### Intravenous fluid therapy in children and young people in hospital

*Appendix J*

*December 2015*

*Commissioned by the National Institute for  
Health and Care Excellence*



**Disclaimer**

Healthcare professionals are expected to take NICE clinical guidelines fully into account when exercising their clinical judgement. However, the guidance does not override the responsibility of healthcare professionals to make decisions appropriate to the circumstances of each patient, in consultation with the patient and/or their guardian or carer.

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**Funding**

National Institute for Health and Care Excellence

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## Appendix J: Forest plots

### J.1 Assessment and monitoring

#### J.1.1 Methods of assessing IV fluid requirements

##### J.1.1.1 Body weight versus body surface area

None

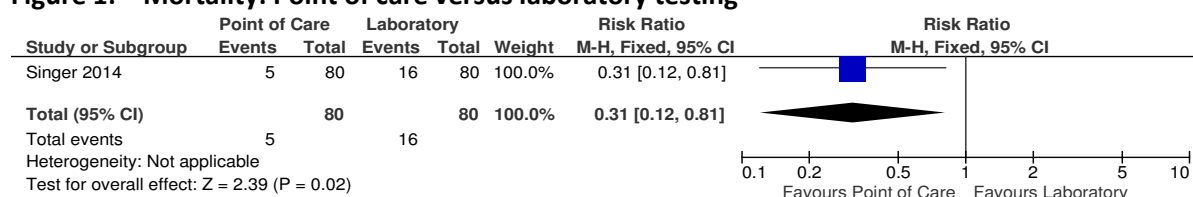
#### J.1.2 Methods of calculating IV fluid requirements

##### J.1.2.1 Measurement and documentation

None

##### J.1.2.2 Point-of-care versus laboratory testing

**Figure 1: Mortality: Point of care versus laboratory testing**



##### J.1.2.3 Assessing dehydration and hypovolaemia

None

## J.2 IV fluid therapy for fluid resuscitation

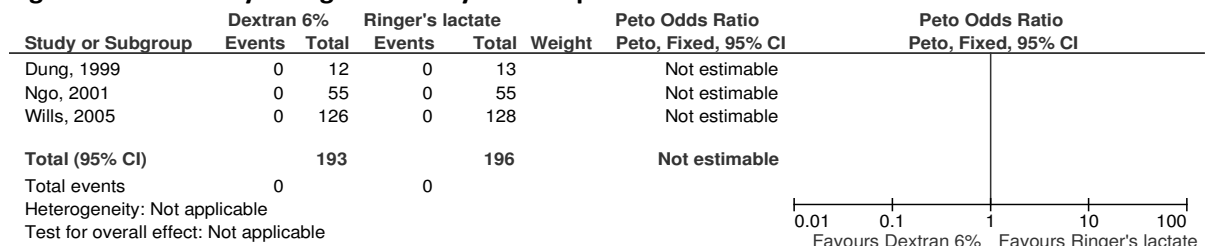
### J.2.1 Fluid type for fluid resuscitation

#### J.2.1.1 Sepsis

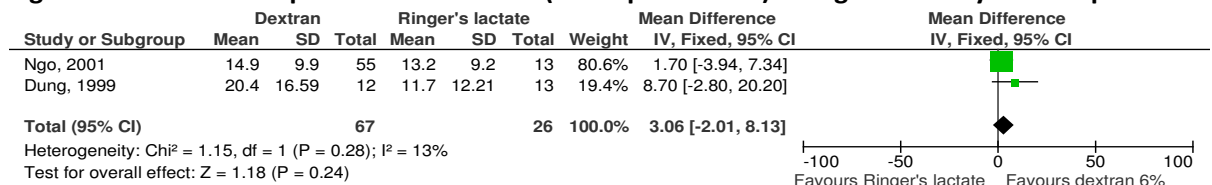
##### J.2.1.1.1 Colloids versus crystalloids

##### J.2.1.1.1.1 Dextran 6% versus Ringer's lactate solution

**Figure 2: Mortality: Dengue shock syndrome patients**

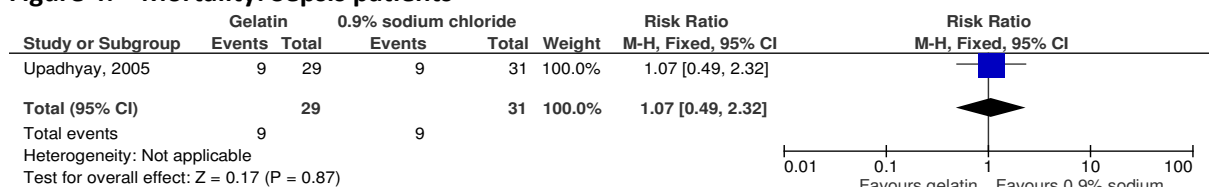


**Figure 3: Decrease in pulse at 1 or 2 hours (beats per minute): Dengue shock syndrome patients**

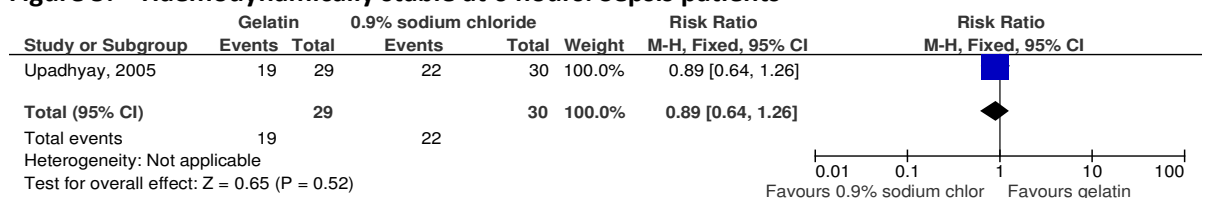


##### J.2.1.1.1.2 Gelatin versus 0.9% sodium chloride

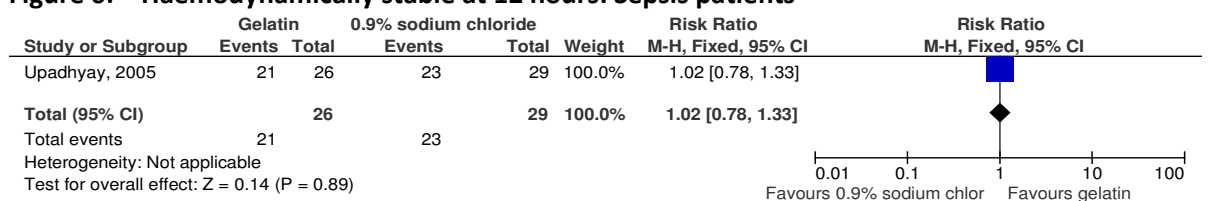
**Figure 4: Mortality: Sepsis patients**



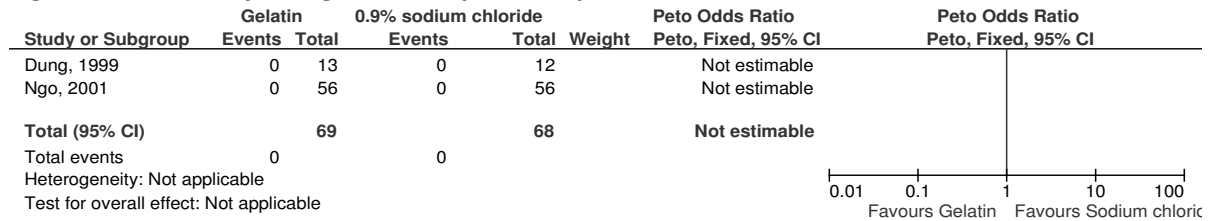
**Figure 5: Haemodynamically stable at 6 hours: Sepsis patients**



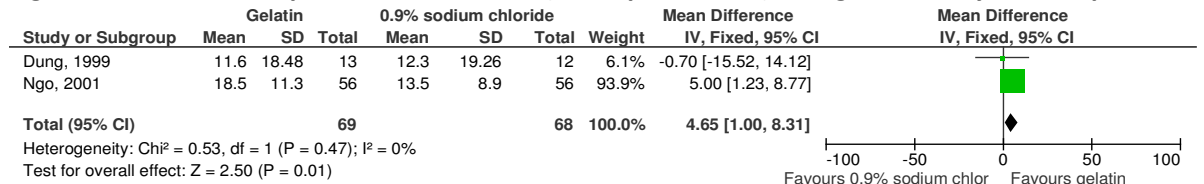
**Figure 6: Haemodynamically stable at 12 hours: Sepsis patients**



**Figure 7: Mortality: Dengue shock syndrome patients**

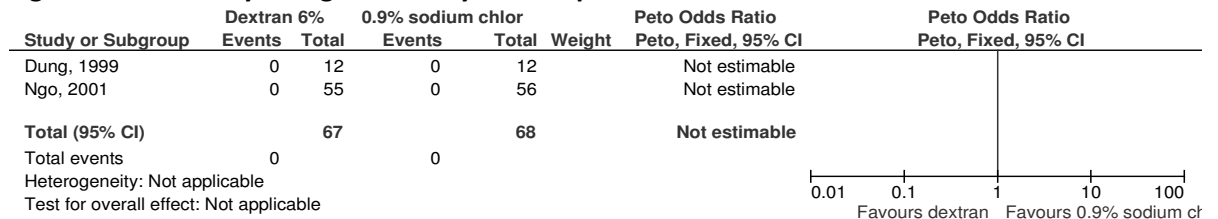


**Figure 8: Decrease in pulse at 1 or 2 hours (beats per minute): Dengue shock syndrome patients**

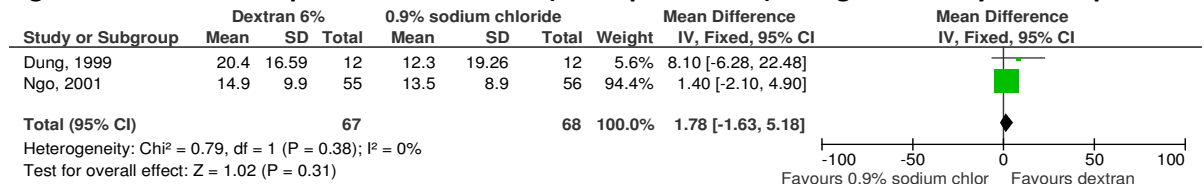


**J.2.1.1.1.3 Dextran versus 0.9% sodium chloride**

**Figure 9: Mortality: Dengue shock syndrome patients**

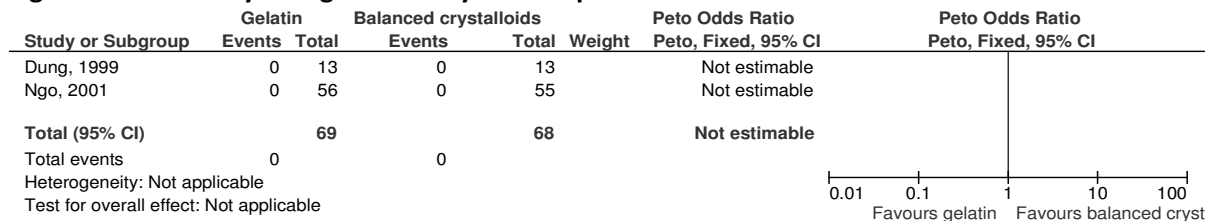


**Figure 10: Decrease in pulse rate at 2 hours (beats per minute): Dengue shock syndrome patients**

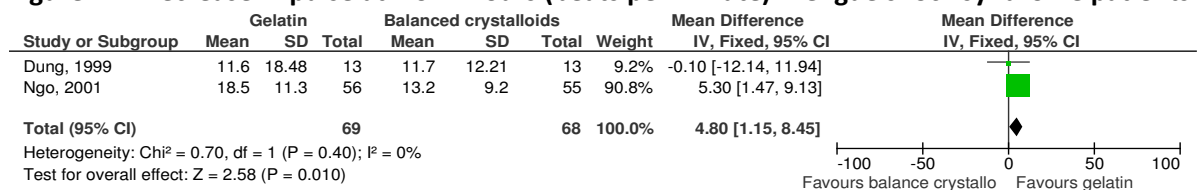


**J.2.1.1.1.4 Gelatin versus Ringer's lactate solution (balanced crystalloids)**

**Figure 11: Mortality: Dengue shock syndrome patients**

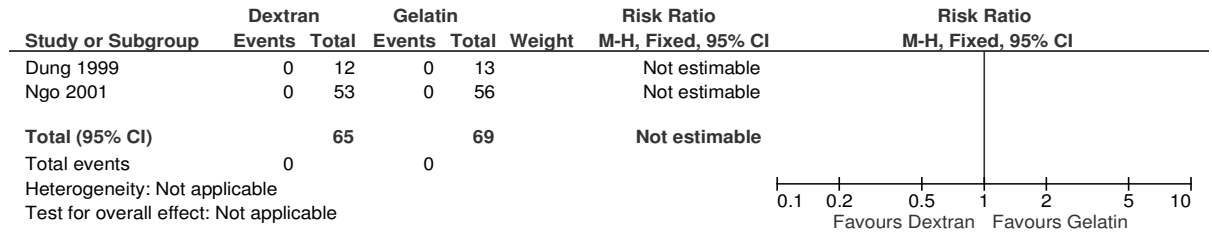


**Figure 12: Decrease in pulse at 1 or 2 hours (beats per minute): Dengue shock syndrome patients**

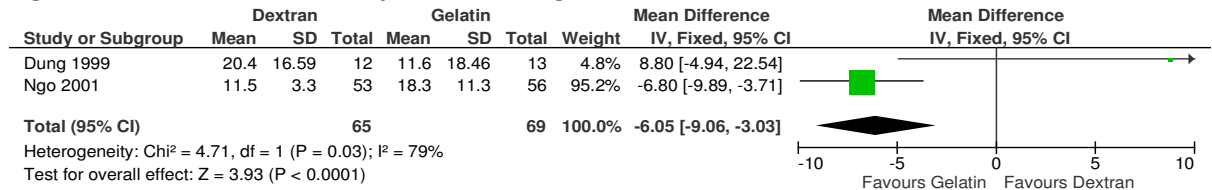


**J.2.1.1.1.5 Dextran versus gelatin – sepsis patients**

**Figure 13: Mortality**



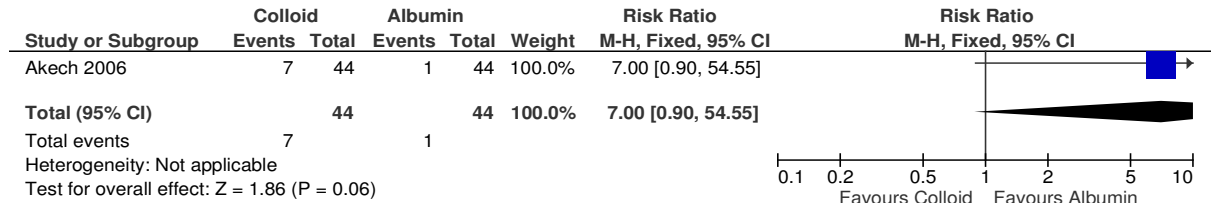
**Figure 14: Cardiovascular compromise (change in heart rate)**



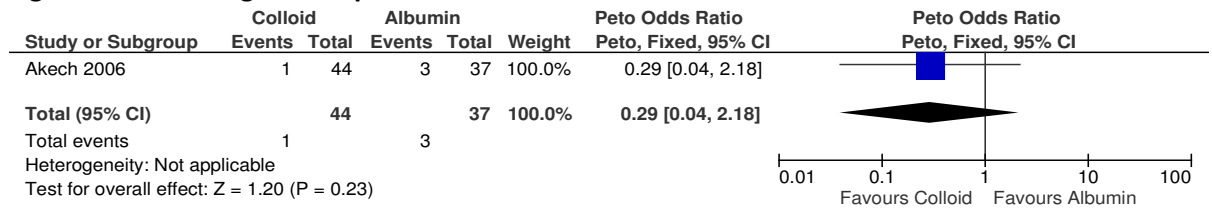
**J.2.1.1.2 Colloids versus albumin**

**J.2.1.1.2.1 Colloids versus albumin – sepsis patients**

**Figure 15: Mortality**



**Figure 16: Neurological compromise**



**J.2.1.1.3 Albumin versus crystalloids**

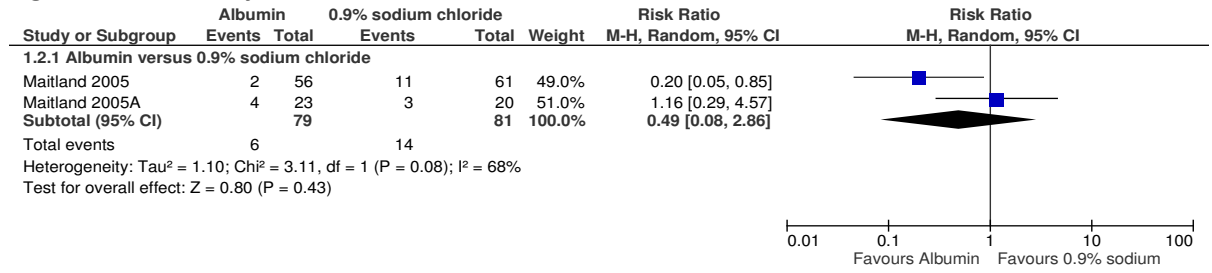
**J.2.1.1.3.1 Albumin versus 0.9% sodium chloride (crystalloids)**

**Figure 17: Mortality at 28 days**

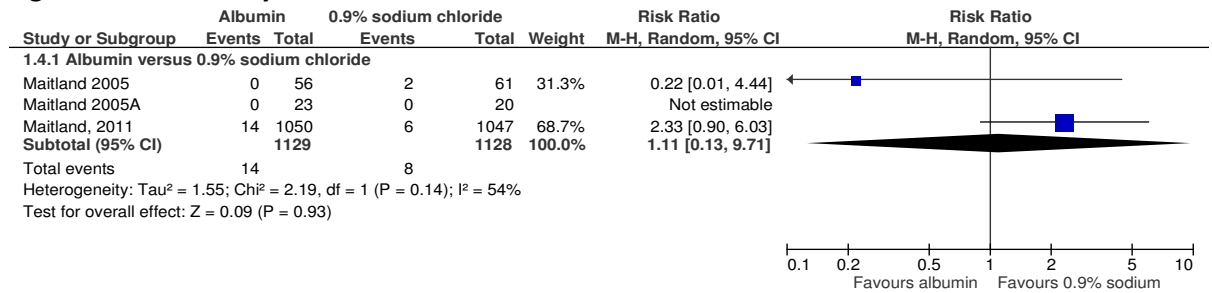




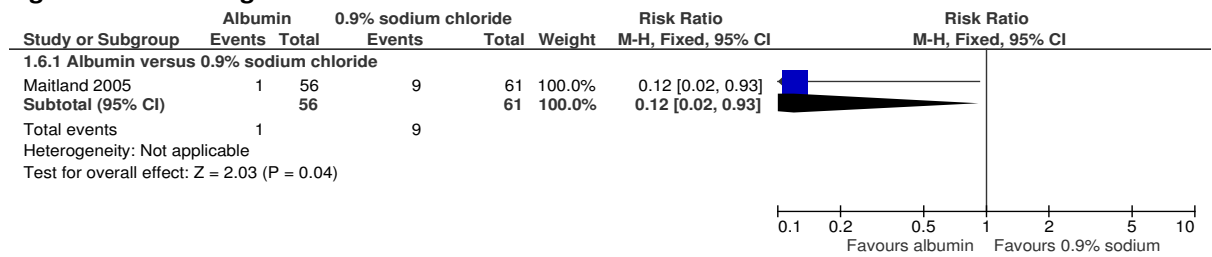
**Figure 18: Mortality at 8 hours**



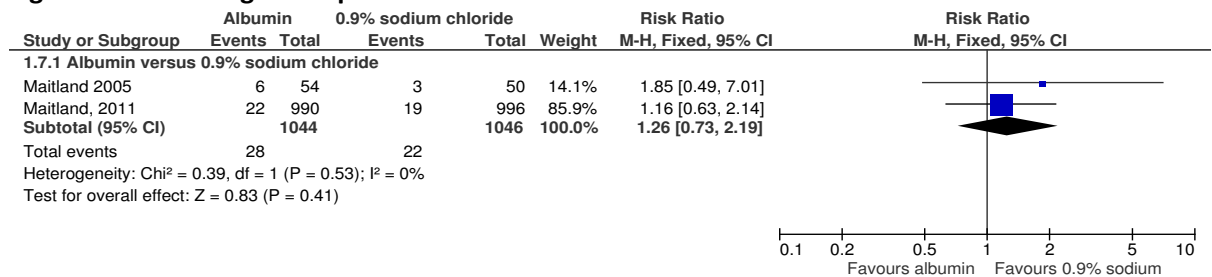
**Figure 19: Pulmonary oedema**



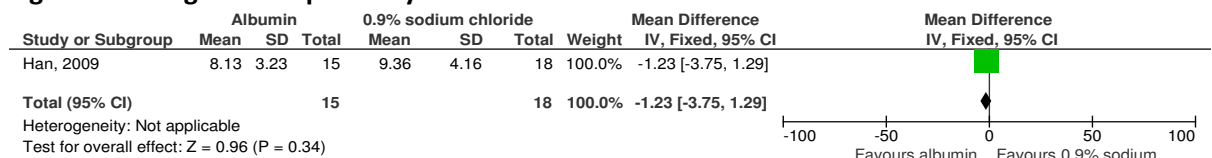
**Figure 20: Neurological deterioration**



**Figure 21: Neurological sequelae**

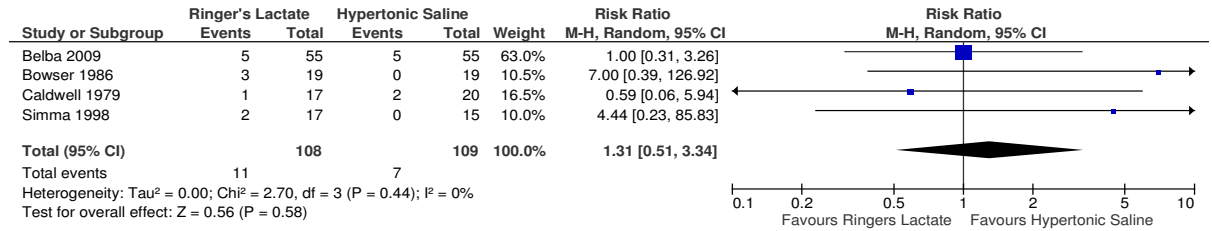


**Figure 22: Length of hospital stay**

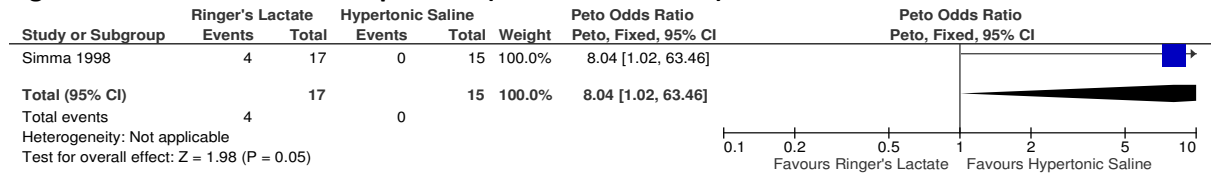


**J.2.1.1.3.2 Ringer's lactate solution versus hypertonic sodium chloride**

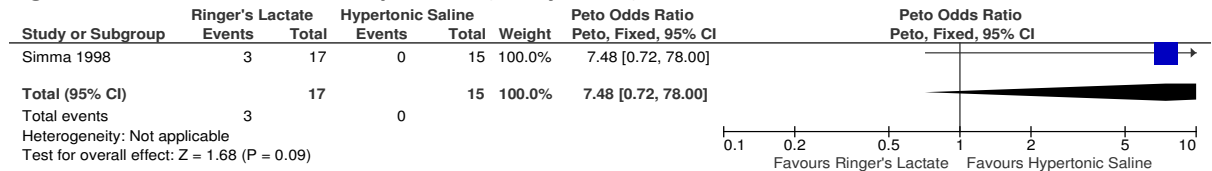
**Figure 23: Mortality (death at 3–15 days)**



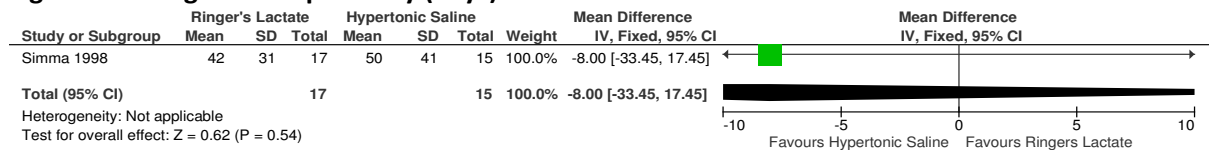
**Figure 24: Cardiovascular compromise (incidence of ARDS)**



**Figure 25: Cardiovascular compromise (arrhythmia)**



**Figure 26: Length of hospital stay (days)**



**J.2.2 Volume and rate of administration for fluid resuscitation**

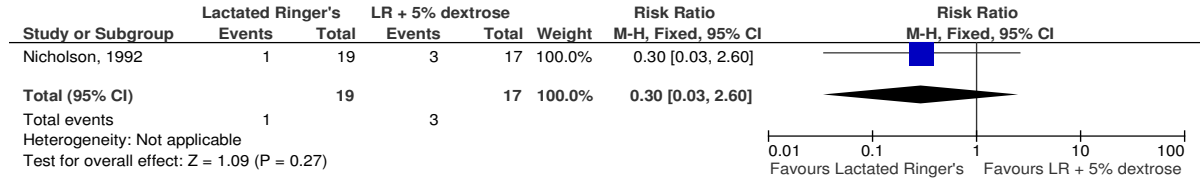
None

## J.3 IV fluid therapy for routine maintenance

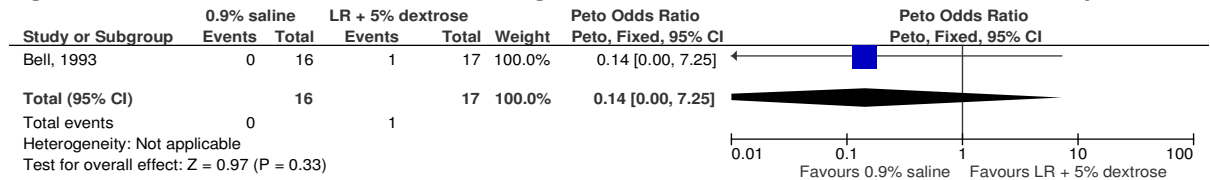
### J.3.1 Fluid type for routine maintenance

#### J.3.1.1 Additional glucose

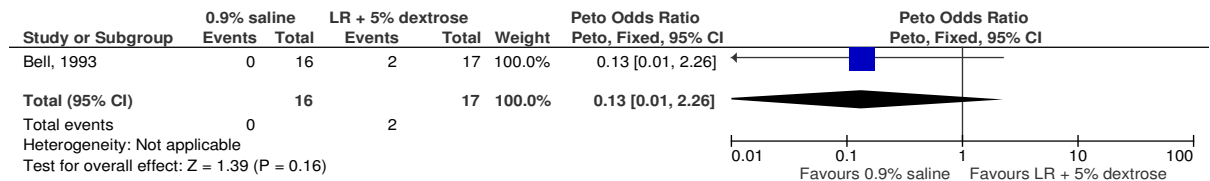
**Figure 27: Ringer’s lactate solution versus Ringer’s lactate solution + 5% dextrose: Neurological sequelae**



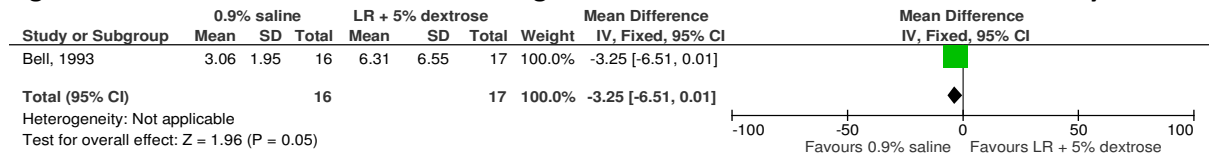
**Figure 28: 0.9% sodium chloride versus Ringer’s lactate solution + 5% dextrose: Mortality**



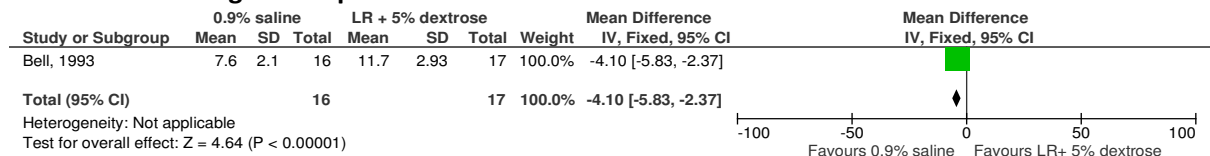
**Figure 29: 0.9% sodium chloride versus Ringer’s lactate solution + 5% dextrose: Cardiorespiratory arrest**



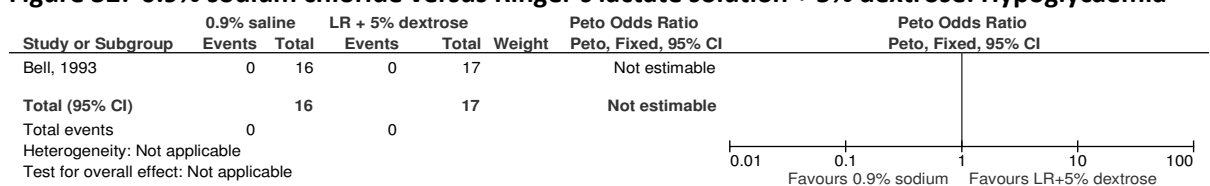
**Figure 30: 0.9% sodium chloride versus Ringer’s lactate solution + 5% dextrose: Mean days in ICU**



**Figure 31: 0.9% sodium chloride versus Ringer’s lactate solution + 5% dextrose: Mean days to discharge in hospital**

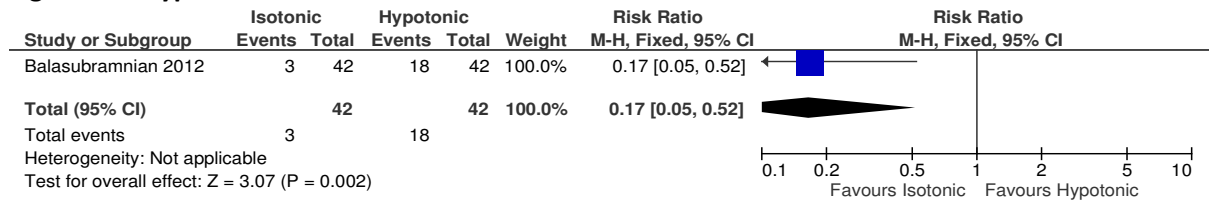


**Figure 32: 0.9% sodium chloride versus Ringer’s lactate solution + 5% dextrose: Hypoglycaemia**

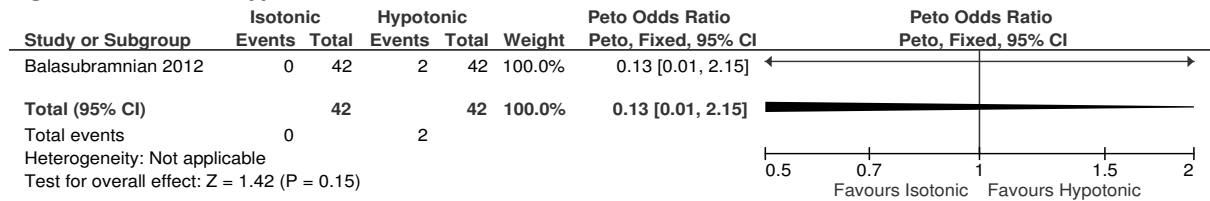


**J.3.1.2 Isotonic versus hypotonic solution for routine maintenance in children aged 48 hours to 28 days**

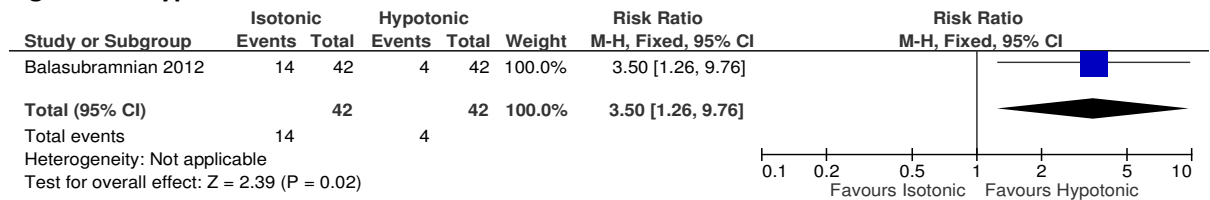
**Figure 33: Hyponatraemia**



**Figure 34: Severe hyponatraemia**

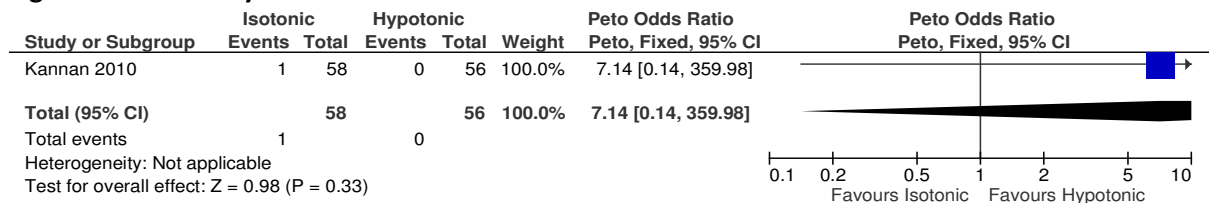


**Figure 35: Hypernatraemia**

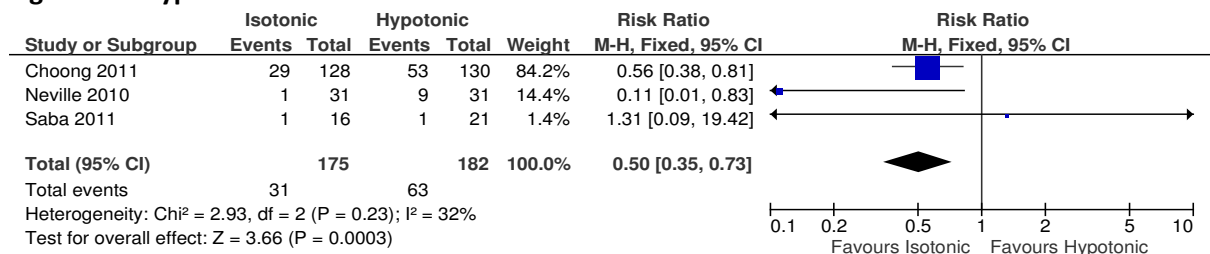


**J.3.1.3 Isotonic versus hypotonic solution for routine maintenance in children aged 28 days to 16 years**

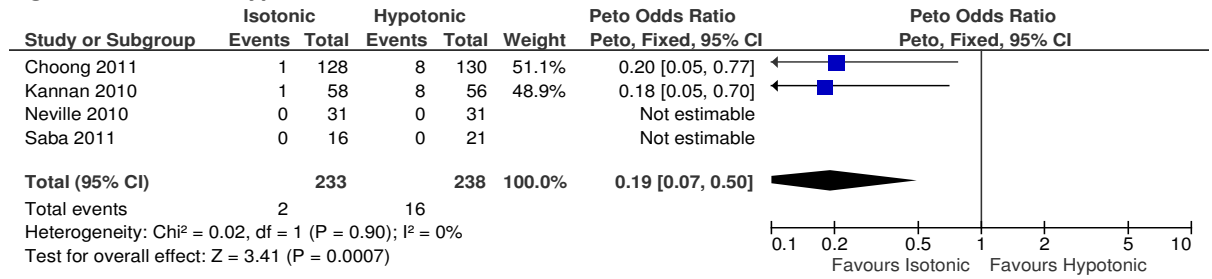
**Figure 36: Mortality**



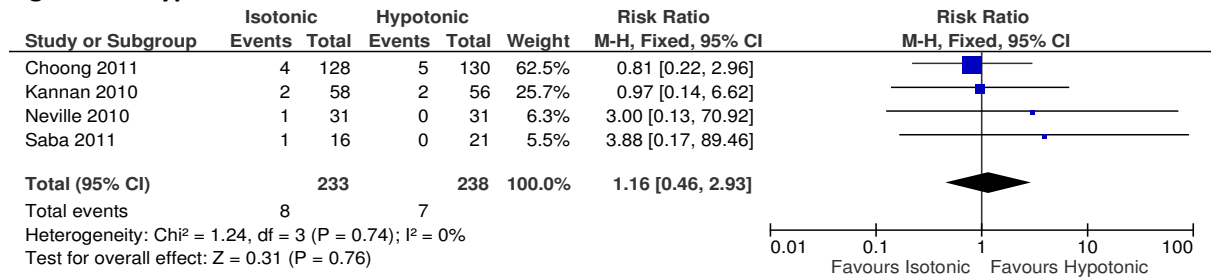
**Figure 37: Hyponatraemia**



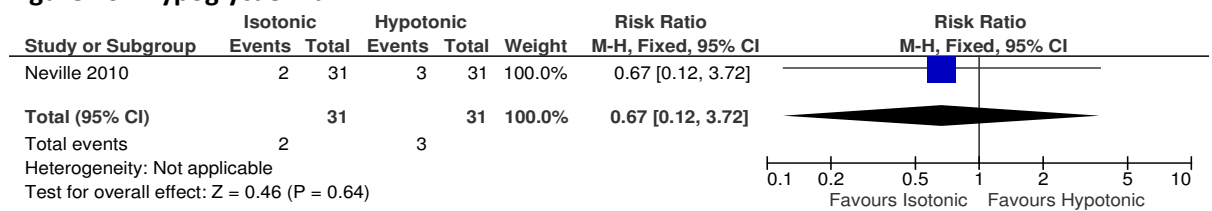
**Figure 38: Severe hyponatraemia**



**Figure 39: Hypernatraemia**

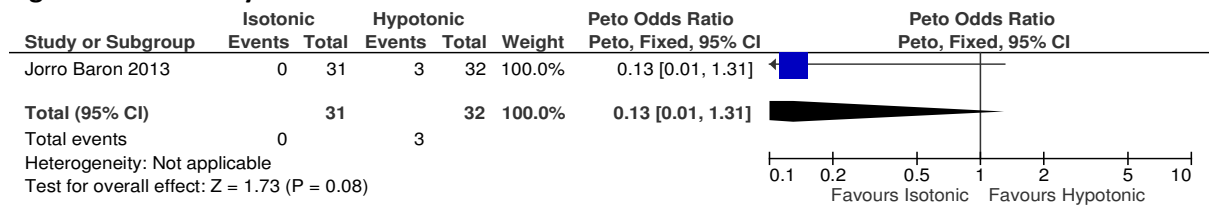


**Figure 40: Hypoglycaemia**

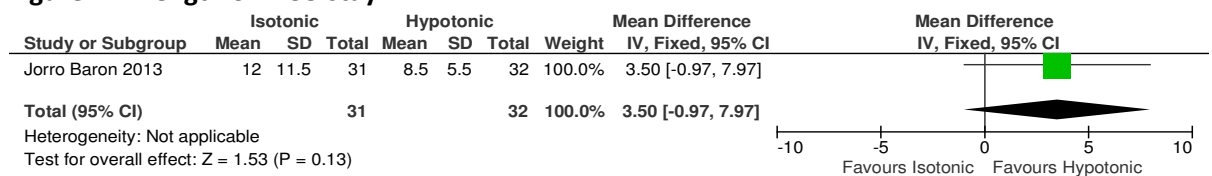


**J.3.1.4 Isotonic versus hypotonic solution for routine maintenance in children within a specialist unit**

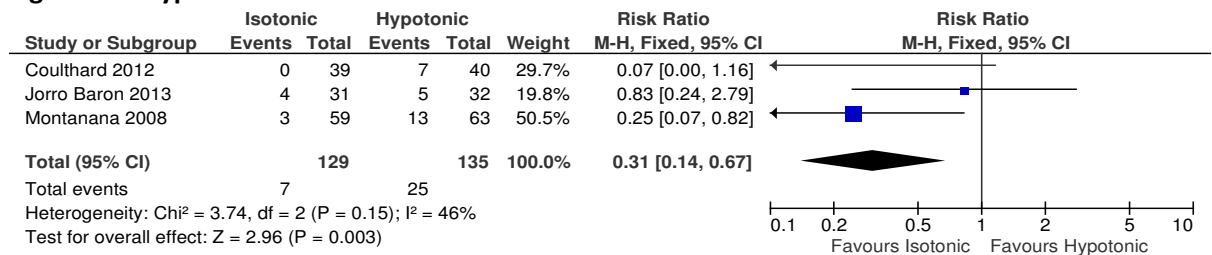
**Figure 41: Mortality**



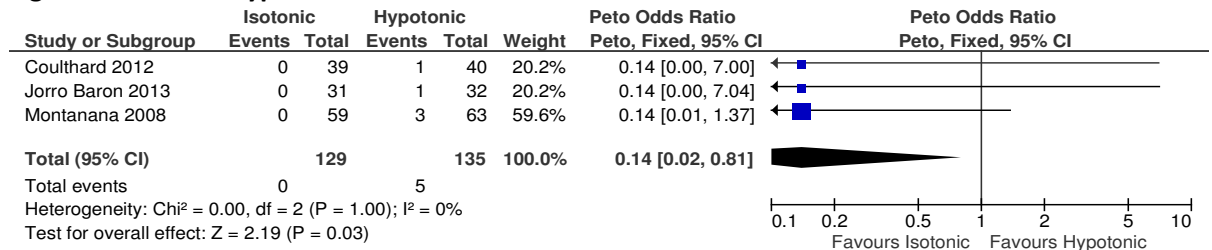
**Figure 42: Length of PICU stay**



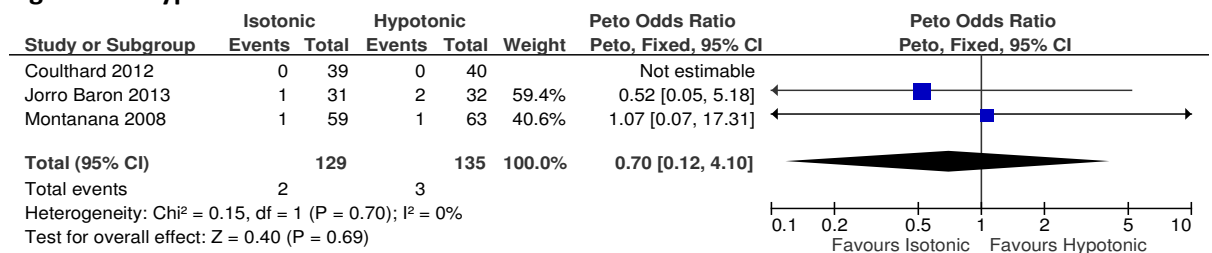
**Figure 43: Hyponatraemia**



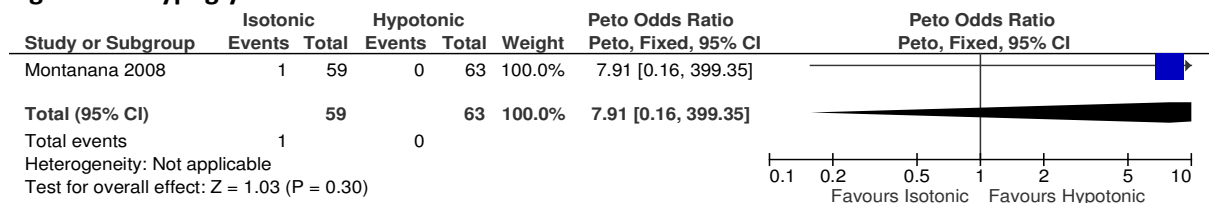
**Figure 44: Severe hyponatraemia**



**Figure 45: Hypernatraemia**



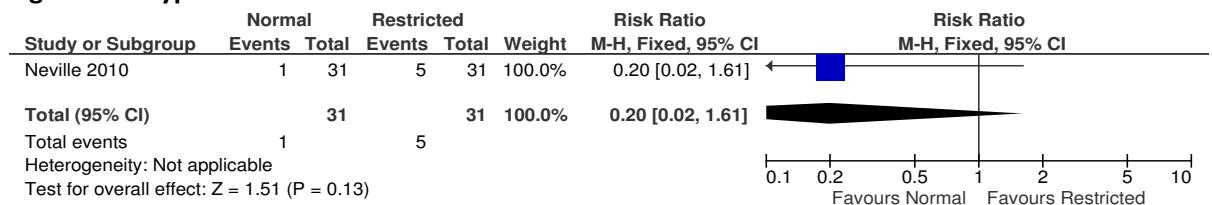
**Figure 46: Hypoglycaemia**



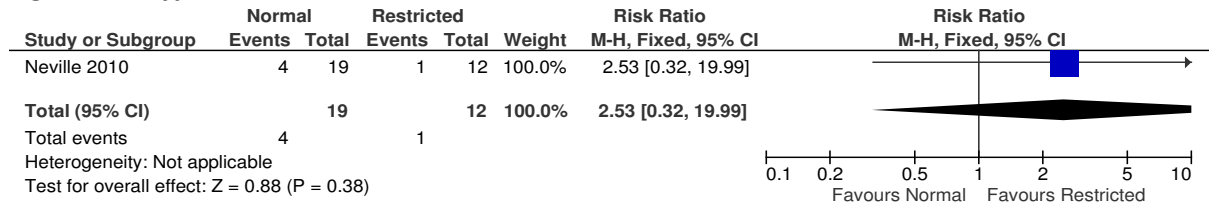
### J.3.2 Rate of administration for routine maintenance

#### J.3.2.1 Isotonic crystalloid at normal rate versus restricted rate

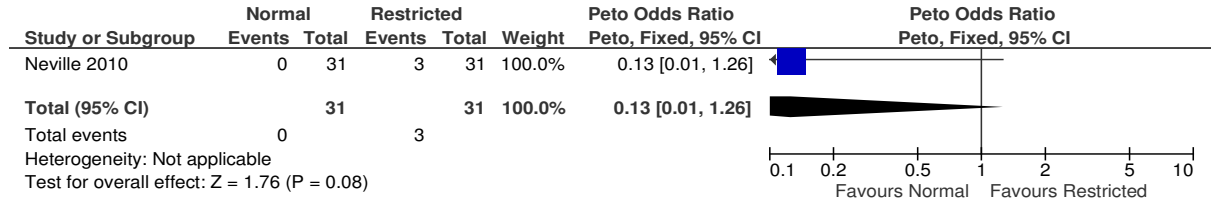
**Figure 47: Hyponatraemia at 8 hours**



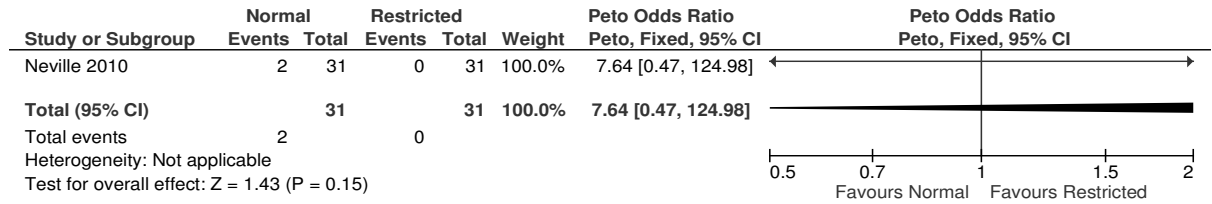
**Figure 48: Hyponatraemia at 24 hours**



**Figure 49: Hypernatraemia at 8 hours**

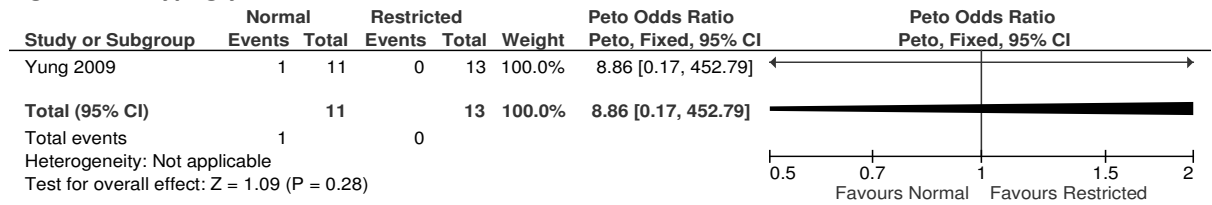


**Figure 50: Hypoglycaemia at 24 hours**



**J.3.2.2 Normal versus restricted in a specialist unit**

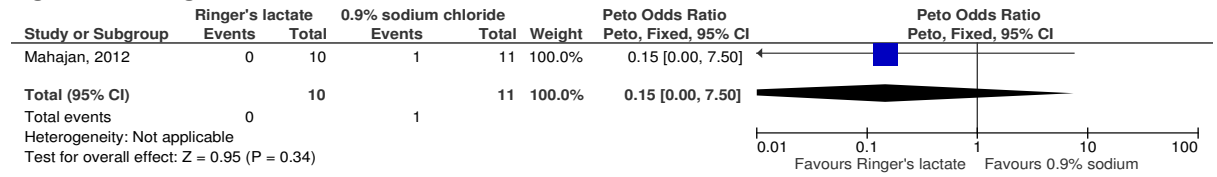
**Figure 51: Hypoglycaemia at 24 hours**



## J.4 IV fluid therapy for replacement and redistribution

### J.4.1 Ringer's lactate solution versus 0.9% sodium chloride

**Figure 52: Ringer's lactate solution versus 0.9% sodium chloride**





## **J.5 Managing hypernatraemia and hyponatraemia developing during IV fluid administration**

### **J.5.1 Management of hypernatraemia**

None

### **J.5.2 Management of hyponatraemia**

None

## **J.6 Training and education of healthcare professionals for management of IV fluid therapy**

None