Supplementary Table 1 Example estimation of body sodium deficit and a replacement strategy

Sample Scenario and Calculation
Treatment strategy requires the patient details, target plasma Na^+ level, Na^+ content of the replacement fluid, and expected Na^+ losses. Patient – 100kg man (i.e. ~ 60kg body water), clinically euvolaemic. Serum Na^+ – 120mmol/L. Desired Na^+ – 130mmol/L. Sodium deficit = body water x (desired plasma Na^+ - measured plasma Na^+). Normal saline Na^+ concentration = 154mmol/L. • Sodium deficient = 60kg x (130mmol/L – 120mmol/L) = 600mmol. • Normal saline required = 600/154 = 3.89L Therefore, the patient in this scenario requires 3.89L of 0.9% normal saline administered over 24 hours to replace the Na^+ deficit to goal. Maintenance fluid requirements must be added to this volume.
Notes
• Ongoing sodium losses in the form of urinary wasting can be directly measured but this process is unwieldy and seldom contributory. • Plasma sodium cannot be corrected by greater than roughly 10mmol/L per day because of the risk of central pontine myelinolysis. Sodium replacement should be calculated in 24-hour blocks at intervals of 10mmol/L. • An adequate target is greater than 130mmol/L. Where the desired rate of correction is not being achieved, up-titration based on serial blood gas analysis is required. Blood testing is usually indicated anywhere from daily to four-hourly depending on the situation. • Severe hyponatraemia should be corrected with hypertonic saline; the

same formula as that above may be used. This circumstance is rare and best managed in a high-dependency unit. • Some experts choose to replenish half the estimated fluid volume in 6 hours followed by the remaining half over the next 18 hours, similar to a burns scenario. • This summary is not exhaustive and readers are encouraged to refer to dedicated resources for detailed discussion on the management of sodium disorders.

Supplementary Table 2 – example estimation of body water deficit and a fluid replacement strategy.

Sample Scenario and Calculation
One method is to determine the effect upon plasma Na^+ concentration by 1L of intravenous fluid. Plasma Na^+ change = (infusion Na^+ concentration – plasma Na^+ concentration) / (body water + 1). Another method is to determine the free water deficit. Water deficit = body water x (plasma Na^+ - 140) / 140. Patient – 100kg man. Serum Na^+ – 168mmol/L. Desired Na^+ – 158mmol/L. Water deficit = 60 x (168 - 140) / 140 = 12L. Fluid replacement with 5% glucose = Na^+ concentration of 0mmol/L. Desired change in 24hrs = 10mmol/28mmol = 0.36 of necessary water volume = 0.36 x 12L = 4.28L. Therefore, the patient in this scenario requires 4.28L of 5% glucose to correct

the water deficit in the first 24hrs while limiting the sodium change to 10mmol/L. The goal must be re-evaluated each day. Maintenance fluid requirements and ongoing losses must be added to this volume.
Notes
• Lowering of the plasma sodium by greater than 10mmol/L per day is associated with a risk of cerebral oedema. • Ongoing urinary water losses can be directly measured and predicted but this complicated process is rarely needed. • Some experts choose to replenish half the desired 24-hour volume in 6 hours followed by the remaining half over the next 18 hours, similar to a burns scenario.
Sodium Concentrations of Common Infusates
• 3% hypertonic sodium chloride = 513mmol/L. • 0.9% 'normal' sodium chloride = 154mmol/L. • Lactated Ringer's solution = 130mmol/L. • 0.45% sodium chloride in 5% dextrose = 77mmol/L.