Convenient Formulas

Formula Name	Formula	Clinical Use
Modified Bedside Schwartz	eGFR = 0.413 x (height/Scr); ht in cm	Used ages 1-18 to estimate GFR
Insensible Fluid Loss	IFL = 300 mL/m^2/day BSA (m^2) = sqrt[(ht [in cm] x wt [in kg])/3600]	Use for oliguric patients when replacing insensible fluid plus urine/stool losses
Free Water Deficit	[(Current Na^+/Desired Na^+) - 1] x total body water (weight in kg x 0.6 for males, 0.5 for females) = water deficit in **liters**	Calculating **water** to be replaced in **hypernatremic** dehydration
Sodium Deficit	(140-actual Na^+) x TBW (wt in kg x 0.6 for males, 0.5 for females) = Na^+ deficit in **mEq**	Calc **Na** to be replaced in **hyponatremic** dehydration
Fractional Excretion of Sodium	**FENa** = (Urine Na x Plasma Cr) / (Plasma Na x Urine Cr)	Use in oliguric **AKI** to determine **pre-renal** (<1%, sodium-avid) vs **intrinsic renal** (>2%, tubular dysfunction) etiology
Fractional Excretion of Urea	**FEUN** = (Urine urea nitrogen x Plasma Cr)/ (Plasma urea nitrogen x Urine Cr)	Use in **AKI** if patient has recently been given **diuretics** (would alter Na excretion and therefore FENa), acute GN, or CKD; **pre-renal** <35%, **intrinsic renal** >50%
Urine Protein:Cr	Urine Protein:Cr on spot urine sample	Normal <0.2. > 3.5 indicates nephrotic-range proteinuria.
Transtubular Potassium Gradient	(urine K / plasma K) / (urine osm / plasma osm)	Normal = 8-9. TTKG <7 + **hyperkalemia** → aldo def / resistance TTKG >3 + **hypokalemia** → aldo ↑ vs renal K loss
Tubular Reabsorption of Phosphate	[1 - (urine phosphate x plasma creatinine) / (plasma phosphate x urine creatinine)] x 100%	Normal 80-98%. ↓ TRP can be seen in conditions with prox tubular dysfx, such as Fanconi syndrome / Type 2 RTA
Urine Calcium:Cr	Urine Ca:Cr on spot urine sample	Normal < 0.2. Use to assess for hypercalciuria in patients with hematuria, stones, and/or hypercalcemia.
Calcium levels w/ low albumin	Corrected Ca^{2+} = (4 - patient's albumin) x 0.8 + measured Ca^{2+}	Albumin = negatively charged, and therefore carries calcium.
Serum Osmolality	[2 x (Na^+ + K^+)] + (glucose/18) + (BUN/2.8) = Sosm in mOsm/kg Osmolar gap = measured serum osm - calculated serum osm	Osmolar gap >10 can be caused by toxic alcohols (ethanol, methanol, ethylene glycol, isopropyl alcohol), mannitol, and lorazepam infusions (which contain propylene glycol).

Fluid Management

Dehydration

Severity	% Volume Loss	Vital Signs	Physical Exam
Mild	3-5%	Normal	Oliguria
Moderate	6-9%	Inc HR, Orthostatic BP	Decreased skin turgor, delayed cap refill, dry mucosa, sunken fontanelle, oliguria
Severe	≥10%	Inc HR, Dec BP	Markedly decreased peripheral perfusion (cool, mottled extremities), lethargy/AMS, deep respirations, anuria

Is this child dehydrated? Steiner MJ; DeWalt DA; Byerley JS. JAMA 2004 Jun 9;291(22):2746-54.