CASE 1: RK is an 83 y/o F admitted from assisted living with a 5-day history of coughing, difficulty breathing and increasing confusion.

HPI: RK was in her usual state of health until one week ago when she developed what appeared to be an URTI. Her cough gradually got worse, being occasionally productive of yellowish sputum. She became increasingly confused over the following days.

PMH: Stroke 6 months ago with some residual R sided weakness.
Mild HTN
GERD
OA (knees)

O/E: Wt. 50 kg (usually 54 kg), Temp 40C. Chest dull to auscultation and percussion. RR 27. Oriented x 1. CXR shows some RLL consolidation.

Labs:

	Plasma	Urine
Na	174 mmol/L	5 mmol/L
K	4.2 mmol/L	
Cl	130 mmol/L	
HCO3	24 mmol/L	
BG	8 mmol/L	
BUN	32 mmol/L	
Cr	140 mcmol/L	500 mcmol/L
Osm	388 mosm/kg H2O	606 mosm/L

CASE 2: KD is 63 y/o F admitted to hospital with a 7 day history of increasing confusion, irritability, excessive thirst, urination, and weight loss.

PMH: Stroke 1 month ago with minimal residual neurologic dysfunction, although she experienced 2 seizures within 24 hours of onset of stroke symptoms.
Stage I HTN controlled with nadolol 40 mg/d x 3 years.
Osteoarthritis x 7 years.

Meds: nadolol 40 mg po daily, phenytoin 300 mg PO daily, Tylenol 500 mg 3-6 x/d

O/E: RC is an emaciated looking F weighing 45 kg (previously 52 kg). BP supine 120/75 (HR 60), standing 95/65 (HR 98). JVP not visible. Temp 37.1 C, U/O 175 ml in last hour. Decreased skin turgor.

Labs:

	Plasma	Urine
Na	165 mmol/L	7 mmol/L
K	4.2 mmol/L	
Cl	110 mmol/L	
HCO3	24 mmol/L	
BG	6.2 mmol/L	
BUN	44 mmol/L	
Cr	320 mcmol/L	
Osm	393 mosm/L	150 mosm/L

CASE 3:

KP is a 77 y/o M brought to the emergency department from home because of increasing lethargy and confusion over the past 48 hours. He has had diarrhea for the past 4 days subsequent to a course of cefuroxime for mild CAP, and has been receiving HCTZ 25 mg/d for one year for ISH.

PMH: HTN. CAP.

O/E: Oriented x 3. 100/60 supine, 75/45 standing. HR 65 supine, 80 standing. JVP <2cm ASA.

Labs on admission:

Plasma	
Na	115 mmol/L
K	2.2 mmol/L
Cl	72 mmol/L
HCO3	20 mmol/L
SCr	263 mcmol/L
BUN	40 mmol/L
Glucose	5 mmol/L

CASE 4:

RQ is a 67 y/o white M admitted from home for general malaise and increasing confusion for one week. While waiting in the emergency department, he experiences what the nurse believes is a tonic-clonic seizure lasting 30 seconds.

PMH: Carcinoma of the bronchus (surgical resection and radiation therapy) 4 months ago
Mild HTN x 5 y (metoprolol 100 mg po bid)
Depression (diagnosed 4 months ago and treated with fluoxetine 50 mg/d)

PE: Moderately obese, disoriented white male. BP 150/85 supine, 145/85 standing. HR 70 supine, 75 standing. Temp 36.8C, Wt. 100 kg, JVP 3 cm ASA.

Labs:

	Plasma	Urine
Na	105 mmol/L	50 mmol/L
K	3.7 mmol/L	
HCO3	22 mmol/L	
Urea	8 mmol/L	
Cr	85 mcmol/L	250 mcmol/L
BG	5.1 mmol/L	
Osm	232 mosm/kg	325 mosm/kg

CASE 5:

ZZ is a 78 y/o M admitted to your medical unit with a CC of shortness of breath.

HPI: ZZ began to experience increased frequency of chest pain at rest over the past 2 weeks which was relieved by nitro spray 1-2 sprays in each case. Over the past 7 days, however, his breathing has become increasingly difficult. He has been sleeping in a chair at night and coughing up frothy blood-tinged sputum for the past 2 days.

PMH: HYHA Class III CHF with multiple admissions for acute pulmonary edema over the last 3 years.
CAD manifest as angina (CCS class II)

Meds: Enalapril 10 mg PO bid, Furosemide 20 mg po daily, K-dur 1 tablet (20 meq) daily, digoxin 0.625 mg PO daily.

O/E: male appearing stated age in moderate respiratory distress. Oriented X 3. BP 150/80 supine (no standing BP measured). HR 108. O2 Sat. 86% on 4L O2/min via nasal prongs. Temp 37.7C. JVP 5 cm ASA. Pitting edema at ankles. CXR shows diffuse opacity, vascular redistribution, Kerly B lines, cardiomegaly. Last EF measured 2 mos ago: 25-30%.

Labs:

	Plasma
Na	125 mmol/L
K	5.2 mmol/L
Cl	100 mmol/L
CO2	30 mmol/L
Cr	225 mcmol/L
BG	5.2 mmol/L
BUN	30 mmol/L
pH	7.24
pCO2	60 mmHg
pO2	70 mmHg
HCO3	29 mmol/L
Plasma Osmolality	267 mosm/kg H2O

Another scenario:

You're quietly working on your general medical unit when a hospitalist approaches you and asks, "Can ramipril cause hyponatremia?"

What do you do?

- You could give an off-the-cuff answer
- You could offer to search the literature to find case reports of this.
- You could think about a mechanistic argument for why is might, or shouldn't.
- You could, instead of the above, ask her about the patient in which this query arose… if you did that, you'd get the following:
    - Patient is a 74 year old M admitted 1 week ago for failure to thrive. On admission his [Na] was 128. On ramipril 5mg upon admission for HTN, x 1 year. He got some volume in ED, ramipril was continued, and today is [Na] is 133. Someone sometime in the intervening days wondered whether he had SIADH and ordered urine electrolytes. Na+ was 14, UOsm was 512.

      WHAT'S GOING ON HERE? WHAT WOULD YOU DO NEXT?

FROM HERB WONG 4FEB13:

"Peter:

I just wanted to drop a quick thanks for your Sodium and Water Therapeutics PLOP.

It came in real handy for my patient who was severely dehydrated due to CDAD for a full month and became hypernatremic. I assessed him physically, calculated his free water deficit and challenged the hospitalist who didn't want to replete his contracted ICF as he was concerned about his HF. I managed to get some D5W in him (wasn't a good candidate for oral free water replacement) over last weekend after expressing my concerns with the geriatrician, who agreed. The patient's sodium corrected by Monday and he looked and felt a lot better with no exacerbation of HF symptoms."

Another scenario:

You receive on your medical unit today an 83 y/o F who is 20 days post-op following a cholecystectomy. She experienced intra-abdominal sepsis in the days following and has completed 14 days of imipenem, with success.

PMH: bells palsy, 3rd nerve palsy, HTN, ischemic stroke, elevated lipids

MPL: moderate-severe pedal edema since the surgery, labile BP in hospital (up to 170 systolic, down to 110). Orthosatic dizziness. Serum Na hovering around 128 since 3 days after surgery. SCr 132 (baseline ~75). WBC elevated (14) today, <10 for the past week.

Medication: HCTZ 25mg daily. metolazone 10mg daily since 2 days post-op for pedal edema, which hasn't obviously helped. Amlodipine 10mg daily. Acebutolol 150 mg bid. Atorvastatin 80mg daily.

You worry that the hyponatremia might be thiazide-induced. Na 129 today. K 3.5. Mg normal.

WHAT DO YOU WANT TO DO?