



Perioperative Medicine Summit

Evidence Based Perioperative Medical Care

Rapid Fire

Answering challenging,
common clinical questions

Implications and Management of Perioperative Hyponatremia

Rachel E Thompson MD MPH SFHM

Chief, Section of Hospital Medicine

Associate Professor, Department of Medicine

University of Nebraska Medical Center

Disclosures

- None

Objectives

- Identify perioperative risks associated with preoperative hyponatremia
- Describe the general approach for management of preoperative hyponatremia
- Review the management of postoperative hyponatremia

Case

A 69 year old male presents for preoperative evaluation prior to undergoing TURP tomorrow.

Recent PCP clinic notes reveal:

PMH: HTN, DM

Meds: HCTZ, Metformin

Labs: Na 129, Glucose 183, Cr 1.1, A1c 7.9

Repeat lab today confirms Na 128 mmol/L

ARS Question



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Given the preoperative hyponatremia, your best course of action is :

- A. Cancel surgery and evaluate cause of hyponatremia.
- B. Proceed to surgery, monitor fluids and sodium closely.
- C. No specific evaluation or caution is needed given only a moderate hyponatremia exists.
- D. No specific evaluation, glucose elevation accounts for his hyponatremia.

Risks associated with Preoperative Hyponatremia

Death Pneumonia
Increased Costs Myocardial Infarction
Increased Length of Stay

Preoperative Sodium and 30-Day Mortality

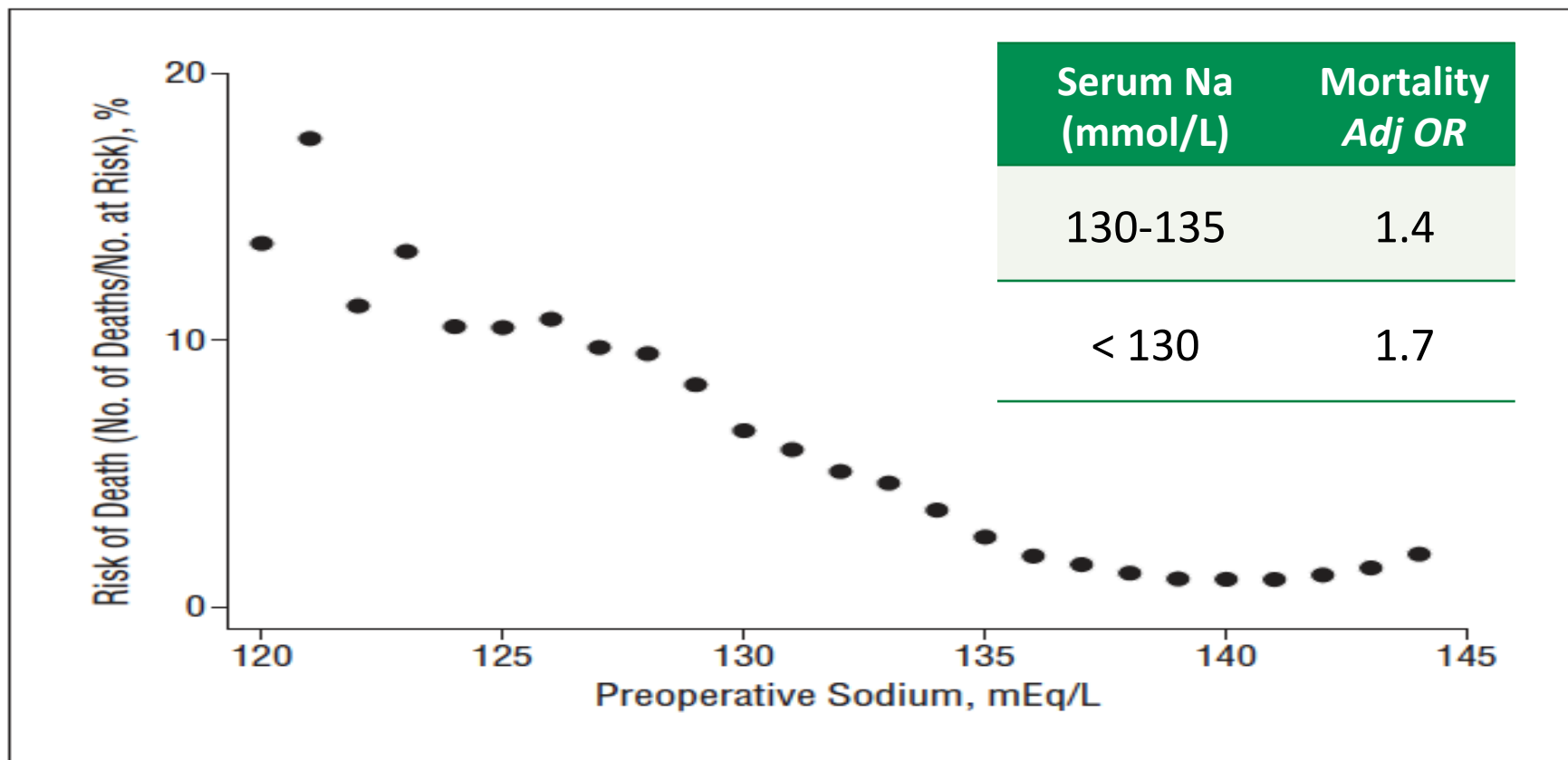


Figure 1. Crude risk of 30-day postoperative mortality according to preoperative sodium level. To convert sodium to millimoles per liter, multiply by 1.0.

Preoperative Sodium, In-Hospital Death and Confounding Variables

≥ 150 mmol/L

145-149 mmol/L

144-145 mmol/L

138-143 mmol/L

136-137 mmol/L

131-135 mmol/L

≤ 130 mmol/L

Severe

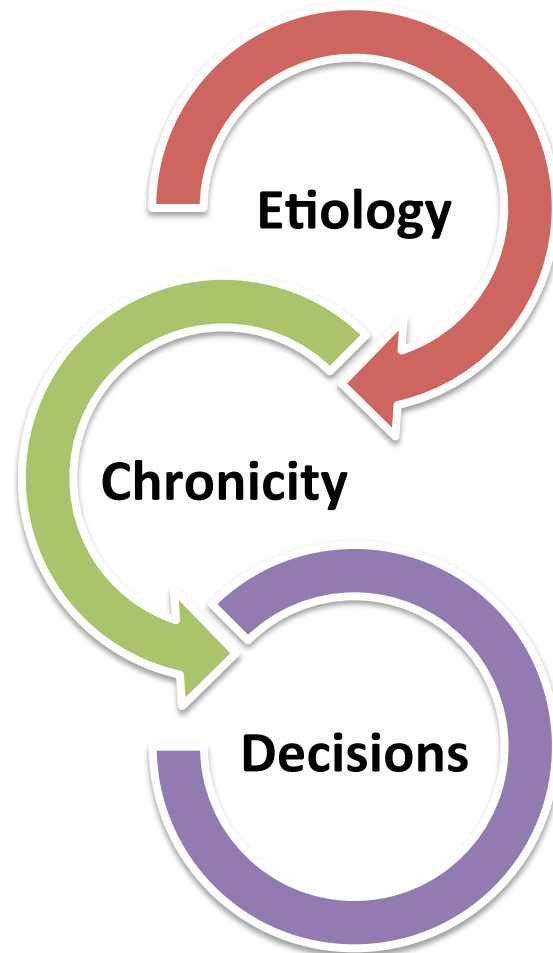
Moderate

Normal

Preoperative Sodium, In-Hospital Death and Confounding Variables

Serum Na (mmol/L)	Unadj OR	Adj OR
≤ 130	3.5 (2.6,4.6)	1.4 (1.0,2.0)
131-135	2.3 (1.9,2.7)	1.3 (1.0,1.6)
138-143	ref	ref
145-149	1.8 (1.4,2.3)	1.3 (1.0,1.8)
≥ 150	10.1 (6.3,16.1)	3.4 (2.0,5.9)

Management of Preoperative Hyponatremia



Hyponatremia, Not Present on Admission

Hyponatremia, Not Present on Admission

- Hospital Acquired Hyponatremia (<138mEq/L)
 - 38% of patients
 - Older, surgical, higher co-morbidity
- Associated with:
 - Increased in-hospital mortality (OR 1.66),
 - Increased LOS (5 v 4d)
 - Discharge to short/long-term facility (46 v. 32%)
- When nadir sodium was <127, there was an associated 14 fold increase in-hospital mortality

Assessment of Postoperative Hyponatremia

Step 1

- Mental status assessment
- Volume status assessment

Step 2

- Review fluids
- Review medications

Step 3

- Consider repeating serum sodium
- Evaluate urine osms and sodium

Step 4

- Is urine inappropriately concentrated?

Differential for Acquired Postoperative Hyponatremia

Concentrated Urine

- Thiazides
- ADH Stimuli:
 - Pain, stress, nausea
 - Drugs (i.e. opioids, SSRIs, antipsychotics)
 - Pulmonary disease
 - CNS disease
- Adrenal (glucocorticoid) insufficiency
- Cerebral Salt Wasting

Dilute Urine

- Hypotonic Fluids
- Volume overload
- Hypovolemia
- Polydipsia

Management of Postoperative Hyponatremia

Give Fluids

- Who
 - Hypovolemic
 - Cerebral Salt Wasting
 - Acute mental status changes
- How
 - 4 to 6mEq/L in 24 hours (do not exceed 10mEq/L)
 - Type of fluids
 - Typically normal saline
 - Hypertonic saline for severe symptoms

Restrict Fluids

- Who
 - SIADH
 - Primary polydipsia
- How
 - 1-2 liters Free water restrict
 - 800cc in moderate to severe hyponatremia

Take Home Points

- Debate continues: Association vs. Causation
- Preoperative hyponatremia
 - Determine etiology, chronicity
 - Caution with fluids and monitoring of Na periop
- Postoperative hyponatremia
 - Determine etiology
 - Careful monitoring, fluid replacement or restriction

UNMC  Nebraska Medicine



Rachel E Thompson MD MPH SFHM

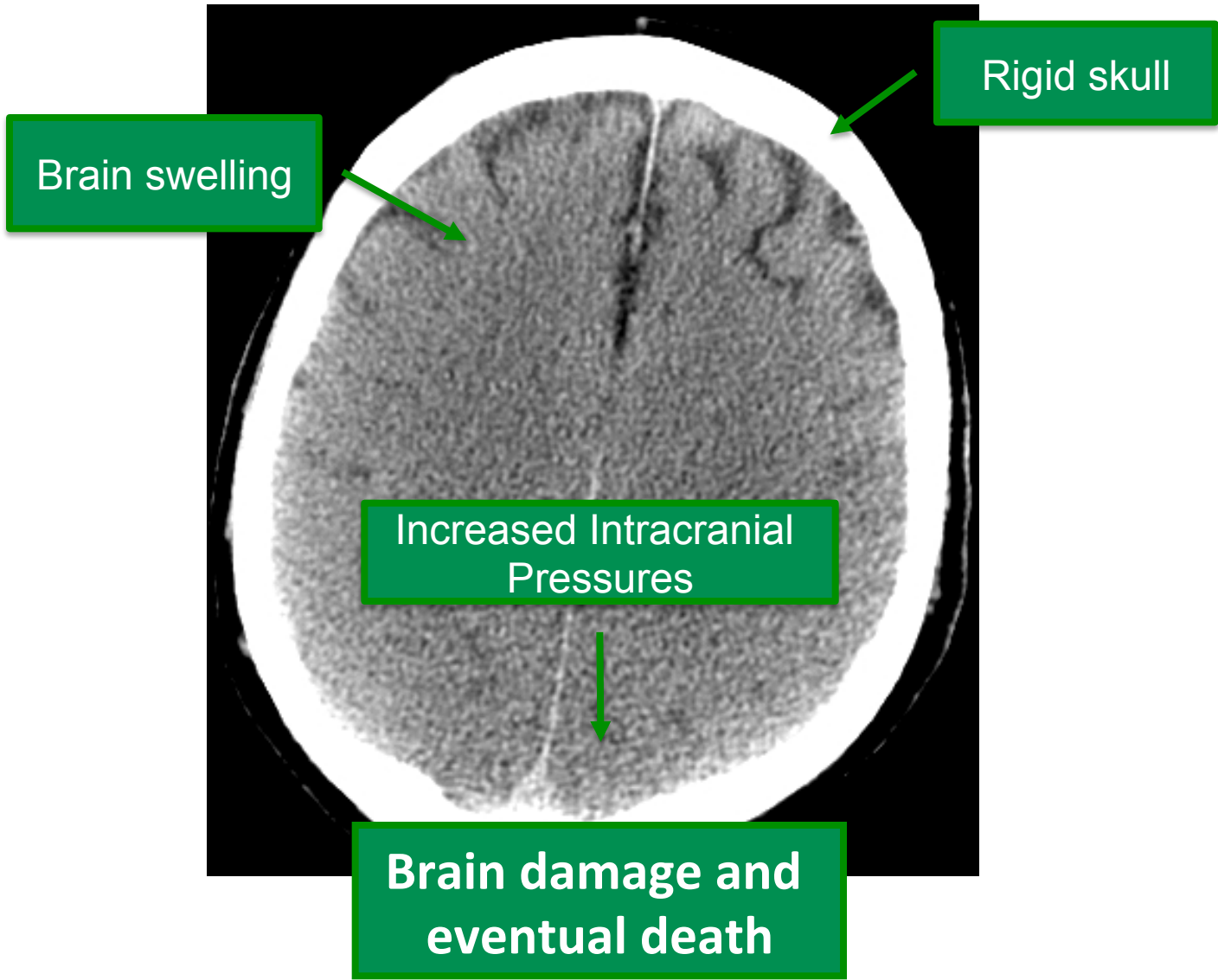
Chief, Section of Hospital Medicine

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rachel.thompson@unmc.edu

Twitter: @RThompsonMD



Two Other Treatments

Sodium Chloride Tablets

- Who
 - Cerebral Salt Wasting
- How
 - 2-4g PO TID to QID
 - Once Na normalizes, wean the NaCl; reverse if Na starts to drop

Vasopressin Receptor Antagonists

- Who
 - Last resort
 - How
 - IV or Oral
- * Extremely expensive (\$260-550/day)
 - * No data on improved outcomes, though sodium will rise
 - * Caution with rapid overcorrection