Post-operative polyuria (UOP > 3 ml/kg/hr)

DI criteria (all must be present)
- Hypernatremia (Na > 145 mEq/L) - confirm x1 (iStat)
- Hypotonic urine (urine Osm <300 mOsm/kg; sg <1.010)
- Increased plasma osmolality (>300 mOsm/kg)

No

Re-evaluate

1. IV fluids (D5 1/4NS w/ 20 mEq/L KCl) at 2/3 rds maintenance (1L/m²/day)
2. Start Vasopressin at 0.2-0.5 milliunits/kg/hr and titrate q30-60 minutes to maintain UOP 1-3 ml/kg/hr
3. Stop vasopressin drip if serum sodium is less than or equal to 140 mEq/L. Do not restart drip until serum Na is greater than 145 mEq/L and patient meets all DI criteria
4. If serum Na >150 and UOP is outside goal range consider urine replacement with D5W. Total IV/PO not to exceed 6ml/kg/hr (see Page 2 for details)
5. Check blood Na via istat every 2 hrs after initiation of vasopressin drip and every 4 hrs once stable serum sodium and vasopressin drip dose.
   - Measuring serum Na more frequently may be necessary when urine output is out of treatment goal range (1-3 ml/kg/hr)

Yes

Post-operative diuresis

Operation with high risk of post-op DI
- Vasopressin drip to bedside prior to arrival to PICU
- Strict Ins and Outs

Patient develops severe hypernatremia (Na >155 mEq/L) - confirm x1
- Review I/O balance.
- Consider dehydration due to excessive UOP and negative fluid balance.
- Titrate vasopressin drip to maintain UOP within target
- Consider additional IV fluid replacement

Discontinue vasopressin drip on day 1 post-op if normal mental status and able to tolerate PO DDAVP.

Monitor UOP and patient’s ability to take PO closely

If ordering DDAVP, make sure DDAVP dose is available at the bedside 1 hr prior to anticipated administration and before stopping the vasopressin drip.

See Page 3 for more details

Patient develops severe hypotension (Na <135 mEq/L) - confirm x1

-Low UOP:
- Review I/O balance
- Consider over-hydration due to excessive IV fluids or PO intake, possible SIADH (see page 2).
- Stop vasopressin drip immediately.
- Limit total intake (PO and IV) to 1 L/m²/day (2/3 maintenance) until sodium is above 140, and anticipate further restriction if persistent low UOP after discontinuation of vasopressin drip

-Normal/High UOP:
- Consider cerebral salt wasting syndrome (see page 2) or over-hydration
- Measure urine Na
- Patient may require Na replacement

Notify PICU/Neurosurgery/Neuro attending immediately if:
- Serum Na <135 or >155
- Drop in GCS of 2 or more
- Signs of brainstem herniation
- Seizures activity

RN to notify Fellow/Resident if:
- Change in mental status
- Urine output > 3 ml/kg/hr
- Urine output < 1 ml/kg/hr
- Blood glucose < 80 mg/dl or >180 mg/dl
- Arterial saturation <95%
- Suspected seizure activity
- Temperature > 37.5 oC
- Serum Na ≥150 mEq/L
- Serum Na ≤ 140 mEq/L
- Absent EVD drainage x1 hr

RN to notify Fellow/Resident if:
- Change in mental status
- Urine output > 3 ml/kg/hr
- Urine output < 1 ml/kg/hr
- Blood glucose < 80 mg/dl or >180 mg/dl
- Arterial saturation <95%
- Suspected seizure activity
- Temperature > 37.5 oC
- Serum Na ≥150 mEq/L
- Serum Na ≤ 140 mEq/L
- Absent EVD drainage x1 hr
Fluid Replacement guidelines: (UOP exceeds hourly max (6 ml/kg/hr))

Example 1: pt wt 80 kg, IVF = 80 ml/hr, UOP = 600 ml, max (6 ml/kg/hr) = 480 ml

480 ml  (total fluid allowed per hour)
- 80 ml  (hourly IVF rate of 1 L/m²/d)
400 ml  UOP to be replaced for last hour’s UOP (using D5W)

Example 2: pt wt 80 kg, UOP = 600 ml, Pt PO intake last hour = 220, no IVF, max (6 ml/kg/hr) = 480 ml

480 ml  (total fluid allowed per hour)
- 80 ml  (hourly PO input at 1 L/m²/d)
- 140 ml  (hourly PO input in excess of 1 L/m²/d)
260 ml  UOP to be replaced for last hour’s UOP (using D5W)

Example 3: pt wt 80 kg, UOP = 600 ml, IVF = 80 ml/hr, Pt PO intake last hour = 50 ml, max = 480 ml

480 ml  (total fluid allowed per hour)
- 80 ml  (hourly IVF rate of 1 L/m²/d)
- 50 ml  (hourly PO intake above 1 L/m²/d)
350 ml  UOP to be replaced for last hour’s UOP (using D5W)

Fluid Replacement guidelines: (UOP does NOT exceed hourly max)

Example 1: pt wt 80 kg, IVF = 80 ml/hr, UOP = 300 ml, max (6 ml/kg/hr) = 480 ml

300 ml  (total fluid allowed per hour)
- 80 ml  (hourly IVF rate of 1 L/m²/d)
220 ml  UOP to be replaced for last hour’s UOP (using D5W)

Example 2: pt wt 80 kg, UOP = 400 ml, Pt PO intake last hour = 220, no IVF, max (6 ml/kg/hr) = 480 ml

400 ml  (total fluid allowed per hour)
- 80 ml  (hourly PO input at 1 L/m²/d)
- 140 ml  (hourly PO input in excess of 1 L/m²/d)
180 ml  UOP to be replaced for last hour’s UOP (using D5W)

Example 3: pt wt 80 kg, UOP = 300 ml, IVF = 80 ml/hr, Pt PO intake last hour = 50 ml

300 ml  (total fluid allowed per hour)
- 80 ml  (hourly IVF rate of 1 L/m²/d)
- 50 ml  (hourly PO intake above 1 L/m²/d)
170 ml  UOP to be replaced for last hour’s UOP (using D5W)

Diagnostic Definitions

Diabetes Insipidus (all must be present)
- polyuria (UOP > 3 ml/kg/hr)
- serum Na > 145 mEq/L
- increased plasma osmolarity (> 300 mOsm/kg) and decreased urine osmolality (< 300 mOsm/kg)

Syndrome of Inappropriate Antidiuretic Hormone Secretion (SIADH)
- decreased plasma osmolality (< 275 mOsm/kg)
- inappropriate urinary concentration (urine osmolality > 100 mOsm/kg with normal renal function)
- urine Na loss (> 40 mEq/L) with normal salt and water intake
- clinical euvoëmia

Cerebral Salt Wasting
- Hyponatremia
- Hypovolemia
- Natriuresis (urine Na > 40 mEq/L) and diuresis
Criteria for transition off gtt
- Patient's Neuro status is adequate for patient to maintain appropriate fluid intake
  Or
- Pt's UOP and Na appear within goal range
  Or
- Pt is able to tolerate PO or SQ DDAVP (if indicated)

Post-op Diabetes Insipidus Flowsheet

Recommendations for transitioning from vasopressin infusion to intermittent Desmopressin (DDAVP)

Step 1- Transitioning—Preplanning
Order Desmopressin to bedside
Dosage:
- >12 yrs—start 0.05 mg, max 1.2 mg/day
- 1 yr-12 yrs—start 0.05 mg, max 0.8 mg/day
- <1 yr—obtain Endocrine consult prior to transitioning

Free, unrestricted access to water
D/C IV fluids

Anticipate inadequate thirst mechanism (must know daily fluid requirements and monitor q6-8 hrs for inadequate intake)
Desmopressin to bedside 1 hour prior to anticipated time of administration of 2nd dose

Step 2– Transition
Stop Vasopressin infusion and give oral Desmopressin
- Do not delay administration of Desmopressin after vasopressin has been stopped

Note:
- Oral desmopressin takes ~ 1 hr to see ADH effects
- Effects may be diminished if taken at meal time
- Goal to achieve q 12 hr dosing pattern (8 am/ 8 pm ideally)

Order next dose of Desmopressin to bedside no later than 1 hour prior to anticipated time of administration

Step 3– Titrate dosage to achieve q12 hr dosing

Break through (UOP >3 ml/kg/hr) occurs at 12 hours
- No change in dosing
  Ideally now...
  - Q12 hour dosing (although some patients will require a q8 hr dosing)
  - “normal” dosing interval (ie– NOT 3AM/3PM)
  - Stable serum Na

Break through (UOP >3ml/kg/hr) occurs <12 hours
- Increase dose by 0.05 mcg
  Replace volume lost if patient lacks thirst response
  - Calculate goal fluid requirements
  - Calculate enteral fluid intake
  - Replace excessive losses or inadequate intake in 6– 8hr blocks (max 6 ml/kg/hr)
  Continue to titrate dose by 0.05 mcg until q12 hr dosing is achieved

Break through (UOP >3 ml/kg/hr) occurs >12 hours
- Reduction in size of dose by 1/4 to 1/2 depending on timing of breakthrough