

Emergency Medicine

- ◆ **Alcohol Intoxication:**
Elevated serum osmolality can be an indication of intoxication; the rate of increase is approximately 23 mOsm/kg for each 100 mg/dL ethanol¹.
- ◆ **Drug Intoxication Screening:**
Possible ingestion of substances such as methanol, ethylene glycol, isopropanol, propylene glycol and paraldehyde is indicated by elevated serum osmolality when glucose/BUN/Na⁺ are normal and there is no evidence of alcohol intake².
- ◆ **Burns:**
Osmolality offers a rapid assessment of a burn victim's state of hydration for determining proper fluid therapy.
- ◆ **Head Injury/Shock:**
When normal CNS and renal homeostatic mechanisms are unresponsive, serum and urine osmolality can provide rapid determination of appropriate IV therapy⁴. In use of mannitol for treatment of brain swelling, osmolality guides appropriate usage of drug⁵.
- ◆ **Coma:**
Very high serum osmolality could indicate renal impairment, drug overdose or diabetes mellitus⁶.
- ◆ **Non-Ketonic Diabetic Coma:**
In cases of markedly elevated blood sugar, but with little or no ketosis, osmolality helps to establish the diagnosis⁷.

Internal Medicine/ Endocrinology

- ◆ **Hyper/Hyponatremia:**
Osmolality differentiates between real and factitious hyponatremia. Urine osmolality helps identify pathogenesis of hypo- and hypernatremia⁸.

◆ Inappropriate ADH syndrome:

Serum and urine osmolality help determine whether SIADH is present in a patient with normal blood volume⁹.

◆ ADH Therapy:

Urine osmolality provides a rapid measure of patient response, assisting therapy modification¹⁰.

◆ Diabetes Insipidus:

Urine osmolality can measure the effects of humoral factors and offers rapid determination of the disease's etiology¹¹.

◆ Insulin Therapy:

Osmolality provides rapid assessment of the effectiveness of insulin therapy¹².

◆ Differential Diagnosis of Polyuria:

Osmolality can help to differentiate between diabetes insipidus and psychogenic polyuria¹³.

Urology/Renal Function

◆ Renal Malfunction Differential Diagnosis:

Urine and serum osmolality respond differently to water overload, water deprivation, diuretics, antidiuretic hormone (ADH) and insulin¹⁴.

◆ Uremia:

The difference between measured and calculated osmolalities can determine the accumulation of unmeasured metabolites in the blood. Once baseline electrolyte levels are established, osmolality can be used to monitor the progress of the uremic patient¹⁵.

◆ Osmolal and Free Water Clearance:

Clearance can be calculated immediately from urine and serum osmolality, providing the earliest marker of tubular damage¹⁶.

◆ Renal Dialysis:

In patients with known renal disease, elevated serum osmolality can indicate the need for dialysis. During therapy, dialysate osmolality can be used to monitor progress¹⁷.

Surgery/Critical Care

- ◆ **Hypovolemic Shock Prevention:**
Osmolality can be used to monitor perfusate during coronary bypass or renal surgery to avoid hypo-volemic shock¹⁸.
- ◆ **IV Therapy:**
Osmolality can help monitor and manage IV therapy²⁰.
- ◆ **Liver Transplant:**
Large increases in osmolality can occur due to blood loss or transfusion, changes in plasma sodium levels or the administration of sodium bicarbonate²¹.

Obstetrics/Gynecology

- ◆ **Pre-Eclamptic Patients:**
Osmolality can help assess renal function, fluid balance and electrolyte balance²².

Pharmacy

- ◆ **Quality Control:**
Osmolality is a rapid and accurate QC measurement for pharmaceutical preparations, including infant formulas, electrolyte solutions and other parenterals²³.
- ◆ **Electrolyte/Metabolite Imbalance:**
Osmolality offers rapid detection of post-surgery electrolyte/metabolite imbalance¹⁵. In urologic surgery, the difference between calculated and measured osmolality can be used to estimate absorption of irrigation fluid¹⁹.

General Quality Control

- ◆ **All Laboratories:**
Osmolality is a rapid and accurate QC measurement for aqueous reagents and standards, reconstituted solutions, and media used in IVF, tissue fixation and tissue cultures²⁴.
- ◆ **Blood Bank:**
Osmolality is measured to ensure that glycerol has been completely removed from frozen red cells²⁵.

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