

Standard Operating Procedure

Hyperglycemic Hyperosmolar State (HHS)

Special Region (1)

Union of Myanmar

Version: 1.0

Effective Date: __20 March 2026____

Review Date: __20 March 2028 ____

Approved by: Internal Medicine Unit

1. PURPOSE

To provide a rapid, standardized, and safe approach for the diagnosis and management of Hyperglycemic Hyperosmolar State (HHS), ensuring:

- Early recognition of severe hyperglycemia
- Controlled correction of dehydration and hyperosmolarity
- Prevention of complications
- Safe insulin and electrolyte management

2. DEFINITION

HHS is a life-threatening metabolic emergency characterized by:

- Plasma glucose >600 mg/dL
- Serum osmolality >320 mOsm/kg
- Minimal or absent ketosis
- pH >7.30
- Bicarbonate >18 mmol/L

3. PATHOPHYSIOLOGY

- Relative insulin deficiency $\rightarrow$ severe hyperglycemia
- Osmotic diuresis $\rightarrow$ profound dehydration
- Increased osmolality $\rightarrow$ neurological dysfunction
- Minimal ketogenesis

4. RISK FACTORS

- Infection (pneumonia, UTI, sepsis)
- Medications (steroids, thiazides)
- Non-compliance
- Acute illness (stroke, MI)
- Dehydration

5. CLINICAL FEATURES

- Severe dehydration
- Confusion to coma
- Tachycardia, hypotension
- No Kussmaul breathing

6. DIAGNOSIS

Essential:

- Blood glucose
- Electrolytes
- Urea/creatinine
- Urine ketones

Osmolality formula:

$$\text{Osmolality} = 2(\text{Na}) + \text{glucose}/18 + \text{urea}/2.8$$

7. MANAGEMENT

Priority:

1. Fluids first
2. Electrolytes
3. Insulin
4. Treat cause

Initial:

- IV access
- Monitoring
- Labs

Fluids:

- 0.9% saline 1–1.5 L first hour

- Then 250–500 mL/hr

Potassium:

- <3.3: hold insulin
- 3.3–5.5: replace
- >5.5: monitor

Insulin:

- 0.05 units/kg/hr IV
- Start after fluids

When glucose <300:

- Add dextrose

8. MONITORING

- Glucose hourly
- Electrolytes 2–4 hourly
- Urine output
- Mental status

9. COMPLICATIONS

- Cerebral edema
- Hypokalemia
- Fluid overload
- Thrombosis

10. ICU INDICATIONS

- Coma
- Shock
- Severe electrolyte imbalance
- Renal failure

11. TRANSITION

- Conscious, eating
- Stable glucose
- Overlap IV and SC insulin 1–2 hours

12. SPECIAL NOTES

- Treat clinically if no osmolality available
- Infection common trigger → treat early

13. REFERENCES

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