PATIENT IDENTIFICATION

Fairview Health Services
Hyperosmolar Hyperglycemic Non-Ketotic Syndrome (HHNS) Orders; Adult (>45kg)

Usual Diagnostic Criteria:

- **Serum glucose > 600 mg/dL**
- **Arterial pH > 7.3**
- **Serum bicarbonate > 15 mEq/L**
- **Minimal ketonuria or ketonemia**

A. PATIENT CARE

- ☑ Admit as Inpatient to PCU_____
- ☑ Vital Signs Q 30 mins until stable, then Q1H
- ☑ Neuro Checks Q1H x ____ hrs, then Q4H
- ☑ Intake and Output Q1H x 4, then Q4H x 2, then Q Shift
  Notify MD: If urine output < 50 mL/hr
- ☑ ECG Continuous Monitoring ***IF ICU***
- ☑ Telemetry ***IF non-ICU***
- ☐ Foley Catheter to straight gravity drainage
- ☐ Nasogastric tube to low intermittent suction

Blood Glucose Monitoring Frequency

- ☑ Glucose Monitoring Q1H until stable for 4 hrs within 250-300 mg/dL range, then Q2H

B. RESPIRATORY THERAPY

- ☑ Oxygen by nasal cannula or face mask to maintain O_2 Sats > 90%

C. NUTRITION SERVICES

- ☐ NPO
- ☐ NPO x 4 hrs, then ice chips PRN
- ☐ Clear Liquids
- ☐ Low Consistent Carbohydrate Diet *(1200-1500 calories / 3-5 CHO units per meal)*
- ☐ Moderate Consistent Carbohydrate Diet *(1600-1900 calories / 4-6 CHO units per meal)*
- ☐ High Consistent Carbohydrate Diet *(2000-2400 calories / 4-7 CHO units per meal)*
- ☐ Very High Consistent Carbohydrate Diet *(2500-3000 calories / 6-9 CHO units per meal)*
- ☐ Other _____

D. LABORATORY TESTS

Initial-STAT

- ☑ Basic Metabolic Battery *(sodium, potassium, chloride, CO2, glucose, BUN, creatinine, calcium, anion gap)*
- ☑ Hemogram Differential Platelet Count
- ☑ Blood Gas Arterial with Oxyhemoglobin
- ☑ Serum Ketone *(In FCIS: Ketone @ non-UMMC sites; Ketone Whole Blood Quantitative @ UMMC)*
- ☑ Serum Osmolality
- ☑ Phosphorus Level
- ☑ Magnesium Level
- ☑ Hepatic Panel *(albumin, alk phosphatase, ALT(SGPT), AST(SGOT), bilirubin, total protein)*
- ☑ Blood Culture
- ☑ Urine Analysis *(In FCIS: Urinalysis Routine @ FSH; UA with Microscopic @ FRH / UMMC)*
- ☐ Urine Culture
- ☐ Lactic Acid
- ☐ Amylase Level
- ☐ Troponin I

THIS ORDER SET AVAILABLE IN FCIS

D. LABORATORY TESTS (continued)

Follow-up labs Q _____hrs *(recommend Q 2-4 hrs)*

- ☐ Basic Metabolic Panel
- ☐ Serum Osmolality
- ☐ Phosphorus Level
- ☐ Other _____
- ☐ Other _____

Routine AM labs

- ☐ Hemoglobin A1C ***(If none available within past 3 months)***
- ☐ Phosphorus Level
- ☐ Other _____
- ☐ Other _____
- ☐ Other _____

E. DIAGNOSTIC IMAGING

- ☐ Chest AP Port – Xray *Reason for exam:* _____
- ☐ Chest PA/Lat – Xray *Reason for exam:* _____

F. PROCEDURES

- ☑ EKG 12 Lead ___STAT ___ Routine *Reason for exam:* _____

G. CONSULTS

- ☐ Endocrinology Consult – **UMMC, FSH Only** *Reason for consult:* _____
- ☐ Diabetes Consult: Clinical Nurse Specialist Consult – **UMMC Only** *Reason for consult:* _____
- ☐ Diabetes Education Consult : Basic Survival Skills *Reason for consult:* _____
- ☐ Diabetes Education Consult: Outpatient *Reason for consult:* _____
- ☐ Nutrition Services Consult *Reason for consult:* _____
- ☐ Other _____

H. PHARMACY

IV FLUID THERAPY - STEP ONE (Bolus)

- ☑ **IV Fluid Bolus - Sodium Chloride 0.9%.** Infuse 1000 mL over 1 hour
  For initial fluid replacement related to HHNS.

H. PHARMACY (continued)

IV FLUID THERAPY - STEP TWO (Maintenance)

Note: After completing Step One, determine hydration status and select one of the following.

For Hypovolemic Shock

☐ Sodium Chloride 0.9% - IV soln @ 1000 mL/hr

For Mild Hypotension *Corrected Sodium = Sodium plus (glucose – 100) x 0.016 = _____ mEq/L

Serum sodium corrected HIGH or NORMAL

☐ Sodium Chloride **0.45%** - IV soln @ _____ mL/hr
If initial potassium ≥ 5.3 mmol/L

☐ Sodium chloride **0.45%** + **20** mEq KCL/L - IV soln @ _____ mL/hr
If initial potassium 4 – 5.2 mmol/L to maintain at 4 – 5 mmol/L

☐ Sodium chloride **0.45%** + **30** mEq KCL/L - IV soln @ _____ mL/hr
If initial potassium 3.3 – 3.9 mmol/L to maintain at 4 – 5 mmol/L

☐ Sodium Chloride **0.45%** - IV soln @ _____ mL/hr
If initial potassium < 3.3 mmol/L (and see electrolyte replacement orders below)

Serum sodium corrected LOW

☐ Sodium Chloride **0.9%** - IV soln @ _____ mL/hr
For initial potassium ≥ 5.3 mmol/L.

☐ Sodium Chloride **0.9%** + **20** mEq KCL/L - IV soln @ _____ mL/hr
For initial potassium 4 – 5.2 mmol/L to maintain at 4 – 5 mmol/L.

☐ Sodium Chloride **0.9%** + **30** mEq KCL/L - IV soln @ _____ mL/hr
For initial potassium 3.3 – 3.9 mmol/L to maintain at 4 – 5 mmol/L.

☐ Sodium Chloride **0.9%** - IV soln @ _____ mL/hr
For initial potassium < 3.3 mmol/L (and see electrolyte replacement orders below)

When Serum Glucose reaches 250 mg/dL change to:

☑ D5W Sodium Chloride 0.45% - IV soln + _____ mEq KCL/L @ _____ mL/hr
Note: Order potassium at previously ordered concentration

ELECTROLYTE REPLACEMENT

Note: Establish adequate renal function (urine output approximately 50 mL/hr).

POTASSIUM CHLORIDE

For initial potassium ≥ 5.3 mmol/L – *Select appropriate IV fluid above. Recheck serum potassium Q 2 hrs.*
For initial potassium 4 - 5.2 mmol/L – *Select appropriate IV fluid above.*
For initial potassium 3.3 – 3.9 mmol/L – *Select appropriate IV fluid above.*

For initial potassium < 3.3 mmol/L, HOLD INSULIN and give:

☐ Potassium Chloride 20 mEq IV Q1H PRN for K+ < 3.3 mmol/L *(In 100 mL of Sodium Chloride 0.9%)*
☐ May use Lidocaine 1% (PF) inj 10 mg IV for each 20 mEq KCL Q1H PRN for pain during peripheral infusion.

PHOSPHATE

For phosphorus < 1.0 mg/dL

☐ Sodium Phosphate 25 mmol IV in 500 mL Sodium Chloride 0.9% Q6H PRN. Infuse over 6 hrs. Stop after: 48 hrs
☐ Potassium Phosphate 25 mmol IV in 500 mL Sodium Chloride 0.9% Q6H PRN. Infuse over 6 hrs. Stop after: 48 hrs

H. PHARMACY (continued)

CONTINUOUS IV INSULIN INFUSION

NOTE: DO NOT start insulin infusion until Serum Potassium level is ≥ 3.3 mEq/L.
Rate of blood glucose fall should be 50-70 mg/dL/hr.
Insulin Infusions will be provided as 1 Unit of Regular Insulin/1 mL Sodium Chloride 0.9%.

Step One

☐ Insulin Regular Human _____ units *(0.1 units/kg; MAX dose: 10 units)* IV bolus. One Time Only.

Step Two

☐ Insulin Regular Human (1 unit/mL) Drip **Initiate drip with Algorithm 1**

Move to HIGHER number algorithm:
If BG >300 mg/dL AND BG has not fallen by at least 60 mg/dL within the previous hour.
Notify MD if already at Algorithm 4.

Move to LOWER number algorithm:
If BG <250 mg/dL x 2 consecutive readings. Notify MD if already at Algorithm 1.

Algorithm 1		Algorithm 2		Algorithm 3		Algorithm 4	
BG	Units/hr	BG	Units/hr	BG	Units/hr	BG	Units/hr
< 60 = Hypoglycemia (Follow hypoglycemia orders)							
< 70	Off	< 70	Off	< 70	Off	< 70	Off
70-109	Off	70-109	Off	70-109	Off	70-109	Off
110-119	Off	110-119	Off	110-119	Off	110-119	Off
120-149	Off	120-149	Off	120-149	Off	120-149	Off
150-179	Off	150-179	Off	150-179	Off	150-179	Off
180-209	2	180-209	3	180-209	5	180-209	9
210-239	2	210-239	4	210-239	6	210-239	12
240-269	3	240-269	5	240-269	8	240-269	16
270-299	3	270-299	6	270-299	10	270-299	20
300-329	4	300-329	7	300-329	12	300-329	24
330-359	4	330-359	8	330-359	14	> 330	28
> 360	6	> 360	12	> 360	16		

TRANSITION FROM IV INSULIN INFUSION TO SQ INSULIN

NOTE: When HHNS has resolved and patient is tolerating PO intake, transition to SQ insulin.
See FV SQ Insulin Management Orders, #510111, for transition orders.

HYPOGLYCEMIA MANAGEMENT

☑ FV Hypoglycemia Orders, Adult (>45 kg), #510177

MD/PROVIDER SIGNATURE:_____ **DATE:**_____ **TIME:**_____

MD/PROVIDER NAME (print):_____ **PAGER #:**_____