New IV Insulin Power Plans Incorporating EndoTool IV

Sharp Healthcare

Diabetes Service Line

4/14/2021

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EndoTool IV will replace the current paper based insulin infusion orders and is incorporated into new Power Plans (PP)

- EndoTool IV is a clinical decision support system designed to provide insulin dosing recommendations to control of hyperglycemia
- EndoTool is only available by initiating the appropriate Power Plan (PP)
- EndoTool IV calculates a patient specific dosing model using:
  - Diabetes Dx (Type 2, Type 1, Gestational, or Unknown)
  - Age
  - Weight
  - Steroids (Yes/No)
  - Renal Function
  - HbA1c (%)
  - Patient's serial response to insulin
- EndoTool IV will be operated by the RN

Where are PPs with EndoTool IV available?

Search with "Starts with" : "Insulin" OR Search with "Contains" : "Insulin or EndoTool"

- **SMH**- SICU, MICU, ED
  - Insulin Infusion ED ICU Continuous
  - Diabetes Crisis ED ICU PPs
- **SMBHWN**- PACU, LDR, PSCU
  - Insulin Infusion Continuous
- **SGH:** SICU, MICU, PCU*, ED, Women's Health
  - Insulin Infusion Continuous – ED ICU and ED PCU versions
  - Diabetes Crisis PPs – ED ICU and ED PCU versions
- **SCVMC**: ICU, PCU, ED, Women's Health
  - Insulin Infusion ED ICU Continuous – ICU, PCU, WHS versions
  - Diabetes Crisis ED ICU PPs - ICU and PCU versions
- **SCOR:** ICU, ED
  - Insulin Infusion ED ICU Continuous
  - Diabetes Crisis ED ICU PPs

Go Live:
May 4, 2021

*SGH PCUs = 1S/2S, 4E and 3E

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New Hyperglycemia Continuous Insulin Infusion Power Plan ED and ICU EndoTool

(not for Diabetes Crises – e.g., DKA)

- This is the Power Plan to use for patients with hyperglycemia without DKA/HHS
- Indications are the same as with the current continuous insulin infusion (CII) Power Plan
- This new Power Plan will be added to plans currently containing the CII option
- Type 2 diabetes is the default and this can be used for all patients or can be changed
- All that is required with this plan is “initiate” and “sign”
- For patients with known diabetes type 1, the default should be changed to type 1
- Limited options are provided, e.g., nutrition

Why are there 4 New Power Plans for ED ICU Diabetes Crisis?

- Evidence shows that customized treatment of the different types of diabetes crisis optimizes outcomes and prevents complications.
- In the past, we have had only ONE Power Plan:

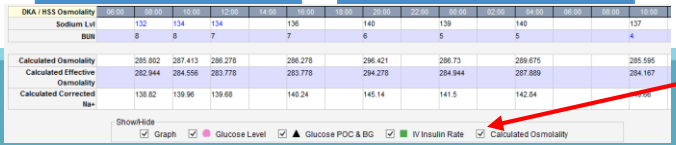
- A single Power Plan could not be structured to address the various types of diabetes crises with a simple initiation process
- The four types of diabetes crises are outlined in the boxes
- An osmolality calculator is now available on the Diabetes MPage

Standard DKA (sDKA)
- Acidosis
  - HCO3 (CO2) ≤18 *mEq/mL*
  - Anion Gap > 12
  - pH < 7.3
  - Ketones
- Blood Glucose (BG) generally > 400 mg/dL
- Osmolality < 320 *mOsm/kg*

HHS
- NO acidosis
  - HCO3 (CO2) ≥ 18 *mEq/L*
  - pH 7.35-7.45
  - Negative ketones
- BG generally > 600 mg/dL
- Osmolality ≥320 *mOsm/kg*

Hyperosmolar DKA (hDKA)
- Acidosis
  - HCO3 (CO2) ≤ 18 *mEq/L*
  - Anion gap >12
  - pH < 7.3
  - Ketones
- BG generally > 600 mg/dL
- Osmolality ≥ 320 *mOsm/kg*

Euglycemic DKA (eDKA)
- Acidosis
  - HCO3 (CO2) ≤ 18 *mEq/L*
  - Anion Gap > 12
  - pH < 7.3
  - Ketones
- BG generally ≤ 300 mg/dL
- Persistent glycosuria with SGLT2i inhibitors
- Osmolality < 320 *mOsm/kg*



Check box on Diabetes M page for calc. osmo

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Orders Common to All the ED ICU Diabetes Crisis Power Plans

Pre checked orders	*Provider must select	Optional orders
Nutrition - NPO	• Type of Diabetes	Fluid bolus (often done in ED)
Laboratory monitoring & general monitoring guidelines	• Two Bag Method with or without KCL	Insulin bolus (often done in ED)
Provider notification	• Total IV fluid rate	Additional labs and diagnostic studies
Electrolyte with phosphorous replacement	• IV insulin rate start up	

***Many orders are pre checked; see next slide for details.**

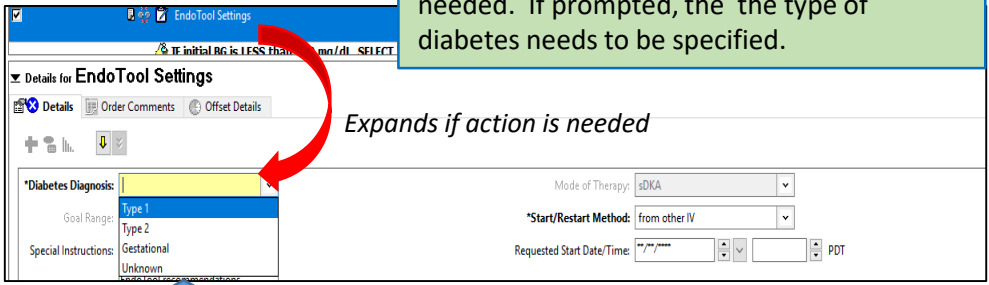
EndoTool is only available by initiating a Power Plan

Keys to Initiate the New ED ICU Diabetes Crisis Power Plans

PP Order to Review	sDKA	HHS	hDKA	eDKA
Type of Diabetes In the EndoTool Setting Order in the Power Plan	ACTION NEEDED **Select Type of Diabetes** *Type 1, Type 2, Gestational, Unknown*			NO ACTION NEEDED **Diabetes Type 2 is preselected.** *Change if Patient has Type 1*
IV fluid Two Bag Method Provides a controlled rate of dextrose administration	ACTION NEEDED 1. Select fluids either WITH or WITHOUT KCL 2. Then select the two bags at the desired total IV rate 150 mL/hour, 200 ml/hour, or 250 ml/hour The Orders for Bag A (without dextrose) and Bag B (with dextrose) are linked so that "checking" (selecting) Bag A at the desired rate, will activate the order for Bag B			
Insulin Drip start rate	ACTION NEEDED Select Insulin drip start rate	NO ACTION NEEDED Insulin drip rate is pre checked at a fixed rate *EndoTool IV will start when the BG < 500 mg/dL*		

• A NEW Order in Each Power Plan: "EndoTool Settings"

The EndoTool (ET) Settings order specifies parameters which the RN uses to start ET; in most PPs all required items in this order are preselected and no action by the provider is needed. If prompted, the the type of diabetes needs to be specified.



Expands if action is needed

ACTION IS NEEDED if not already pre checked or change is desired

Provider must select: Type of Diabetes

(Type 1, Type 2, GDM or Unknown)

Implementing the Two Bag Method in the ED ICU Diabetes Crisis Power Plans

- Option available: two linked bags either WITH or WITHOUT KCL
- The provider must select the Total IV rate, options are: 150 mL/hour, 200 mL/hour, or 250 mL/hour
- For the Two Bag Method, the total IV rate includes the combined rate of Bag A (dextrose free bag) and Bag B (dextrose containing bag)
- (excludes piggybacks and concentrated dextrose such as D10W and D20W)

Selecting "The Two Bags" in the PowerPlans

Select both IV's at the desired total IV rate

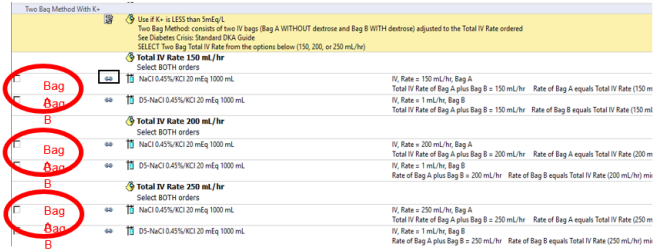
Bag A + Bag B = 150 mL/hr

or

Bag A + Bag B = 200 mL/hr

or

Bag A + Bag B = 250 mL/hr



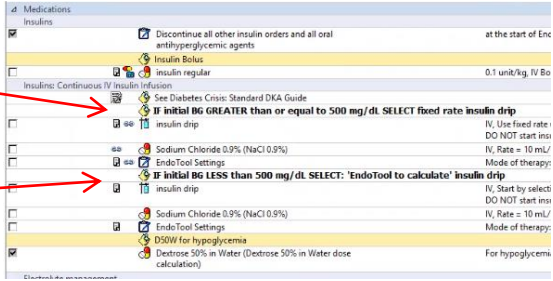
The order for the two bags at each combined rate are linked, so checking Bag A automatically selects Bag B

How to Order Insulin in the ED ICU DM Crisis PPs

Start up Insulin Rate Depends on Initial BG

BG ≥ 500 or < 500 mg/dL

- If initial BG ≥ 500 mg/dL, select fixed rate (up to 0.1 unit/kg/hour; not to exceed 10 units/hour). EndoTool to start when BG less than 500 mg/dL.
- If initial BG < 500mg/dL, select insulin with EndoTool



Exception:

- For Euglycemic DKA, EndoTool is started upon initiation of the power plan, regardless of initial BG
- **Do Not Use** from Other SC as a start Method

After EndoTool is started, insulin rate will be adjusted based on EndoTool recommendations

SGH PCU Plans

Mild DKA PCU EndoTool ED ICU

Insulin Infusion Continuous ED PCU EndoTool

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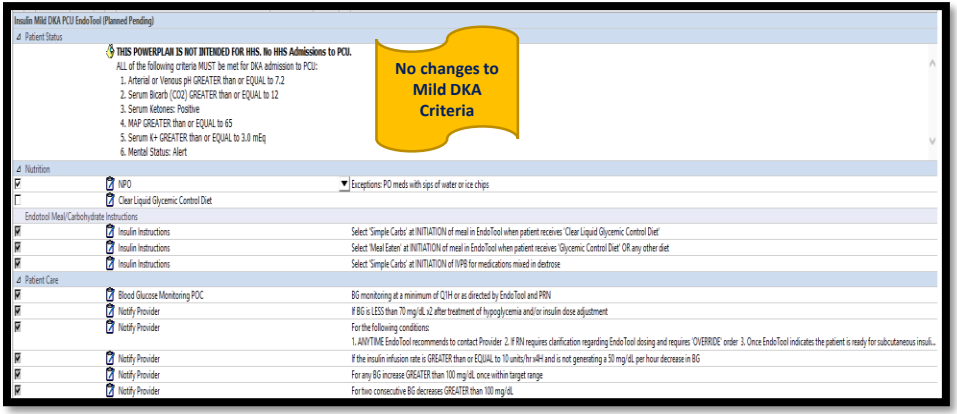
EndoTool

- Providers will furnish:
  - Diabetes diagnosis
  - Mode of therapy
  - Goal Range (pre-determined)
  - Maintenance IVF and rate
  - Steroid use and/or administration
  - Transition orders
    - EndoTool will give a basal insulin recommendation once patient reaches stability
  - Nursing will provide input
    - POC BG results
    - Insulin adjustments

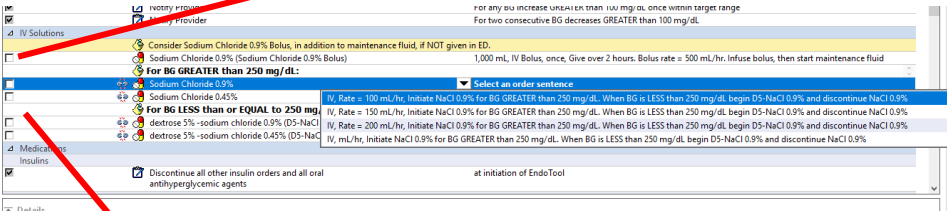
Insulin Infusion Mild DKA ED PCU EndoTool



At SGH PCU Units taking Insulin Infusions are:
1S/2S, 4E and 3E

Insulin Infusion Mild DKA ED PCU EndoTool

NS bolus available

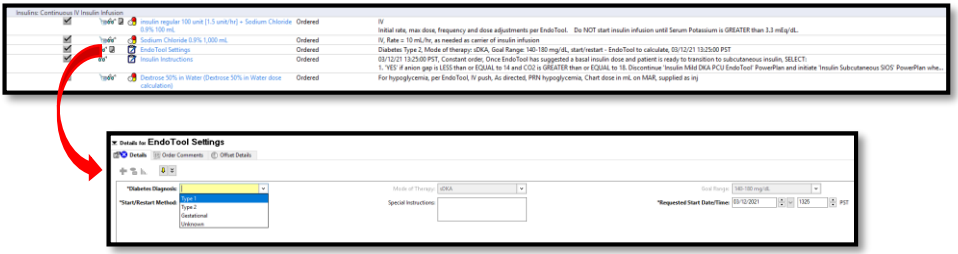


Choose NS or ½ NS and rate

Drop down box offers IVF rate options of 100, 150, 200 or your choice of rate

IVFs are linked so D5NS or D5 ½ NS will be initiated once BG < 250 mg/dL

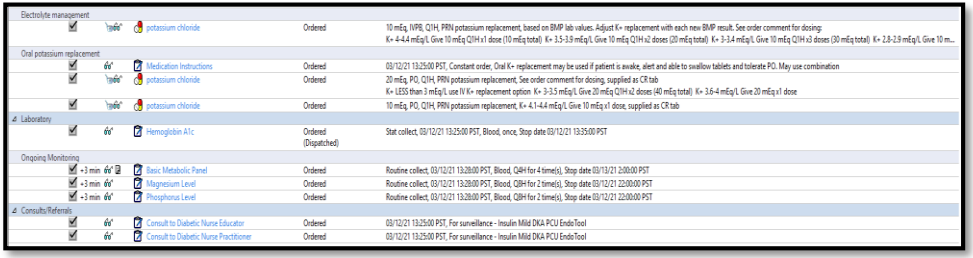
Insulin Infusion Mild DKA ED PCU EndoTool



- Complete Detail: Diabetes Diagnosis
- Start Method: EndoTool to calculate
- Mode of Therapy is DKA
- Initial BG Target Range is 150-200mg/dL
  this adjusts to 140-180mg/dL once acidosis clears

Insulin Infusion Mild DKA PCU EndoTool

Potassium Replacement & Labs Pre-checked



Electrolyte management					
		potassium chloride	Ordered	10 mEq, IVPB, Q1H, PRN potassium replacement, based on BMP lab values. Adjust K+ replacement with each new BMP result. See order comment for dosing: K+ 4-4.4 mEq/L Give 10 mEq Q1H x1 dose (10 mEq total) K+ 3.5-3.9 mEq/L Give 10 mEq Q1H x2 doses (20 mEq total) K+ 3-3.4 mEq/L Give 10 mEq Q1H x3 doses (30 mEq total) K+ 2.8-2.9 mEq/L Give 10 m...
Oral potassium replacement					
		Medication Instructions	Ordered	03/12/21 13:25:00 PST, Constant order, Oral K+ replacement may be used if patient is awake, alert and able to swallow tablets and tolerate PO. May use combination	
		potassium chloride	Ordered	20 mEq, PO, Q1H, PRN potassium replacement, See order comment for dosing, supplied as CR tab K+ LESS than 3 mEq/L use IV K+ replacement option K+ 3-3.5 mEq/L Give 20 mEq Q1H x2 doses (40 mEq total) K+ 3.6-4 mEq/L Give 20 mEq x1 dose	
		potassium chloride	Ordered	10 mEq, PO, Q1H, PRN potassium replacement, K+ 4.1-4.4 mEq/L Give 10 mEq x1 dose, supplied as CR tab	
Laboratory					
		Hemoglobin A1c	Ordered (Dispatched)	Stat collect, 03/12/21 13:25:00 PST, Blood, once, Stop date 03/12/21 13:35:00 PST	
Ongoing Monitoring					
	+3 min	Basic Metabolic Panel	Ordered	Routine collect, 03/12/21 13:28:00 PST, Blood, Q4H for 4 time(s), Stop date 03/13/21 2:00:00 PST	
	+3 min	Magnesium Level	Ordered	Routine collect, 03/12/21 13:28:00 PST, Blood, Q8H for 2 time(s), Stop date 03/12/21 22:00:00 PST	
	+3 min	Phosphorus Level	Ordered	Routine collect, 03/12/21 13:28:00 PST, Blood, Q8H for 2 time(s), Stop date 03/12/21 22:00:00 PST	
Consults/Referrals					
		Consult to Diabetic Nurse Educator	Ordered	03/12/21 13:25:00 PST, For surveillance - Insulin Mild DKA PCU EndoTool	
		Consult to Diabetic Nurse Practitioner	Ordered	03/12/21 13:25:00 PST, For surveillance - Insulin Mild DKA PCU EndoTool	

Mild DKA ED PCU EndoTool Power Plan includes:

- A prompt to Nurse to change IVF to include Dextrose once BG < 250mg/dL
- Adjusts Target range to 140-180mg/dL once anion gap < 14 and CO_2 > 18
- Once BG stable offers basal insulin dose recommendation for transition *(requires provider order)*

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Insulin Infusion Continuous ED PCU EndoTool

for Hyperglycemia, not intended for Mild DKA

- Choose NPO or Diet
- Complete Detail: Diabetes Diagnosis
- Start Method will be EndoTool to Calculate
- BG Goal range pre-set at **140-180mg/dL**

EndoTool will offer Basal insulin dose for transition once BG is stable, *requires provider order*

For any questions, please contact your diabetes team:

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