LIBERTYHEALTH

Jersey City Medical Center
Department of Patient Care Services

Guidelines: CRITICAL CARE INSULIN PROTOCOL (MICU/SICU, CCU, ED)

Developed by: Pharmacy Dept

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Approved by Policy Committee: _____

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Distribution:

Purpose: To maintain a Target blood of glucose (BG) of 140 -180 for all critically ill patients

PROCESS:

Target blood glucose (BG) range for critically ill patients: 140-180 mg/dL

INSULIN INFUSION

1) For non-cardiothoracic patients with existing Accu-Chek order

Check blood glucose as ordered. If BG is greater than 180 mg/dL on two consecutive readings at least 4 hours apart, RN to notify MD and obtain order to initiate intravenous insulin drip protocol.

2) For Cardiothoracic patients

- If BG is greater than 180 mg/dl on one reading, RN to notify MD and obtain order to initiate intravenous insulin drip protocol.
- If patient on insulin infusion upon admission to CCU, recalculate drip rate with first blood glucose reading as per protocol using initial multiplier of “0.02”.

3) For all patients without current Accu-Chek order

If AM serum glucose is greater than 180 mg/dL, take Accu-Chek reading x1. If both readings >180 mg/dL, RN to notify MD and obtain order to initiate intravenous insulin drip protocol.

4) Adult insulin intravenous infusion coverage

Insulin Drip: 100 Units Regular Insulin / 100 ml 0.9% Sodium Chloride
Start insulin infusion as defined above.

a) Initiate insulin drip rate using this formula: (Current BG-60) x **multiplier** = Units / hour

Use "0.02" in the equation as the **NEW** multiplier

b) Monitor BG every 1 hour while infusion is in progress

c) Adjust the infusion rate by using the infusion adjustment equation.

d) "Current multiplier" is the multiplier used within the last hour.

e) The drip rate must be recalculated with every new BG measurement, <u>even if the multiplier does not change</u>.

f) If blood glucose between 120 – 140 mg/dL and current multiplier becomes 0, hold insulin drip and continue to monitor every hour and resume as indicated using 0.02 as the NEW multiplier.

g) If blood glucose is less than 120 mg/dL, hold insulin infusion. For every hour insulin is on hold, decrease current multiplier by 0.01 to obtain new multiplier while holding.

h) For BG less than 100 mg/dL, RN to call MD and initiate hypoglycemia guideline as ordered.

i) For BG greater than 140 for two <u>consecutive readings</u> while holding, restart insulin drip following protocol. If current multiplier becomes 0 while holding, resume infusion by using 0.02 as NEW multiplier.

- For cardiothoracic patients restart insulin drip after <u>one reading</u> >140 while on hold for POD# 1 and POD # 2 and notify MD/PA

j) Prior to insulin drip discontinuation use recommendation for transitioning to subcutaneous insulin therapy

k) To restart insulin drip after discontinuation follow protocol as described above using 0.02 as initial multiplier**.**

- For cardiothoracic patients on Accu-chek supplemental sliding scale: Resume insulin drip for glucose >140 mg/dl for <u>one reading</u> for POD# 1 and POD # 2 and notify MD/PA
- Accu-check and coverage to be completed as ordered on POD #1 and 2

5) Management of hypoglycemia

a) RN to call MD when patient BG measurement is less than 100.

b) RN will initiate hypoglycemia guideline as ordered by physician according to recommendations below:

6) Transitioning from insulin drip to subcutaneous insulin therapy

In patients indicated for insulin transition. RN will obtain order from MD for subcutaneous insulin therapy. MD may choose to transition as per following recommendations:

a) Discontinue insulin infusion 2 hours after the first dose of subcutaneous insulin glargine

b) Discontinue insulin infusion 30min after the first dose of subcutaneous short or rapid-acting insulin or mix 70/30 insulin.
c) Refer to Accu-chek supplemental sliding scale recommendations

ACCU-CHEK INSULIN SLIDING SCALE WITH RAPID-ACTING INSULIN

1) Supplemental sliding scale is not recommended as the only form of insulin coverage for more than 48 hours.
2) Select “low” or “moderate” supplemental coverage based on patient-specific characteristics.
3) Select “high” supplemental coverage for patients with endocrine consult only
4) Perform accu-chek every 4 hours for patients NPO / continuous tube feeds
5) Perform accu-chek before meals and at bedtime for patients that are eating. Physician may select additional 3am accu-chek for reading only.
6) Cardiothoracic patients will follow monitoring parameters as stated in protocol and obtain MD order to reinitiate insulin infusion for single blood glucose reading > 140mg/dL on POD#1 and POD#2.

INSULIN INFUSION

Finger Stick (mg/dL)	Insulin infusion adjustment equation
Less than 100	Call MD - Initiate Hypoglycemia Guideline – refer to reverse side and MAR Hold infusion and monitor BG every 1 hour for 2hours. (Decrease current multiplier by 0.01 for every hour on hold) For BG greater than 140 for 2 hours restart infusion, less than 120 for 2 hours discontinue infusion.
Less than 120	Hold infusion and monitor BG every 1 hour for 2 hours. (Decrease current multiplier by 0.01 for every hour on hold) For BG greater than 140 for 2 hours restart infusion, less than 120 for 2 hours discontinue infusion.
Less than 140	(current BG – 60) x (current multiplier – 0.01)
140 – 180	(current BG – 60) x (current multiplier) (ie. the same multiplier used in the last hour)
Greater than 180	(current BG – 60) x (current multiplier + 0.01)
Greater than 300	Call MD and recommend new rate by: (current BG – 60) x (current multiplier + 0.01)
Initiate subcutaneous / oral coverage when drip is discontinued (RN to obtain physician order) Patients who require transitioning with overlapping insulin, see transition recommendation section*	

HYPOGLYCEMIA MANAGEMENT

Recommended Hypoglycemia guideline		
Blood Glucose, Patient Status	**Treatment**	**Re-Check Blood Glucose**
Glucose 60-69 mg/dl, but patient is NOT symptomatic	No treatment	• In 30 minutes if time until next meal is more than 30 minutes
Glucose 60-69 mg/dl, patient symptomatic but alert	15g of carbohydrates: 4 oz. juice (any type)	• In 15 minutes after treatment dose is given • If no response: can repeat treatment dose, and continue to re-check every 15 minutes
Glucose 45-59 mg/dl, patient is alert	20g of carbohydrates: 6 oz. juice (any type) *If NPO, give 1/2 amp (12.5g) D50 IV*	
Glucose <45 mg/dl, patient is alert	30g of carbohydrates: 8 oz. juice (any type) *If NPO, give 1/2 amp (12.5g) D50 IV*	
Glucose <70 mg/dl, patient is NOT alert	1 amp (25g) D50 IV *If no IV access, consider glucagon* Call covering physician	

ACCU-CHEK SUPPLEMENTAL SLIDING SCALE

Blood Glucose (mg/dL)	☐ LOW BMI<18.5/Elderly /Renal Require <40 Units/day	☐ MODERATE BMI 18.5 – 30 Require 40-80 Units/day	Endocrine Consult Only ☐ HIGH BMI >30 / Infection / Steroids Require >80 Units/day
< 70	**Call MD ☐ Initiate Hypoglycemia Guideline – refer to reverse side & MAR**		
70 – 120	No Insulin	No Insulin	No Insulin
121 – 150	No insulin	1 Units	2 Units
151 – 200	1 Units	2 Units	4 Units
201 – 250	2 Units	4 Units	6 Units
251 – 300	3 Units	6 Units	8 Units
301 – 350	4 Units	8 Units	10 Units
351 – 400	5 Units	10 Units	12 Units
>400	7 Units & Call MD	12 Units & Call MD	14 Units & Call MD
Guidelines Insulin drip	In addition to insulin: Call MD, Chem-10, ketones, re-check in 15 minutes		

INSULIN INFUSION EXAMPLE

Scenario: ICU patients with two consecutive Accu-chek readings of 196 and 204. RN obtained MD order to initiate insulin infusion.
Initial rate = (204 - 60) x 0.02 = 2.9 mL/hr

AACE/ADA Recommended Blood Glucose Goals:
Critically ill: 140 – 180 mg/dL; Non-critically ill: <130 mg/dL preprandial; <180 mg/dL random glucose

Date	Time	Bedside BG	Multiplier		Insulin Coverage	RN Initial	Comment / 1st Dose Reaction
			Current	New	Unit/hr		
10/1/10	0700	204	--	0.02	2.9		See 4-a
10/1/10	0800	232	0.02	0.03	5.2		See 4-b, 4-c, 4-d
10/1/10	0900	230	0.03	0.04	6.8		
10/1/10	1000	198	0.04	0.05	6.9		
10/1/10	1100	180	0.05	0.05	6		See 4-e
10/1/10	1200	168	0.05	0.05	5.4		
10/1/10	1300	132	0.05	0.04	2.9		
10/1/10	1400	125	0.04	0.03	1.9		
10/1/10	1500	115	0.03	0.02	HOLD		Insulin held, see 4-g
10/1/10	1600	100	0.02	0.01	HOLD		
10/1/10	1700	97	0.01	0	HOLD		MD Called, see 4-h
10/1/10	1800	100	0	0	HOLD		
10/1/10	1900	142	0	0	HOLD		Recheck in 1 hr
10/1/10	2000	168	0	0.02	2.2		See 4-i
10/1/10	2100	135	0.02	0.01	0.8		
10/1/10	2200	132	0.01	0	0 = HOLD		See 4-f
10/1/10	2300	148	0	0.02	1.8		See 4-f
10/2/10	0000	162	0.02	0.02	2		
10/2/10	0100	198	0.02	0.03	4.1		
10/2/10	0200	206	0.03	0.04	5.8		
10/2/10	0300	199	0.04	0.05	6.9		
10/2/10	0400	198	0.05	0.06	8.3		
10/2/10	0500	186	0.06	0.07	8.8		
10/2/10	0600	182	0.07	0.08	9.8		
10/2/10	0700	179	0.08	0.08	9.5		
10/2/10	0800	156	0.08	0.08	7.7		
10/2/10	0900	124	0.08	0.07	4.5		
10/2/10	1000	112	0.07	0.06	HOLD		Insulin held
10/2/10	1100	100	0.06	0.05	HOLD		
10/2/10	1200	156	0.05	0.04	HOLD		
10/2/10	1300	198	0.04	0.05	8.3		
10/2/10	1400	145	0.05	0.05	4.3		
10/2/10	1500	115	0.05	0.04	HOLD		
10/2/10	1600	105	0.04	0.03	HOLD		
10/2/10	1700	102	0.03	0.02	HOLD/DC		MD order to DC, see 4-j

For bedside glucose < 40 mg/dL or >400 mg/dL, lab glucose to be drawn within 30 minutes of bedside result

Reference:

ACE Inpatient Diabetes and Metabolic Control Consensus Conference: Intravenous Insulin Infusion Therapy: Indications, Methods, and Transition to Subcutaneous Insulin Therapy. *Endocrine Practice*. April 2004. Vol 10 (2). (Appendix 3)

Wilson M, et al. Intensive insulin therapy in critical care. *Diabetes Care*. April 2007. Volume 30 (4):1005-1001.

Smith AB, et al. Implementation of a nurse-driven intensive insulin infusion protocol in a surgical intensive care unit. *Am J Health-Syst Pharm*. Jul 2007. 64: 1529-40.

Professional Practice	Y____	N/A X____
Cardiac Care	Y 11/10	N/A_____
Emergency Dept	Y____	N/A _X__
Peri-Op	Y____	N/A _X___
Maternal Child Health	Y____	N/A _X__
Behavioral Health	Y____	N/A _X___
Cardiac Cath Lab	Y____	N/A _X___
Interventional Radiology	Y____	N/A _X___
Med Exec	Y_11/10___	N/A _____
Pharmacy/ P&T	Y_11/10___	N/A _____