SERVICE	ATTENDING	RESIDENT	SEE ORCA FOR ALLERGIES

UWMC PRE-OP HOLDING & SURGERY INSULIN INFUSION PROTOCOL

Goal Blood Glucose (BG) Range = 80-150 mg/dL

Algorithm 1 Recommend start here for type 1 diabetes		**Algorithm 2** Recommend start here for type 2 diabetes		**Algorithm 3** Recommend NO patients start here		**Algorithm 4** Recommend NO patients start here	
BG	Units/hr	BG	Units/hr	BG	Units/hr	BG	Units/hr
<60 = Hypoglycemia (See below for treatment)							
<70	Off	<70	Off	<70	Off	<70	Off
70-109	0.2	70-109	0.5	70-109	1	70-109	1.5
110-119	0.5	110-119	1	110-119	2	110-119	3
120-149	1	120-149	1.5	120-149	3	120-149	5
150-179	1.5	150-179	2	150-179	4	150-179	7
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		

General Guidelines:

- **Standard insulin infusion**: 100 units/100 mL 0.9% Sodium chloride via an infusion device
- **Start insulin infusion when**:
  - BG > 150 X 2 readings for patients not previously on insulin
  - BG ≥ 70 for patients with Type 1 diabetes or already on insulin infusion therapy
- **Check blood glucose EVERY hour**
- **Hypoglycemia protocol for BG < 60 mg/dL**
  - **Turn off** infusion AND give 50% dextrose IV
    BG 50-60 mg/dL **25 mL** (1/2 amp)
    BG <50 mg/dL **50 mL** (1 amp)
  - **Recheck blood glucose (BG)** every 20 minutes and repeat **25 mL** of 50% dextrose IV if BG < 60 mg/dL. Restart infusion *at a lower algorithm* once blood glucose is >70 mg/dL X 2 checks

Changing Algorithms according to blood glucose:

- Moving Up: blood glucose (BG) is out of goal range **and** has not decreased by at least 60 mg/dL
- Moving Down: BG < 70 mg/dL **OR** BG decreases >100 mg/dL in an hour **OR** pt has hypoglycemic episode.

TPN/Tube Feeds

- **Decrease insulin infusion rate by 50% if nutritional therapy is discontinued or significantly reduced and check BG every hour.**

PHYSICIAN SIGNATURE	PRINT NAME	PAGER	UPIN/NPI	DATE	TIME

PT.NO

NAME

DOB

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UWMC SURGERY INSULIN INFUSION ORDERS

U2627

UH2627 REV AUG 08

WHITE - MEDICAL RECORD
CANARY - PHARMACY
PINK - NURSING

PHYSICIAN ORDER – **YELLOW**

SERVICE	ATTENDING	RESIDENT	SEE ORCA FOR ALLERGIES

UWMC Insulin Infusion Protocol

Goal BG Range = 80-180 mg/dL **ICU Goal BG Range =_____**

Discontinue All Previous Insulin Orders

Algorithm 1		Algorithm 2		Algorithm 3		Algorithm 4	
BG	Units/hr	BG	Units/hr	BG	Units/hr	BG	Units/hr
<60 = Hypoglycemia (See below for treatment)							
<70	Off	<70	Off	<70	Off	<70	Off
70-109	0.2	70-109	0.5	70-109	1	70-109	1.5
110-119	0.5	110-119	1	110-119	2	110-119	3
120-149	1	120-149	1.5	120-149	3	120-149	5
150-179	1.5	150-179	2	150-179	4	150-179	7
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		

General Guidelines:

- **Standard drip**: 100 units/100 mL 0.9% NaCl via an infusion device
- Start when:
  - BG > 120 for patients who have received oral diabetes medication within 24 hrs
  - BG ≥70 for patients treated with insulin prior to hospital admission
- Discontinue insulin infusion when patient is eating **AND** has received first dose of subcutaneous insulin.
- Hypoglycemia protocol for BG<60 mg/dL (see back for specifics)

Intravenous Fluids:

Recommendations for patients that are not eating:

DM Type 1 (10 grams glucose/hour) **DM Type 2** (5 grams glucose/hr)

☐ D51/2 normal saline with 20 mEq/L Potassium chloride IV at _____mL/hr

☐ D5LR with 20 mEq/L Potassium chloride IV at _____mL/hr

☐ TPN or Enteral Feeds (see separate orders)_____at _____mL/hr

PHYSICIAN SIGNATURE	PRINT NAME	PAGER	UPIN	DATE	TIME

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UWMC INSULIN INFUSION PROTOCOL ORDERS

*U1957

UH1957 REV SEP 06

WHITE - MEDICAL RECORD
CANARY - PHARMACY
PINK - NURSING

PHYSICIAN ORDER – **YELLOW**

Initiating The Infusion

- **Algorithm 1**: Start here for most patients.
- **Algorithm 2**: Start here if s/p CABG, solid organ transplant, receiving glucocorticoids, or patient receiving >80 units/day of insulin as an outpatient.
- **Algorithm 3** NO PATIENTS START HERE.
- **Algorithm 4** NO PATIENTS START HERE

Moving Algorithms: (Move up or down only one algorithm per BG check)

- Moving Up: If BG is out of goal range **and** has not decreased by at least 60 mg/dL
- Moving Down: When blood glucose <70 mg/dL or if BG decreases >100 mg/dL in an hour **OR** if pt has hypoglycemic episode.

Maintain Patient Within Current Algorithm-Once BG is in Goal Range

- Adjust **RATE** within current algorithm until patient is in goal range for 4 hours
- Once patient is within goal range for 4 hours, **there is no need to adjust RATE unless BG falls out of goal range**

Patient Monitoring:

- Check BG every hour until it is within **goal** range for 4 hours. Then check every 2 hours X2, then every 4 hours. Resume hourly checks if BG falls out of goal range.
- Hourly monitoring may be indicated for critically ill patients even if they have stable blood glucose.
- If patient is eating, check BG every hour X 3 after meals.
- **TPN/Tube Feeds**
    - **Decrease insulin infusion rate by 50% if nutritional therapy is discontinued or significantly reduced and check BG every hour X 4 hrs.**

Treatment of Hypoglycemia (BG<60 mg/dL)

Signs and symptoms include, palpitations, diaphoresis, weakness, altered mental status.

- **Turn off** drip AND
- Give D50W IV
    - BG 50-60 mg/dL **25 mL** (1/2 amp)
    - BG <50 mg/dL **50mL** (1 amp)
- Recheck BG every 20 minutes and repeat **25mL** of D50W IV if BG<60mg/dL. Restart drip once blood glucose is >70 mg/dL X2 checks. *Restart infusion at a lower algorithm* (see moving down).

Notify the Physician:

- For any blood glucose change >100 mg/dL in one hour.
- For blood glucose ≥ 360 mg/dL
- For any hypoglycemia which results in loss of consciousness
- For hypoglycemia which has not resolved within **20 min** of administering **50mL** of D50W IV and discontinuing the insulin infusion**.**
- Failure of algorithm 4 (Consider Endocrine consult)

ANESTHESIOLOGY PERIOPERATIVE ORDERS

- ☐ Historical Medical Record at bedside
- ☐ IV: Start upon pre-op arrival
  - ☐ Lactated Ringers at_____mL/hr
  - ☐ 0.9% Sodium chloride at_____mL/hr
- ☐ D5NS at _____mL/hr
- ☐ Meds:_____
- ☐ EKG ☐ CXR ☐ Urine HCG
- ☐ Labs_____
- ☐ Other_____

GLUCOSE CONTROL ORDERS

Check capillary blood glucose (BG) on arrival and every hour—
Check One of the Following:

☐ **Patient uses subcutaneous insulin pump at home**

1. Turn pump off and disconnect tubing when patient arrives
2. Piggyback Insulin Infusion per UWMC Operating Room Insulin Infusion Protocol
3. If IV fluid does NOT contain dextrose - piggyback dextrose 5% to deliver 50-100 mL/hour

☐ **Patient is an inpatient already on the insulin infusion protocol.**

1. Continue insulin infusion at current rate UNLESS TPN/enteral feeds will be interrupted. Reduce rate by 50% for these cases per the insulin infusion protocol
   a) If IV fluid does NOT contain dextrose - piggyback dextrose 5% to deliver 50-100 mL/hour
   b) Continue hourly BG monitoring and titration per protocol

☐ **Patient is not currently receiving an insulin infusion**

1. Check blood glucose hourly and if >150 mg/dL confirm with another point of care test or lab draw within 20 minutes.
2. If confirmed BG>150 (see step 1) OR any single BG>250 mg/dL
   - Initiate UWMC Operating Room Insulin Infusion Protocol with BG monitoring per protocol.
   - If IV fluid does NOT contain dextrose - piggyback dextrose 5% to deliver 50-100 mL/hour

If BG<60 mg/dL:

1. Give 25 mL of 50% dextrose and turn off insulin infusion if on (see OR insulin infusion protocol orders)
2. If IV fluid does NOT contain dextrose - piggyback dextrose 5% to deliver 50-100 mL/hour
3. Recheck BG in 20 minutes.

If blood glucose is still <60 mg/dL, retreat with 50% dextrose and call anesthesiologist.

ANESTHESIOLOGIST SIGNATURE	PRINT NAME	PAGER	NPI	DATE	TIME

PT.NO

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ANESTHESIOLOGY PERIOP ORDERS

UH2397 REV JUL 08

WHITE – MEDICAL RECORD
CANARY – PHARMACY
PINK – NURSING

PHYSICIAN ORDER – **YELLOW**

ALLERGIES

PACU DIABETES ORDERS

☐ **Patient is to be admitted to the hospital or stay overnight on 4 South**

- Continue Surgery insulin infusion protocol with hourly blood glucose monitoring
- Call surgical team for post Op insulin orders

☐ **Patient will be discharged to home from the PACU**

- Discontinue insulin infusion upon arrival to PACU
- Check blood glucose (BG) on arrival and hourly until discharge

If BG<60 mg/dL Give 25 mL of 50% dextrose IV and recheck BG in 20 minutes
If BG>250 mg/dL Call anesthesiologist for additional orders

☐ **Patient receives insulin as a routine medication at home**

- If BG>150 mg/dL administer Lispro (Humalog^{R}) insulin every **3** hours using the algorithm below. (Blood glucose is checked hourly but correction Lispro is given only every 3 hours)

	SubQ Correction Dose of Lispro (Humalog^{R})			
Blood Glucose (mg/dL)	**Patient ≤ 50 kg**	**Patient 51-70 kg**	**Patient 71-90 kg**	**Patient >90 kg**
150-199	1 unit	2 units	3 units	4 units
200-249	2 units	4 units	5 units	6 units
250-299	4 units	6 units	7 units	9 units
300-349	6 units	8 units	10 units	12 units
>349	7 units	9 units	12 units	14 units

- Restart routine prandial subQ insulin once patient is able to resume usual oral diet **and/or**
- Resume basal subQ insulin at next scheduled dose **or**
- Resume subQ insulin pump once patient awake and able to self manage his/her diabetes

(To have RN administer insulin at UWMC, you must complete Sub-Q insulin order form UH1807)

☐ **Non-insulin Treated Patient**

Instruct patient at discharge to restart oral anti-diabetic agents **EXCEPT METFORMIN** once able to resume oral diet (provide patient with "How to Manage Your Diabetes Before and After Surgery" handout)

☐ **For Patients Taking Meformin (check one below)**:

☐ **Procedure unlikely to alter renal function:** (e.g. Cataract or minor orthopedic procedures)

- Restart Metformin once patient is able to resume his/her usual oral diet

☐ **Procedure likely to alter renal function:** (e.g. upper GI procedure, procedure involved significant blood loss and/or IV contrast/aminoglycoside administration):

- Instruct patient to call primary care physician in 2 days before restarting Metformin

DATE	TIME	SERVICE	
PHYSICIAN SIGNATURE	PRINT NAME	PAGER	UPIN/NPI

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PACU DIABETES ORDERS

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