Review Article

Medanta insulin protocols in patients undergoing cardiac surgery

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ABSTRACT

Hyperglycemia is common in patients undergoing cardiac surgery and is associated with poor outcomes. This is a review of the perioperative insulin protocol being used at Medanta, the Medicity, which has a large volume cardiac surgery setup. Preoperatively, patients are usually continued on their preoperative outpatient medications. Intravenous insulin infusion is intiated postoperatively and titrated using a column method with a choice of 7 scales. Insulin dose is calculated as a factor of blood glucose and patient's estimated insulin sensitivity. A comparison of this protocol is presented with other commonly used protocols. Since arterial blood gas analysis is done every 4 hours for first two days after cardiac surgery, automatic data collection from blood gas analyzer to a central database enables collection of glucose data and generating glucometrics. Data auditing has helped in improving performance through protocol modification.

Key words: Cardiac surgery, infusion, insulin, protocol

Introduction

Type-2 diabetes is highly prevalent in India[1] and its management poses challenges especially in hospitalized patients. Patients undergoing coronary artery bypass graft surgery CABG suffer from type 2 diabetes in 30-40%[2] cases and another 50% of those without pre-existing diabetes develop hyperglycemia in the post-operative period.[3]

Glycemic management is an important predictor of outcomes in patients undergoing CABG.[4-14] Presence of diabetes is a risk factor for deep sternal wound infections DSWI[4,5] Although, earlier studies showed an association of diabetes with short-term morbidity and mortality in patients undergoing CABG, with improved hyperglycemia management, the immediate outcome in patients with diabetes is similar to those without diabetes.[6,7] New onset hyperglycemia in CABG patients, however, is still an important predictor of short-term mortality.[8] Also, studies done over a period of 7 to 10 years reveal that diabetes is an important risk factor for long-term morbidity and mortality after CABG.[9-10]

The management of diabetes in hospital and in patients undergoing CABG is challenging and complex. Making a simple protocol based on the assumption that glucose values vary in a linear, predictive manner with a single variable (insulin) affecting glucose in a constant manner will not work because in reality, glucose values vary in chaotic, unpredictable manner with a complex interaction between biological, behavioral and systematic factors outlined later in this article. Medanta, the Medicity is a multi-speciality tertiary care institute started in 2009 with a large cardiac surgery program. About 4,000 CABG are conducted annually. The endocrinology team takes care of the glycemic management of these patients during their hospital stay and later outpatient follow-up as an institutional policy.

Therefore, it was realized that any protocol needs to be designed to best suit our working system.

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Medanta insulin protocols in patients undergoing CABG

The glucose values and insulin prescriptions are written on "glucose charts" in the patient's file [Appendix 1], which are of two types: One for insulin infusion and other for subcutaneous insulin. The front side of glucose chart has

- A table to fill in insulin doses by the doctors [see Appendix 1]
  - In the sub-cutaneous chart, the insulin doses need to be filled date wise before each meal, bedtime or basal and correction doses. This way, it is ensured that only scheduled insulin regimen is used and sliding scale has been eliminated from the hospital by the implementation of these charts.
  - In the insulin infusion charts, date-wise insulin algorithms are written in a column manner.

- Hypoglycemia standing orders
- Target blood glucose values
- Instructions to inform endocrinologist in case glucocorticoids or total parenteral nutrition is started or stopped; or oral intake is discontinued for any reason.

On the reverse side of glucose charts, glucose values are recorded by the nurses (Appendix 1), which being visualized on a single sheet are easy for the endocrinologist to see the trends and take decisions on insulin doses accordingly. For nurses, it is easy to see the insulin orders on the same chart where they enter glucose records. These charts also ensure that the only insulin orders that are followed, are the column method for insulin infusion or a scheduled insulin regimen for subcutaneous regimens. The nursing staff is well-trained and accustomed to these charts. There is a continued nursing education about hyperglycemia management and insulin.

Pre-operative assessment and management

- In all patients with diabetes undergoing CABG, a glycosylated hemoglobin (HbA1c) is estimated
- An endocrine consultation is done in all patients with diabetes or new onset hyperglycemia
- In patients with HbA1c less than 7.5%, previous anti-diabetic medications are continued till the day before surgery
- In patients with HbA1c 7.5 to 8.5%, modification in their medications is done depending on the point of care blood glucose (POC-BG) values after hospitalization. In our experience, often patients achieve better glycemic control in hospital as compared to that at home, most likely due to change in the diet
- In patients with HbA1c >8.5% and if the patient is on oral anti-diabetics (OAD), insulin initiation is considered after stopping sulfonyl urea. However, if the patient had been on metformin or gliptin, these are continued along with insulin. Thiazoledindiones are avoided with insulin. Total daily dose (TDD) of insulin is estimated depending on the previous OAD doses, patient's body mass index (BMI), renal function, age and HbA1c value [Table 1]
- In patients with HbA1c >8.5% and already on insulin, multiple sub-cutaneous insulin (MSI) regimen is started and doses titrated as per POC-BG values. In this case, TDD can be calculated by increasing current TDD by 20 to 40%.

Table 1: Calculation of total daily dose preoperatively

	Normal weight	Overweight	Obese
No OAD	0.3 U/kg	0.4 U/kg	0.5 U/kg
Minimal OAD doses (1 or 2 drugs)	0.4 U/kg	0.5 U/kg	0.6 U/kg
Sub-maximal OAD doses (2 drug)	0.5 U/kg	0.6 U/kg	0.6 to 0.7 U/kg
Maximal OAD doses (2 or 3 drugs)	0.6 U/kg	0.7 U/kg	0.8 to 1 U/kg

TDD: Total daily dose

Intra-operative management [Appendix 2]

- On the day of surgery, any oral anti-diabetic medication or sub-cutaneous insulin is withheld
- Starting at 6 am, 5% dextrose is administered at 100 ml/hour with regular insulin 4 to 10 units added to 500 ml of the solution, depending on patient's insulin sensitivity and ambient blood glucose
- POC-blood glucose (BG) is monitored every 2 hours. Any BG <80 mg/dl or more than 180 mg/dl, is informed to the endocrinology team and appropriate measures are taken
- In patients with chronic kidney disease or heart failure, the rate of infusion of dextrose solution has to be reduced according to the patient's hydration status.

Ideally, insulin should be administered as a 1:1 solution through an insulin pump with hourly titration. However, since these patients transiting between ward, pre-operative area and operation theater (OT) are more prone to hypoglycemia, insulin added to dextrose solution is preferred during this period [Appendix 2].

Post-operative

On the day of surgery and the next day i.e. post-operative days (POD) 0 and 1, the patient is kept on insulin infusion. We follow the column method of insulin infusion protocol with six columns of different insulin rates [Appendix 3].

In the table, the most left-hand side column shows BG ranges. Each range is about 40 mg/dl, which is narrower than some other protocols, allowing for adjustments with small changes in BG.

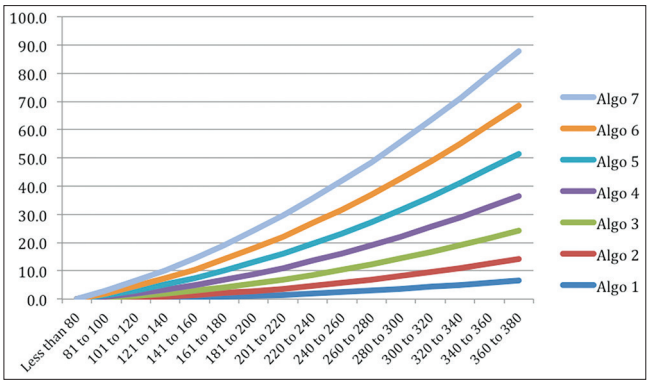

Figure 1: Relationship between mean of BG range and recommended insulin flow rate

The BG ranges start with less than 80 mg/dl and as we go down the column the values increase to a maximum of more than 300 mg/dl. The insulin infusion rates also progressively increase from top to bottom in each of the six columns of insulin rates, with higher rates at higher values and lower rates at lower values. But the relationship between BG and insulin infusion rate is non-linear or quadratic [Figure 1], with disproportionately higher rates at higher BG values to bring down the glucose levels faster. The aim is to bring the glucose values in the optimal range i.e., 110 to 180 mg/dl within 2 hours. At lower BG values, the insulin infusion rates are disproportionately lower to avoid hypoglycemia. The change in insulin plotted against change in BG ($\Delta I/\Delta G$) is different at different levels of glucose [Figure 2].

When we move from left to right, at each BG level, the insulin rates increase. The first column has lowest rates of insulin for highly insulin sensitive patients or patients more prone to hypoglycemia. The last column has the highest rates of insulin for highly insulin-resistant patients or those on steroids or vasopressors. Insulin sensitivity ($\Delta I/\Delta G$) is different for different columns and that at BG level of 160 mg/dl for various columns is shown in the figure [Figure 3].

The infusion is initiated at column 3 and titrated upwards or downwards in 4 hours depending on the glycemic response to the insulin infusion. If the patient is on vasopressors, the requirement is anticipated to be high and infusion is started at the highest rates (Column 6). For patient with kidney dysfunction, lower rates are administered. The doses also take into consideration the patient's medications before admission and HbA1c value.

The target BG in ICU is kept between 110 to 180 mg/dl.

Transition from insulin infusion to sub-cutaneous insulin

Usually by day 2, semisolid diet is initiated and patient is shifted to sub-cutaneous insulin. The patient's insulin TDD is calculated depending on the average of previous 4 hour infusion rates. This is multiplied by 20 to get the TDD. 40% is given as basal and 20% of TDD before each meal as prandial insulin. Correction doses for prandial insulin are also placed in the insulin chart [Appendix 1]. The doses are then titrated depending on glycemic response. In our experience, the insulin requirement increases from day 2 to day 7, probably because of improvement in appetite and this is taken into consideration while titrating insulin doses.

The target fasting BG is 90 to 150 mg/dl. Titration of basal insulin depending on fasting BG:

- If fasting BG is 150 to 200 mg/dl, basal insulin is increased by 20%
- If fasting BG is 200 to 250 mg/dl, basal insulin is increased by 40%
- If fasting BG is 250 to 300 mg/dl, basal insulin is increased by 60%
- If fasting BG is 300+, basal insulin is increased by 80% and metformin is added, provided creatinine and patient's appetite is normal.

Since the appetite improves gradually, typically insulin requirement increases every day by 5-20% from post-operative day 3 to 10 and this is taken into consideration while doing daily insulin dose adjustments. The exception is, in patients with new onset hyperglycemia the insulin requirement usually reduces everyday and they usually do not need insulin 5 to 7 days after surgery.

Discharge planning and patient education

Patients are usually discharged by day 6. A nurse educator counsels all the patients or their primary caretakers on day 4 or 5 about insulin administration, self-monitoring of BG and hypoglycemia.

A nurse educator teaches the attendants or primary caretakers of the patients about insulin administration, self-monitoring of BG, hypoglycemia and correction doses in a room on the same floor where they are admitted. It is ensured that none of the patient is discharged without getting this basic education. They are advised to meet the endocrinologist 3 days after discharge, as they frequently need increase in insulin doses due to increased appetite and change in diet at home.

Outpatient follow-up

The patients are discharged on basal bolus insulin regimen and correction doses are given for initial 3 days. A correction dose of insulin is advised in the discharge summary for these initial 3 days. They are recalled to meet the endocrinologist three days after discharge, when addition of metformin and gliptin is considered if patient

has good appetite. If the patient's TDD is low, insulin can completely be stopped and metformin or metformin and gliptin can be substituted. If insulin is continued, then the patients are counseled at length about insulin dose adjustment.

Second post-discharge visit is on day 7, when most patients can be shifted to OAD. However, since some surgeons still follow the school of thought that insulin helps in cardiac recovery, in their patients, insulin is usually continued for 6 weeks. However, not all patients manage daily self-monitoring blood glucose (SMBG) and insulin appropriately and in them, glycemic control is better with more convenient oral regimens. Hence more and more earlier initiation of OAD after CABG is advocated.

Glucometrics

Glucometrics are used to measure the efficacy of glucose control in the hospital. Since there are over 150 diabetic inpatients at any point of time, a robust data driven management system is employed to monitor and improve the performance of the protocol. Data of inpatient glucose values in non-critical wards is collected through manual entry of POC-BG values into the hospital information system. In critical care, since each patient with diabetes is tested 2 hourly for POC-BG, manual entry is difficult. Every 4th hour, arterial blood gas analysis is done in patients after CABG. Data from the blood gas analyzers is automatically transferred to a central database.

The endocrinology team is automatically alerted in case of hypoglycemic events and significant hyperglycemic exposure. Historical performance is also studied to identify opportunities for improvement and tighter control.

Comparison of commonly used algorithms

There are two broad classes of insulin infusion algorithms[15,16]

- Those that adjust the sensitivity based on the observed deviation over a period of time and calculate the applicable dosage based on the current glucose value (University of Wisconsin, Glucommander)
- Those, which calculate the required change in rate of insulin dosage, based on the glucose value and observed rate of change of glucose values (Portland protocol, Yale protocol).

Although, the algorithm being used at Medanta has organically developed and evolved without much influence of practices in other hospitals, it is similar to the protocols in type A. In comparison with the other types of protocols, this protocol only requires a quick look at the table by the nursing staff. The endocrinologist takes a decision for sensitivity change based on a daily review of the performance (or earlier if required). Thus, the nursing staff is able to understand and implement the protocol with minimal training, whereas the endocrinologist takes decisions on sensitivity changes based on knowledge of the patient's history and other considerations described above. The relationship between BG and insulin infusion rate is quadratic [Figure 1], with disproportionately higher rates at higher BG values to bring down the glucose levels within the desired range i.e. 110 to 180 mg/dl rapidly. At lower BG values, the insulin infusion rates are disproportionately lower to allow BG to increase to reach the desired levels. The change in insulin plotted against change in BG ($\Delta I/\Delta G$) is different at different levels of glucose [Figure 2]. Insulin sensitivity ($\Delta I/\Delta G$) is different for different columns and that at BG level of 150 mg/dl for various columns is shown in the figure [Figure 3].

The University of Wisconsin (UW) protocol also has a set of scales, which are adjusted based on the patient's sensitivity. Figure 4 shows a comparison of the scales used at our center *vs.* those in the UW protocol. Our protocol has finer control of sensitivities in the low to moderate sensitivity zone. However, the UW protocol uses a very aggressive algorithm for patients with high sensitivity, whereas we have found column 7 to be adequate for control in most cases. We have rarely used an infusion rate more than 12 units per hour.

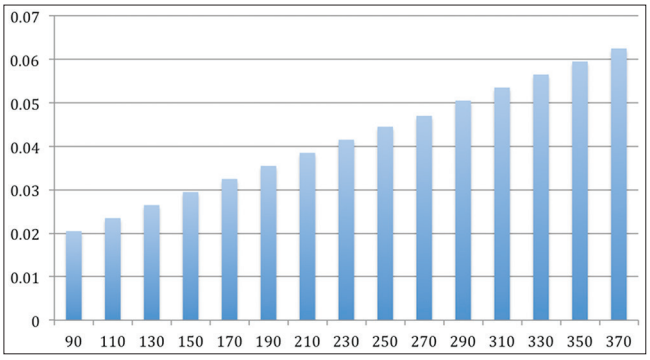

Figure 2: Glucose sensitivity ($\Delta I/\Delta G$) at various BG levels for column 4

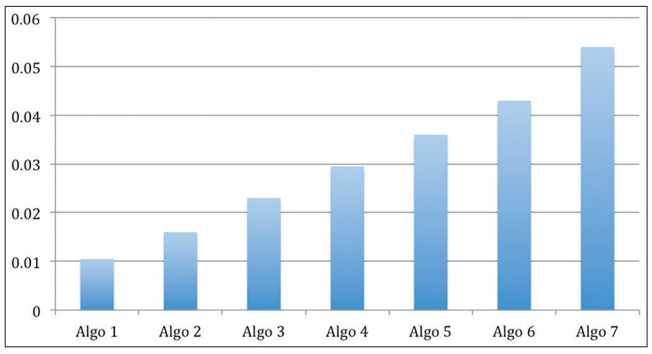

Figure 3: Sensitivity ($\Delta I/\Delta G$) for each of the columns at a glucose level of 150 mg/dl

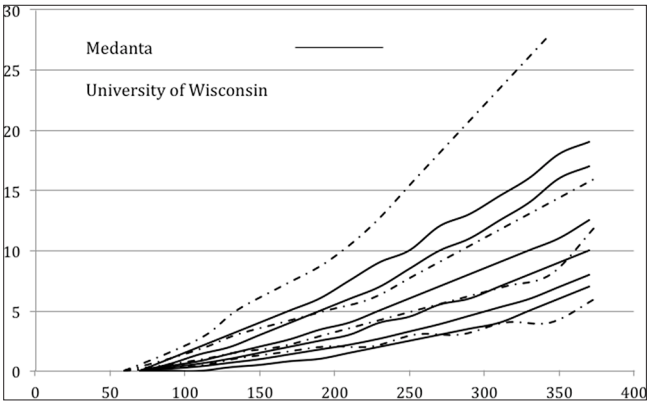

Figure 4: Comparison of the scales used at Medanta versus those in the University of Wisconsin protocol

Further, the choice of the starting scale is fixed in the UW protocol whereas in our hospital it is based on the assessment of the endocrinologist with the criteria described earlier.

Discussion

Medanta, the Medicity is a multi-speciality tertiary care institute with a large cardiac surgery service. To cater to the need of large number of diabetic patients undergoing cardiac surgery, several members of endocrinology team are involved. Hence, to ensure uniform quality of care, the protocols came into shape gradually over the last 4 years ever since the center is running.

Target BG

Despite evidence that hyperglycemia can be associated with poor outcomes, hyperglycemia management is far from optimal in most centers around the world.[17] One of the limiting factors in inpatient hyperglycemia management is hypoglycemia. Lower the targets of BG, higher is the risk of hypoglycemia, which is a distressing event for the patient. There is a real risk of mortality with hypoglycemia and, therefore, insulin is one of the high alert medications and further insulin-related errors should be minimized at all costs. Apart from this, there is a suggestion in studies that hypoglycemia may also indirectly increase mortality and in fact worsen outcomes in critically ill patients. This was one of the reasons that the initial positive results of "tight glucose control" (i.e., BG between 80 to 110 mg/dl) seen in surgical intensive care unit (SICU)[18] were not replicated in subsequent studies. The more recent NICE-SUGAR study[19] and a subsequent metaanalysis[20] confirmed the skepticism felt by practitioners regarding tight glycemic control, by showing that BG values more than 140 mg/dl were associated with less mortality as compared to less than 110 mg/dl. Both American Diabetes Association (ADA) and American Association of Clinical Endocrinologists (AACE) recommend a target BG of 140 to 180 mg/dl in critically ill patients.[21] However, this statement is further qualified that, lower BG can be targeted in select group of patients. We have been able to maintain mean BG within our desired target range most of the times i.e., 110 to 180 mg/dl.

Hyperglycemia management in hospital is challenging also because several patient related and system related factors influence glycemic management in inpatients. In the initial post-operative period, mean BG is more than 180 mg/dl and the reason is that insulin infusion protocols are initiated after the patient is shifted to ICU. The peri-operative period patients transit between wards and also between caregivers with a higher risk of hypoglycemia. Ultimately, the translation of this knowledge into practice is dependent on system/organizational factors[22] like institutional policies; interdisciplinary coordination among primary team, diabetes specialist, nurses, dieticians; knowledge, behavior and beliefs of doctors and nursing staff towards glycemic management; coordination between meal timings and insulin; and protocol based hyperglycemia management. The introduction of the glucose charts was one such systemic factors, which improved glycemic control at our institution through various ways as described above and also it helped in virtually eliminating the sliding scale insulin method. Interface between blood gas analyzer and central database is another factor improving quality of care through provision of glucometrics.

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Appendix 1

Glucose Monitoring Chart for Patients on Subcutaneous Insulin

"Sliding scale" insulin is an ineffective mode of therapy. It should not be used with our patients.

Hypoglycemia (blood glucose less than 80mg/dl):

- For patient who can take orally, give 15 grams (3 teaspoons) of glucose or sugar.
- If patient cannot take orally, give 50ml 25%dextrose IV push.
- Check fingerstick glucose every 15 minutes and repeat above treatment until BG is >100 mg/dl.
- Do not arbitrarily "hold" insulin without calling. Please call if dose change needed.
- Give Novorapid, Humalog, or Apidra insulin immediately before eating.
- Give Regular insulin (e.g.Actrapid or Huminsulin-R) 30 minutes before eating.
- Basal insulin (NPH, Lantus or levemir) is given irrespective of mealtime.

Please call the endocrinologist in case of

- changes in patient's diet
- patient NPO
- TPN started or stopped
- Steroids started or stopped

Timing:

Scheduled insulin doses *(to be filled by doctor)*

Time	**Date →**					
	Insulin					
Before breakfast						
Before lunch						
Before dinner						
Bedtime						
Doctor's Signature:						

Correction doses for mealtime insulin:

Blood glucose (mg/dl)	**Change in dose**
<65	
66 to 80	
81 to 100	
101 to 180	
181 to 220	
221 to 250	
251 to 300	

Blood glucose monitoring
Before meals and 2 hours after dinner

Target blood Glucose:

Blood Glucose Chart *(to be filled by nurse)*

Date	Time	Blood glucose	Insulin name	Insulin dose(units)	Nurse's Signature	Remarks
	Before Breakfast					
	Before Lunch					
	Before Dinner					
	Bedtime					
	Before Breakfast					
	Before Lunch					
	Before Dinner					
	Bedtime					
	Before Breakfast					
	Before Lunch					
	Before Dinner					
	Bedtime					
	Before Breakfast					
	Before Lunch					
	Before Dinner					
	Bedtime					
	Before Breakfast					
	Before Lunch					
	Before Dinner					
	Bedtime					

Glucose Monitoring Chart for Patients on Insulin Infusion

Hypoglycemia

- Blood glucose 60 to 80 mg/dl, give 50ml 25% dextrose IV push.
- Blood glucose less than 60 mg/dl, give 100ml 25% dextrose IV push.
- Check fingerstick glucose q15 minutes and repeat above treatment until BG is >100 mg/dl.
- Do not arbitrarily "hold" insulin without calling. Please call if dose change needed.

Please call the endocrinologist in case

- Patient started on soft diet
- TPN started or stopped
- Steroids started or stopped

To prepare insulin infusion
Add 40 units (1ml) of 40U Regular Insulin to 39 ml 0.9% normal saline.
Insulin infusion Advice

- Monitor blood glucose 2 hourly
- **Target blood glucose:**
- Adjust the rate of infusion as per the following scale
  (to be filled by doctor)

Date→							
Blood glucose (mg/dl)	**Rate** (ml/hour)	**Rate** (ml/hour)	**Rate** (ml/hour)	**Rate** (ml/hour)	**Rate** (ml/hour)	**Rate** (ml/hour)	**Rate** (ml/hour)
Less than 80							
81 to 100							
101 to 120							
121 to 140							
141 to 160							
161 to 180							
181 to 200							
201 to 220							
221 to 250							
251 to 300							
>300							
Doctor's Signature:							

Blood glucose monitoring chart *(to be filled by nurse)*

Date	Time	Blood glucose (mg/dl)	Insulin Infusion rate	Nurse's Signature	Remarks

Appendix 2

PERI–OP AND PERI-PROCEDURE ORDERS

For Type 2 diabetes patients undergoing surgery under GA (e.g. CABG)

- HbA1c…….
- Creatinine…….
- **Antidiabetic medications till the day before surgery-**
- Procedures should preferably be scheduled for the early morning if possible.
- BGs should be checked every 2 hours before, during, and after procedure.
- Give 5%dextrose or DNS @100ml/ hour 6 am onwards. *(if NPO >4 hrs)*
- Add regular insulin to 5% D/ DNS as per the blood glucose level at 6am *(if NPO >4 hrs)*

Blood glucose (mg/dl)	Regular insulin (to be added to 500ml of 5% D/ DNS)
<80	
81 to 150	
151 to 200	

Inform if blood glucose less than 80 or more than 200 mg/dl.

- Shift to insulin infusion **postoperatively till the patient is NPO**-start column 3.
- If the patient is on vasopressors, start column 6.
- **Shift to subcutaneous insulin once oral soft diet starts** as per the following chart

Time	Insulin	Dose
Before breakfast		
Before lunch		
Before dinner		
Bedtime		

Patient Label

Medanta Insulin Infusion Protocol for CABG patients

Patient ID: **Target glucose range: ___ to ___** *(110-180 mg/dl if not specified)*

Instructions:

- Dosage of insulin is to be given only as per one of the columns on next page
- Change of dosage column must be noted in the sheet below.

Monitoring blood glucose

- When BG is within target range – check BG every two hours
- 'When BG is outside target range – check BG at least once an hour

Changing insulin dosage

- If three consecutive readings, more than 200 mg/dl - Increase column by 1
- If two consecutive readings, less than 100 mg/dl - Reduce the column by 1

In case of hypoglycemia

- Blood glucose 60 to 80 mg/dl, give 50ml 25% dextrose IV push.
- Blood glucose less than 60 mg/dl, give 100ml 25% dextrose IV push.
- Check fingerstick glucose 15 minutes and repeat above treatment until BG is >100 mg/dl.
- Do not arbitrarily "hold" insulin without calling. Please call if dose change needed.

Please call the endocrinologist in case

- Patient started on soft diet
- TPN started or stopped
- Steroids started or stopped

To prepare insulin infusion

Add 40 units (1ml) of 40U Regular Insulin to 39 ml 0.9% normal saline.

Date	Time	Dosage column	Reason	Nurse sign	TL/ doctor sign

Med/Oct 13/Endocr 4609

Patient Label

Patients **not** on vasopressors start here

Patients on vasopressors start here

COLUMN 1		COLUMN 2		COLUMN 3		COLUMN 4		COLUMN 5		COLUMN 6		COLUMN 7	
Blood glucose (mg/dl)	Rate (ml/hr)	Blood glucose (mg/dl)	Rate (ml/hr)	Blood glucose (mg/dl)	Rate (ml/hr)	Blood glucose (mg/dl)	Rate (ml/hr)	Blood glucose (mg/dl)	Rate (ml/hr)	Blood glucose (mg/dl)	Rate (ml/hr)	Blood glucose (mg/dl)	Rate (ml/hr)
Less than 80	**0**	*Less than 80*	**0**	*Less than 80*	**0**	*Less than 80*	**0**	*Less than 80*	**0**	*Less than 80*	**0**	*Less than 80*	**0**
81 to 100	**0.0**	*81 to 100*	**0.2**	*81 to 100*	**0.3**	*81 to 100*	**0.4**	*81 to 100*	**0.5**	*81 to 100*	**0.8**	*81 to 100*	**1.0**
101 to 120	**0.0**	*101 to 120*	**0.4**	*101 to 120*	**0.6**	*101 to 120*	**0.8**	*101 to 120*	**1.0**	*101 to 120*	**1.8**	*101 to 120*	**2.0**
121 to 140	**0.3**	*121 to 140*	**0.7**	*121 to 140*	**1.0**	*121 to 140*	**1.4**	*121 to 140*	**2.0**	*121 to 140*	**2.5**	*121 to 140*	**3.0**
141 to 160	**0.5**	*141 to 160*	**1**	*141 to 160*	**1.5**	*141 to 160*	**2.0**	*141 to 160*	**2.5**	*141 to 160*	**3.0**	*141 to 160*	**4.0**
161 to 180	**0.8**	*161 to 180*	**1.4**	*161 to 180*	**2.0**	*161 to 180*	**2.6**	*161 to 180*	**3**	*161 to 180*	**4.0**	*161 to 180*	**5.0**
181 to 200	**1.0**	*181 to 200*	**1.8**	*181 to 200*	**2.5**	*181 to 200*	**3.4**	*181 to 200*	**4**	*181 to 200*	**5.0**	*181 to 200*	**6.0**
201 to 220	**1.5**	*201 to 220*	**2.2**	*201 to 220*	**3.0**	*201 to 220*	**4.0**	*201 to 220*	**5**	*201 to 220*	**6.0**	*201 to 220*	**7.5**
220 to 240	**2.0**	*220 to 240*	**2.7**	*220 to 240*	**4.0**	*220 to 240*	**5.0**	*220 to 240*	**6**	*220 to 240*	**7.0**	*220 to 240*	**9.0**
240 to 260	**2.5**	*240 to 260*	**3.3**	*240 to 260*	**4.5**	*240 to 260*	**6.0**	*240 to 260*	**7**	*240 to 260*	**8.5**	*240 to 260*	**10.0**
260 to 280	**3.0**	*260 to 280*	**3.9**	*260 to 280*	**5.5**	*260 to 280*	**7.0**	*260 to 280*	**8**	*260 to 280*	**10.0**	*260 to 280*	**12.0**
280 to 300	**3.5**	*280 to 300*	**4.6**	*280 to 300*	**6.0**	*280 to 300*	**8.0**	*280 to 300*	**9**	*280 to 300*	**11.0**	*280 to 300*	**13.0**
300 to 320	**4.0**	*300 to 320*	**5.3**	*300 to 320*	**7.0**	*300 to 320*	**9.0**	*300 to 320*	**10.5**	*300 to 320*	**12.5**	*300 to 320*	**14.5**
320 to 340	**5.0**	*320 to 340*	**6.0**	*320 to 340*	**8.0**	*320 to 340*	**10.0**	*320 to 340*	**12**	*320 to 340*	**14**	*320 to 340*	**16**
340 to 360	**6.0**	*340 to 360*	**7.0**	*340 to 360*	**9.0**	*340 to 360*	**11.0**	*340 to 360*	**14**	*340 to 360*	**16.0**	*340 to 360*	**18.0**
360 to 380	**7.0**	*360 to 380*	**8.0**	*360 to 380*	**10.0**	*360 to 380*	**12.5**	*360 to 380*	**16**	*360 to 380*	**17.0**	*360 to 380*	**19.0**

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