Peri-operative Glucose Control Guidelines

SW Anesthesia
Revised May 2024

Drug Class	Generic Name	Trade Name	Admin Route
Rapid-acting insulins	insulin aspart	NovoLog	Parenteral
	insulin glulisine	Apidra	Parenteral
	insulin lispro	Humalog	Parenteral
Short-acting insulins	regular insulin	Humulin-R, Novolin-R	Parenteral
Intermed-acting insulins	insulin isophane	Humulin-N, Novolin-N	Parenteral
Long-acting insulins	insulin detemir	Levemir	Parenteral
	insulin glargine	Lantus, Toujeo	Parenteral
	insulin degludec	Tresiba	Parenteral
Biguanides	metformin	Glucophage	Oral
DPP-4 inhibitors	alogliptin	Nesina	Oral
	linagliptin	Tradjenta	Oral
	saxagliptin	Onglyza	Oral
	sitagliptin	Januvia	Oral

Drug Class	Generic Name	Trade Name	Admin Route
GLP-1 agonists	semaglutide	Ozempic	Parenteral
	exenatide ER	Bydureon	Parenteral
	dulaglutide	Trulicity	Parenteral
	tirzepatide	Mounjaro, Zepbound	Parenteral
	liraglutide	Victoza	Parenteral
	exenatide	Byetta	Parenteral
	semaglutide	Rybelsus	Oral
SGLT 2 inhibitors	dapagliflozin	Farxiga	Oral
	canagliflozin	Invokana	Oral
	empagliflozin	Jardiance	Oral
	bexagliflozin	Brenzavvy	Oral
Sulfonylureas	glimepiride	Amaryl	Oral
	glipizide	Glucotrol	Oral
	glyburide	DiaBeta	Oral
Thiazolidinediones	rosiglitazone	Avandia	Oral
	pioglitazone	Actos	Oral

PRE-HOSPITAL

- Medicine consult if non-fasting BG > 200 or HbA1C > 9% for target surgeries:
  - Abdominal hysterectomy & colorectal
  - Total joint replacement
  - Open vascular surgery of lower body
  - Lumbar instrumented fusion
  - CABG

- Insulin instructions - Continue as normal until the morning of surgery:
  - If BG > 140, take one-half of AM dose of long-acting insulin
  - Pumps – suggest decreasing the basal rate by one-half (patient may override this instruction)
  - Hold all other insulins

- Non-insulin injectables (GLP1 agonists) – For those on once daily dosing, just hold the day of surgery. For those on weekly dosing:
  - Hold for 7 days if surgery is at an ASC
  - Hold for 7 days for minor cases
  - Hold for 7 days if the indication is solely weight loss
  - Continue regular dosing schedule if intermediate or major surgery at hospital, but must be NPO for solids the day before surgery
  - Continue regular dosing schedule for colonoscopies

- Oral hypoglycemics – Hold the day of surgery, except
  - SGLT2i's should be continued the DOS if non-diabetic
  - SGLT2i's should be held for 3 days for diabetics facing prolonged lack of oral intake = major surgery other than total joints

- NPO instructions:
  - For AM surgery: no solids after MN
  - For PM surgery: light (non-fatty) breakfast permitted 6 hours before arrival time
  - Clears ad-lib up to 2 hours before arrival time (does not have to contain carbohydrate)
  - Sugar-containing clears anytime if BG < 80 or if experiencing hypoglycemic symptoms

PAA

- Check BG on all diabetics
- Check BG on non-diabetics having a target surgery *(listed above)*
- If the patient is non-diabetic and the BG < 130, no further action is required until arrival to PACU
- Treat BG > 160 with IV Humulin-R *(see recommended doses)*
- Consider cancellation if BG > 280 for major elective procedures
- Remove insulin pumps and non-disposable CGMs for procedures involving use of x-rays or monopolar cautery

INTRA-OP

- Target BG 110-180
- Check BG q45 minutes, from the time of the PAA insulin dose, or from incision time if no insulin given
- Treat BG > 160 with IV Humulin-R *(see recommended doses)*
- Consider insulin infusion for any of the following:
  - BG > 220 after two corrective doses
  - Insulin pump removed for a non-minor surgery
  - ICU post-op is likely
- *The following steps apply to cardiopulmonary bypass cases only*
  - Check glucose at the time of heparinization
  - Re-bolus insulin at cannulation
  - Increase insulin infusion by a factor of 4 at cannulation
  - Check glucose q20 minutes on bypass; continue to run insulin infusion at 4 times the suggested rate
  - Decrease insulin infusion rate during rewarming: for routine cases, return infusion to suggested rate; for cases requiring high doses of inotropes, decrease infusion to 2 times the suggested rate

PATIENT DEVICES

Disposable CGMs do not have to removed as there is no direct danger to the patient, but the patient must be made aware that CGM function may be altered postop. However, some CGMs have a reusable electronic component that could be damaged intraop. Such CGMs should be removed if there will be intraop energy exposure. Likewise, insulin pumps should be removed if there will be intraop energy exposure

PACU

- Check BG on arrival or 60 min after the last short-acting insulin dose
- Treat BG > 160 with SQ Humalog *(see recommended doses)*
- Consider insulin infusion if BG > 220 and patient going to ICU

PERIOPERATIVE INSULIN DOSING

<table>
<tr><th>Glucose</th><th>Group A</th><th>Group B</th><td rowspan="5">SLIDING SCALE
Humulin-R IV
-or-
Humalog SQ</td></tr>
<tr><td>160</td><td>2U</td><td>4U</td></tr>
<tr><td>200</td><td>3U</td><td>6U</td></tr>
<tr><td>250</td><td>4U</td><td>8U</td></tr>
<tr><td>300</td><td>6U</td><td>12U</td></tr>
<tr><td>150</td><td>2U/ hour</td><td>4U/ hour</td><td rowspan="6">CONT INFUSION
Humulin-R</td></tr>
<tr><td>175</td><td>3U/ hour</td><td>5U/ hour</td></tr>
<tr><td>200</td><td>4U/ hour</td><td>6U/ hour</td></tr>
<tr><td>225</td><td>5U/ hour</td><td>7U/ hour</td></tr>
<tr><td>250</td><td>6U/ hour</td><td>8U/ hour</td></tr>
<tr><td>275</td><td>8U/ hour</td><td>10U/ hour</td></tr>
<tr><td colspan="3">Group A patients – standard dosing
Group B patients – those on > 40U/day</td><td></td></tr>
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