

Clear

Sick Day Check-in for Diabetes with COVID-19

- Symptoms/ how doing overall compared to the day before
 - Fever spikes
 - Temp ranges if has thermometer
 - Trouble breathing – ability to ambulate (SOB), blue fingernails or lips, cold skin, somnolence
 - Pulse Ox readings if available
 - New onset tachypnea (rapid breathing)– consider DKA
 - Chest pain
 - Fatigue – ability for self-care
 - Appetite
 - Able to eat or not
 - Unusual increase in hunger – consider DKA
 - Fluid intake – able to maintain or not*
 - Increased thirst – consider DKA or severe hyperglycemia
 - Orthostatic symptoms
 - Urine output
 - Reduced – dehydration/renal impairment
 - Increased – consider DKA or severe hyperglycemia
 - Confusion, ability to wake up
 - GI symptoms if present –
 - diarrhea worse or better
 - new onset nausea/vomiting – consider DKA
 - New symptoms – e.g. neurologic symptoms/stroke
- What medications they are currently taking/able to take
 - Any OTC meds or herbs, etc.
 - Acetaminophen preferred over NSAID for fever to reduce risk of acute kidney injury from NSAIDs – ensure not exceeding 3-4 gram/day max
 - Diabetes Meds**
 - Current meds – what have they been able to take, what missed
 - Any adjustments made by patient/caregiver
 - Other meds – on med list
 - BP meds, etc.
- Blood sugar issues
 - Monitoring at least every 4 hours (some situations benefit from every 2 hours/CGM)
 - Low BG symptoms or results –
 - How frequent/ how severe
 - Ability to Treat low blood sugar – PWD or caregiver ideally needs to know how to treat low BG before it happens – ensure appropriate treatment (rapid glucose vs other such as peanut butter, sandwich, etc.) -
 - Rapid glucose – ensure have access to some source of rapid glucose
 - If low (blood sugar below 70 mg/dl or target range), eat 15 grams of simple carbs that are easy to digest like glucose tabs, honey, jam, Jell-O, hard candy, popsicles, juice or regular soda, and re-check BG in 15 minutes to make sure levels are rising.

- Glucagon rescue – sick day use
 - Kit
 - Pre-filled syringe
 - Nasal
- Adjust meds as appropriate**
- If no hypoglycemia yet but at risk (sulfonylurea med or insulin) – review how to treat, ensure has rapid glucose source and/or glucagon
- BGs over 250
 - How frequent/how severe
 - Signs/symptoms of dehydration
 - Signs/symptoms of DKA (polyurea, polydipsia, hunger/nausea, rapid breathing)
 - Adjust meds as appropriate** or triage to ED/hospital

***Fluids – Sick day meals & fluids - maintain hydration/avoid hypoglycemia**

Meal Planning on Sick Days

If able to eat meals

- Eat usual meals
- Drink **eight (8) ounces of calorie-free extra fluids each hour** throughout the day
- Examples:
 - water
 - tea
 - broth
 - diet soda
 - sugar-free Jell-O

If not able to eat usual meals

- Try eating or drinking food or beverage items with **15 grams carbohydrate every hour** (see list next slide)
- Continue to drink **extra calorie-free fluids** in between

Foods/Fluids that contain 15 grams of Carbohydrate

- 1/2 cup apple juice
- 1/2 cup regular soft drink (caffeine-free)
- 1 double-stick popsicle
- 1/4 cup regular pudding
- 1 slice dry toast
- 1/2 cup cooked cereal
- 6 saltine crackers
- 1 cup soup
- 1/3 cup frozen yogurt
- 1 cup Gatorade
- 1/2 cup regular ice cream
- 1/4 cup sherbet
- Milkshake (1/3 cup low fat milk and 1/4 cup ice cream)
- 1/2 cup regular gelatin/Jell-O
- 1 cup nonfat, sugar-free yogurt (not frozen)



Maintain Hydration

- **Eight ounces (8 oz) of fluid each hour**
 - If not eating can add in fluids containing carbs
 - e.g. 4 oz Regular Sprite + 4 oz Diet Sprite or 8 oz Gatorade
- **Every third hour**, consume eight ounces (8 oz) of a **sodium-rich choice such as bouillon**
- If having trouble keeping fluids down, **have small sips every 15 minutes or so throughout the day to avoid dehydration**
- Recommend **good hydration (calorie-free fluids) as part of staying healthy** (avoid going into COVID illness with underlying dehydration)

****Diabetes Meds**

Infection in PWD -- Worsening of diabetes or if not sick but limited food intake

- **Hypoglycemia** – usually due to **reduced food intake**
 - Check blood sugar more often – instruct based on risk
 - **Stop SGLT2i** (at first sign of illness and/or reduced food intake)
 - Can take 3-4 days for effect to wane (accentuated stress & starvation ketosis)
 - May need to **reduce or stop sulfonylureas**
 - May need to **reduce or stop insulin**
 - Treat low blood sugar – PWD or caregiver *needs to know how to treat low BG before it happens*
 - Rapid glucose
 - If low (blood sugar below 70 mg/dl or target range), eat 15 grams of simple carbs that are easy to digest like glucose tabs, honey, jam, Jell-O, hard candy, popsicles, juice or regular soda, and re-check BG in 15 minutes to make sure levels are rising.
 - Glucagon rescue – sick day use
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Infection in PWD – Worsening of diabetes:

- **Hyperglycemia** & higher risk for **diabetic ketoacidosis (DKA)** when ill with a viral infection
 - Patients who are feeling sick need to **monitor their glucose more frequently** – even every 2 to 4 hours if /while blood sugar is elevated
 - They should **continue taking their diabetes medications, unless instructed otherwise** by their providers
 - Based on what we know about risk of DKA with ketogenic diet and surgical stress with SGLT2i meds – **stop SGLT2i**
 - if **patient is sick – at first sign of illness** (3-4 days for effect to wear off)
 - May then need to **add Insulin** to control blood glucose levels
 - if **unable to eat** or not sick but **needing to ration food**
 - May or may not need an alternative diabetes med – closely monitor
 - If **patient on both insulin and SGLT2i**, and gets sick, unable to eat or needs to limit food due to shortage → **STOP the SGLT2i first before reduce or stop insulin**
 - if reduce/stop the insulin and not the SGLT2i then much higher **risk for DKA** during stress of illness or reduced carb intake

SGLT2 inhibitor medications increase formation of ketones and can exacerbate the ketones from low carb intake and/or stress / infection resulting in Diabetic Ketoacidosis (DKA) (often “euglycemic DKA – meaning DKA despite BG under 300)

- The patient may or may not need to increase /add insulin to control blood glucose levels after SGLT2 inhibitor is held – requires close monitoring – see sick day insulin below

Preventing severe hyperglycemia / DKA

- If reduced intake, dehydration, N/V/D – stop Metformin, GLP1-RA
- May need to add “sick day” insulin
 - If patient is current insulin user
 - Adjust Basal Insulin & add “correction insulin” – see below
 - Patients new to insulin
 - Instructing patients new to insulin – consider
 - Use pens, if possible, for simplicity
 - Tele-video visit to instruct and help monitor/adjust if possible
 - Phone call to instruct & monitor/adjust
 - if possible, use you-tube (several available) as visual aid
 - Car visit --- instructions provided from outside with patient/caregiver in car (window up – use phone if possible) – then monitor by phone/tele-visit
 - Brainstorm and share ideas
 - Calculating Insulin doses in patients new to insulin - Basal Insulin & Correction Insulin
 - Calculate starting doses of insulin
 - $0.5-0.7\text{u/kg} = \text{Starting Total Daily Dose}$ or
 - $0.25\text{u} \times \text{weight in pounds} = \text{Starting Total Daily Dose}$
 - E.g. 100 kg patient = 50 - 70 units or 220 pounds = 55 units
 - Start with $\frac{1}{2}$ of total daily dose as **Basal Insulin** - e.g. 25-35 units insulin glargine
 - If patient sick & has increased insulin resistance may need to rapidly increase dose - need to monitor & adjust based on FBS –
 - Call patient daily or algorithm for patient/caregiver
 - Start with 20% increase if BG in 200s, 30% increase if BGs in 300s
 - May need to double dose or even more if severe insulin resistance
 - With insulin glargine – split dose to BID if > 50u per injection
 - Can use NPH BID (some are doing q8hour during COVID19)

- 50% AM and 50% PM if not eating (e.g. start at 15u BID for 100 kg patient) and adjust as needed
- Can use 50% AM & 50% PM or 2/3 AM and 1/3 PM if eating
- **Bolus (mealtime) Insulin** - if eating meals add 10-20% of starting dose as rapid-acting insulin with each meal – hold if not eating
 - e.g. 5-10 units before each meal for 50u starting total dose for 100 kg patient
 - More refined methods can be used if needed during the often-prolonged recovery stage of COVID19 illness***
- **Correction Insulin** - Intended to decrease BG levels to target range – based on patient’s “sensitivity or correction factor” - can be used to:
 - add more insulin to a mealtime bolus to correct for a high premeal blood glucose (e.g. 5u if BG 80-140, 6u (5u+1u) if 141-170, 7u(5+2u) if 171-200, etc.)
 - Used alone to correct a high blood glucose outside of mealtime or if NPO
 - The right correction dose will return the BG to within 30 mg/dl of the target blood glucose about 3-4 hours after the dose is injected

Guide for Using Correction Insulin

Only give (dose) **Correction Insulin**

- every **3-4 hours for analog insulin** –
- every **4-6 hours for Regular insulin** –
- otherwise end up “stacking” insulin and risk of low BG
 - Explain it takes Fast Insulin 3-4 hours to finish working

Calculating the Correction Dose

$$\text{Correction dose of Insulin} = \frac{\text{Current BG} - \text{Target BG}}{\text{CF}}$$

Correction Factor (CF) or Sensitivity Factor (SF)

The CF = the mg/dl drop in BG caused by 1 unit of insulin (depends on sensitivity to insulin - weight, age, renal function)

CF based on patient weight

Calculating a Correction Factor(CF)/Sensitivity Factor(SF)

For patient new to insulin/sick day insulin calculate by using **3000/weight in Kg**

e.g. patient weighs 100 kg
 $3000/100\text{kg}=30$
 1u should reduce BG by 30 points

If impaired renal function/older age – may need “weaker” correction dose by using larger CF (SF) number (e.g. 50 – 1u lowers BG 50 points vs 30 points)
 This gives **less insulin** as the correction dose of insulin

With severe IR/infection, may need to go to “stronger” correction dose by using smaller CF (SF) number (e.g. 20 - 1u lowers BG 20 points vs 30 points)
 This gives **more insulin** as the correction dose of insulin

- <60 lb. = 100
- 60—80 lb. = 75
- 81—100 lb. = 60
- 101—120 lb. = 50
- 121—140 lb. = 45
- 141—170 lb. = 40
- 171—200 lb. = 30
- 201—230 lb. = 25
- 231—270 lb. = 20
- >270 lb. = 15

- During illness aim for blood glucose in 110-180 range
 - if high risk of low BG, aim for 140-180 range
 - e.g. use target BG of 140 for 110-180 range
- The Correction dose can be calculated by using the formula or the patient can use a sliding scale based on their sensitivity factor (correction factor)
 - Example of Correction dose calculation for CF 30
 - [current BG-target BG/CF] – e.g. Current BG is 350 and target is ~140

- $350-140/30 = 210/30 = 7u$ correction dose of rapid acting insulin to bring BG down 210 points
 - To strengthen use smaller CF: e.g. $210/25 = 8u$; $210/20 = 10.5u$; $210/15 = 14u$... to reduce BG 210 points
- Or Can give patient a correction scale: e.g. for BG 180-210 1u; BG 211-240 2u; BG 241-270 3u, 271-300 4u, BG 301-330 5u, etc.
 - See cheat sheet for different scales based on different CF values

Correction Scales for different Correction Factors

- **CF 50:** for BG 180-230 give 1u; 231-280 2u; 281-330 3u; 331-380 4u; 381-410 5u; 411-460 6u; 461-510 7u, 511-560 8u, 561-610 9u, etc.
- **CF 40:** for BG 180-220 give 1u; 221-260 2u; 261-300 3u, 301-340 4u, 341-380 5u, 381-420 6u, 421-460 7u, 461-500 8u, 501-540 9u, 541- 580 10u, etc.
- **CF 30:** for BG 180-210 give 1u; 211-240 2u; 241-270 3u; 271-300 4u; 301-330 5u; 331-360 6u; 361-390 7u; 391-420 8u; 421-450 9u, 451- 480 10u, 481-510 11u, 511-540 12u, 541-570 13u, 571-600 14u, etc.
- **CF 25:** for BG 175-200 give 1u; 201-225 2u; 226-250 3u; 251-275 4u; 276-300 5u; 301-325 6u; 326-350 7u; 351-375 8u; 376-400 9u, 401-425 10u, 425-450 11u, 451-475 12u, 476-500 13u, 501-525 14u, 526-550 15u, etc.
- **CF 20:** for BG 180-200 1u; 201-220 2u; 221-240 3u; 241-260 4u, 261-280 5u, 281-300 6u, 301-320 7u, 321-340 8u, 341-360 9u, 361-380 10u, 381-400 11u, 401-420 12u, 421-440 13u, 441-460 14u, 461-480 15u, etc. **OR**
 - BG 180-220 give 2u; 221-260 4u; 261-300 6u, 301-340 8u, 341-380 10u, 381-420 12u, 421-460 14u, 461-500 18u, 501-540 18u, 541-580 19u, etc.

Covering Meal Carbs

- The **insulin-to-carb ratio (ICR)** is a way to get the right amount of insulin for the carbohydrates in a meal (or snack) –
 - it means the patient will take **1 unit of insulin for a certain amount of carbohydrate**
 - Even if eating **fixed amounts of carb** at a meal – need to have appropriate ICR for the **fixed meal insulin dose**
- E.g. - If the insulin-to-carb ratio (ICR) is 1 unit of insulin for every 10 grams of carbohydrate (written 1:10) - will take 1 unit of insulin for every 10 grams of carbohydrate eaten – if eat 60 grams will take 6 units
 - If ICR is 1:15 – will take 1 unit for every 15 grams of carb eaten
 - If eat 60 grams of Carb will take 4 units
 - For fixed meal doses – e.g. patient eats ~45 grams of carb each meal and weighs ~120# with estimated ICR of 1:15 - will take 3 units with each meal
 - Or if patient eats 30g Carb with Breakfast, 45 grams with Lunch & 60 grams with Dinner – would take 2u with B, 3u with L and 4 units with D

Estimating an Insulin to Carb Ratio

Based on Total Daily Dose

- 8—11 units 1:50
- 12—14 units 1:40
- 15—18 units 1:30
- 19—21 units 1:25
- 22—27 units 1:20
- 28—35 units 1:15
- 36—45 units 1:12
- 46—55 units 1:10
- 56—65 units 1:8
- 66—80 units 1:6
- 81—120 units 1:5
- >120 units 1:4

Based on the 500 Rule

Based on Body Weight

- <60 lb. 1:30
- 60—80 lb. 1:25
- 81—100 lb. 1:20
- 101—120 lb. 1:18
- 121—140 lb. 1:15
- 141—170 lb. 1:12
- 171—200 lb. 1:10
- 201—230 lb. 1:8
- 231—270 lb. 1:6
- >270 lb. 1:5

Fails to consider body composition & insulin resistance