



# Sick Day Management

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**I have no financial  
disclosure to report.**

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# AIMS

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The goal of today's lecture is to highlight and review key components of diabetic sick day management, primarily focusing on individuals with insulin dependent diabetes mellitus.

# **Think B's!**

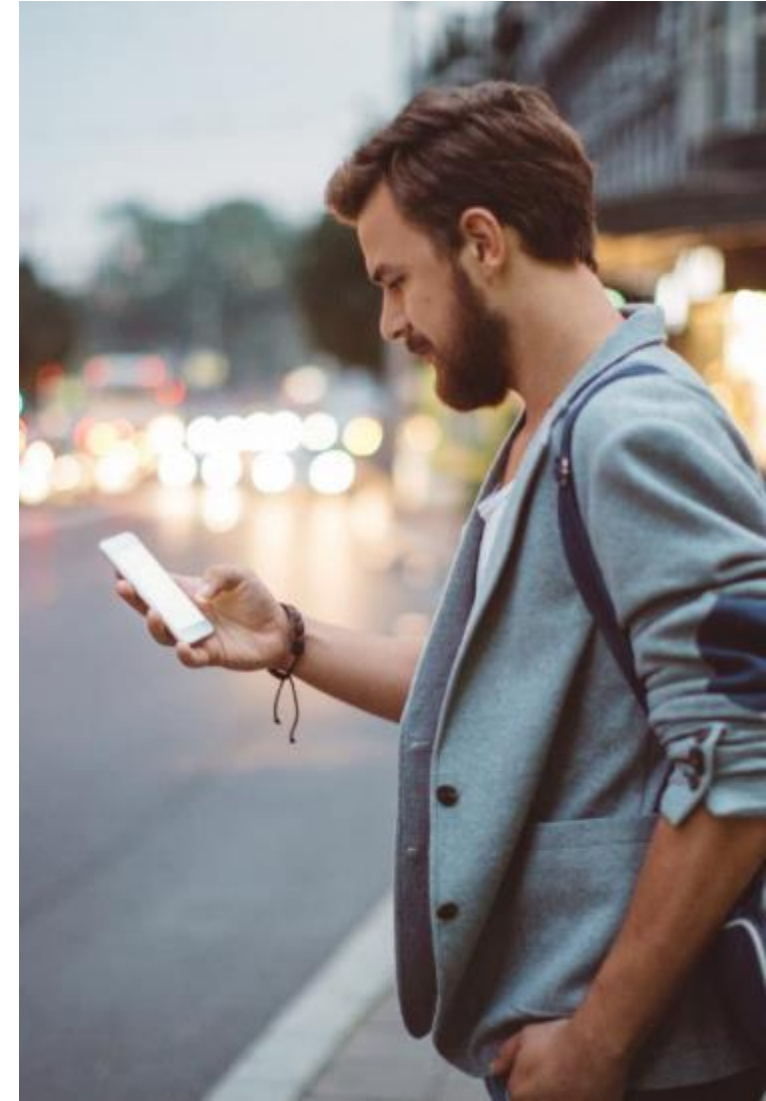
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Be Aware:

Be Prepared:

Be Alert:

Beware:







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# Be Aware

## Illness and My sugars



Infections/illness can lead to elevated blood sugar levels in patients with diabetes mellitus and pre-diabetes via physiological increases in adrenal stress hormone release and increased inflammatory processes.

This results in an increase release of stored sugars, and an increase in peripheral insulin resistance, leading to high and harder to control blood sugar levels.



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# Be Aware

## Medications and my sugars



Many medicines can impact your blood sugars, including those taken during infections/illness

- Steroids and Decongestants often result in a raise in blood sugars, which can last for hours to days following their completion.
- Many pediatric medications are administered in liquid syrups to make them more palatable, which can equate to between 1 to 9 grams of carbohydrates per tablespoon {~15 ml} in some cases.



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# Be Aware

## CGM medication interference?

Some drinks and medicines can also impact your devices as well:

- Tylenol: Older models of certain CGM's (Dexcom G4/5/6, Medtronic, and FreeStyle Libre) could show falsely elevated blood sugars in patients taking Tylenol. These issues have largely been resolved with newer models, and do not have these concerns.
- Vitamin C (ascorbic acid) supplements: FreeStyle Libre 3 Sensors can report falsely elevated blood sugars in patients taking in excess of 500 mg/day of ascorbic acid.

False highs can mask true lows, so Be Aware!



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# Be Aware

## Dehydration



Some infections can result in nausea, vomiting, or diarrhea, leading to dehydration and poor appetite or food intake.

For insulin dependent diabetics, this combination of increased insulin resistance and reduced mealtime insulin dosing can result in relative insulin insufficiency and ketone formation.

If uncorrected, this can ultimately progress to life threatening diabetic ketoacidosis!





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# Be Aware

## Common signs/symptoms of DKA



What are the signs of diabetic ketoacidosis?

- GI: Nausea, vomiting, poor appetite, abdominal pain
- MSK: weakness, malaise, fatigue
- Neurologic: sleepiness, blurred vision, mental confusion



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# Be Aware

## Serious signs/symptoms of DKA



What are the more Serious warning signs of diabetic ketoacidosis?

- Ketotic breath: Fruity or acetone smell to breath
- Kussmaul respirations: deep, rapid, and labored breathing
- DKA induced AMS, Coma, and cerebral edema

# True or false?

Diabetic Ketoacidosis is directly caused by high blood sugar.

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# False!

Ketone formation is caused by insulin insufficiency, not high blood sugars.

Ketones are formed when the body cannot access the sugar in the blood, primarily due to insufficient insulin to transport the sugars from the blood into the cells to use.

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# True or false?

If I am taking my basal/long-acting insulin, I cannot get  
DKA.

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# False!

Basal insulin is not sufficient on its own to prevent ketones from forming in patients with insulin dependent diabetes.

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# True or false?

I do not need to check my ketones if my blood sugars are normal while I am sick.

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# False!

Ketones form as a result of insulin insufficiency, not in response to normal or high blood sugars.

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\*Ketones form in the presence of low blood sugars, but only in the absence of insulin



# True or false?

If I do not eat while I am sick, I do not need short acting insulin if my blood sugars are in range.

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# False!

Even if your blood sugars are in target range, if you are not eating sufficiently your body may not be receiving enough sugar and insulin to meet its needs; meaning ketones can form even if blood sugars look normal.

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# True or false?

I can develop DKA even while on a closed-loop CGM-Insulin pump system.

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# True!

If your pump becomes dislodged or your infusion site kinks, insulin may not be infusing into your body, leading to insulin insufficiency and subsequent ketone formation.

If you are having moderate or large urine ketones while on a closed-loop insulin pump, change out your pod or infusion site and contact your provider!

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# Be Prepared

## Prevention is the best Medicine

Prevention is the best medicine

- Work to optimize your diabetic care prior to ever getting sick
- Healthy habits can help your body to be better able to help fight off illnesses. These include good diet, daily exercise, and health-conscious lifestyle choices
- Get your recommended vaccinations on time



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# Be Prepared

## Personal and Hand Hygiene



Practice good hand and personal hygiene

- Wash your hands with soap and water for at least 20 seconds
- Use hand sanitizer appropriately
- Cover your mouth
- Avoid close contact with individuals with known communicable infections
- Social distance when indicated





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# Be Prepared

## Prepare ahead of time and have a Sick Day kit ready!



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Make sure you have your diabetic medications and supplies, and that they are up to date with your prescriber team (you do not want to run out of supplies while sick!)

- Blood glucose testing equipment
- Thermometer
- Sugary and non-sugary fluids
- Ketone test strips (if instructed by your healthcare team)
- \*Medications for nausea



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# Be Prepared

## Have food/drink provision ready



Make sure you have you have food and quick acting carbohydrates at home to use if you get sick

- You do not want to go low or be unable to correct your ketones due to lack of available carbohydrate supplementation





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# Be Prepared

## Provider Contact/Emergency Line



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Make sure you have the contact information for your healthcare team in case you have questions or concerns during an illness.

- Ask your diabetic team for their emergency call line in case of medical emergencies!
- When in doubt, reach out!!!!



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# Be Prepared

## Medical Alerts and Social Support



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Ensure you have an up-to-date medical alert identifier

Lean on your personal/social networks

- Whenever possible, reach out to close family, friends, and caregivers to establish a check-in plan for when you are sick
- If you pass out from a low or become suddenly incapacitated, you want someone to know and intervene ASAP
- Arrange check-ins or share your CGM data – it can be an important and potentially a life saving safety net

**When Sick, Be Alert!**

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# Be Alert

## Monitor Blood Sugars Closely



Keep a close eye of your blood sugars:

- POC checks vs continuous glucose monitoring every 4 hours at least
- Whenever reasonable, have others checking in and help you monitor your sugars





# Be Alert

# Stay Hydrated



Do not forget to drink!

- Drink plenty of water or non-calorie liquids like tea, broth, Pedialyte, etc to prevent dehydration
- This is especially important if you are losing fluids due to fever, vomiting, diarrhea, or have frequent urination
- Fluids also help to clear out ketones



## Be Alert:

# Am I getting enough fluids?



For children up to 16 years of age

- 1 fluid ounce [30 ml] per year of age per hour

For older teens and young adults

- 2 cups [~475 ml] of hydrating fluids per hour

## Sick-Day Foods

### 1. Liquids (In addition to water – particularly if the blood sugar is below 180 mg/dl [10.0 mmol/L]):

- 🐾 Sugar-containing beverages: regular 7-Up, ginger ale, orange, cola, PEPSI®, etc.<sup>1</sup>
- 🐾 Pedialyte or Infalyte® (especially for younger children)
- 🐾 Sports drinks: Gatorade®, POWERÂDE®, etc. (any flavor)
- 🐾 Tea with honey or sugar<sup>1</sup>
- 🐾 Fruit flavored drinks: regular Kool-Aid, lemonade, Hi-C®<sup>1</sup>, etc.
- 🐾 Fruit juice: apple, cranberry, grape, grapefruit, orange, pineapple, etc.
- 🐾 JELL-O: regular (for infants, liquid JELL-O warmed in a bottle) or diet<sup>1</sup>
- 🐾 Popsicles: regular or diet<sup>1</sup>
- 🐾 Broth-type soup: bouillon, chicken noodle soup, Cup-a-Soup®



# Be Alert

## Do not forget to eat



Do not forget to eat

- Your body needs fuel to function, and insulin to inhibit/prevent ketogenesis (ketone formation/build-up)
- Even small snacks and insulin doses can make a big impact
- Do not forget to dose!

## 2. Solids (when ready) – good foods with which to start:

-  Saltine crackers
-  Banana (or other fruit)
-  Applesauce
-  Bread, toast or tortillas
-  Graham crackers
-  Soup
-  Rice





# Be Alert:

## Ketone Monitoring



Check for Ketones (insulin dependent diabetics)

- You should assess for urine/blood ketones during your illness. Do this particularly if your blood sugars are exceeding 240 mg/dL, you have been skipping meals/missing insulin, you have been vomiting, and/or if you have any increased work of breathing or additional signs of impending diabetic ketoacidosis
- Remember, you do not need to have high blood sugars to develop ketones, and DKA can still occur even when you have normal blood sugar levels



## Be Alert:

# When to reach out to your provider



Know when to contact your provider:

- If you can't get your blood sugar levels below 300 mg/dL
- You have a persistent high fever
- You vomit more than once or have diarrhea 5 or more times within 24 hours
- You are very weak, have stomach pain, or difficulty breathing
- If your Blood/Urine shows moderate or large amounts of ketones
- For any other reasons that you and your provider have discussed

# When reaching out to your provider

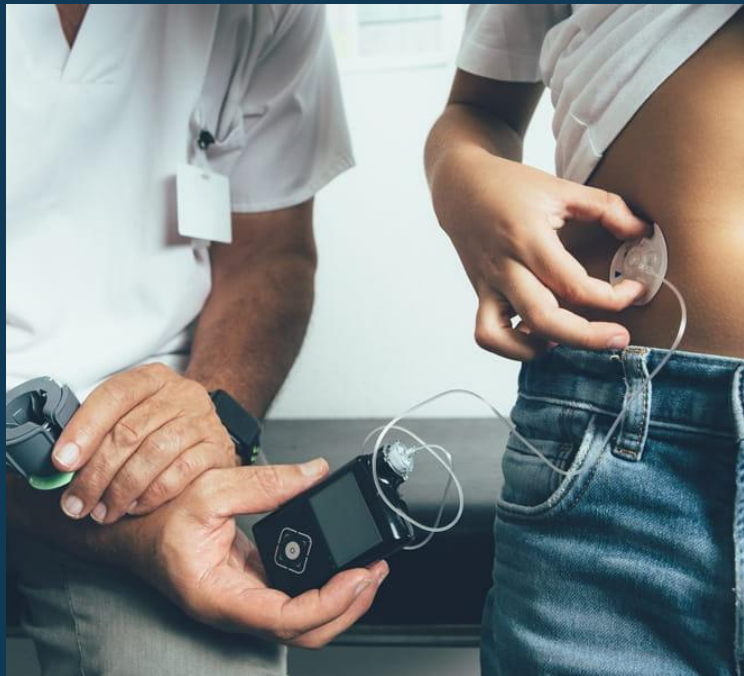
- Provide critical information to help streamline this process:
  - Name and age of patient
  - Type and duration of their diabetes
  - Name of the Doctor/team who manages their diabetes
  - Your present problem and concerns/reason for the call: LMASQOT
  - Last blood sugar and urine ketone checks: time and results
  - Last food intake and hydration status
  - Additional concerns/considerations





# Be Alert:

## Insulin pumps with CGM Closed loop systems



In most cases, you can continue to use your Closed loop insulin pump/CGM systems during your illness.

However, Technology can fail, and you should have a back up plan ready in the event your pump and/or CGM system fails or becomes unavailable:

- Pump malfunction
- Bad/defective batch/pods/CGM's
- Infusion line kink
- Delayed shipments/unavailable prescription



## Be Alert:

# Moderate or large ketones while on pump?



If you are seeing moderate or large ketones while on your close loop insulin pump/CGM system:

- Check your device: insulin reserves, power, and connection
- Check your Infusion line for occlusion/kinks/knots
- When in doubt, change/replace infusion site (check old infusion catheter for kink)
- Reach out to pump representative to trouble shoot device and your diabetic provider for ketone management



## Be Alert:

# What to do if pump/CGM system fails



Pump malfunction:

- Reach out to Pump company/representative to troubleshoot
- Reach out to your diabetic provider for MDI conversion if unable to resume pump system within 2 hours of failure/disconnect
- If the time of pump failure/malfunction is unknown or blood sugar more than 300 mg/dL, check urine/serum ketones

Bad Pod or CGM device

- If devices are not functioning appropriately, reach out to manufacture to trouble shoot
- When in doubt, replace with new device



## Be Alert:

# Shipment/Prescription issues



Pump supplies and CGM shortages can occur, have a back up plan for when they do.

If out or nearly out of supplies, Reach out to your Diabetic provider/team:

- They can review prior pump and CGM data and provide recommendations on MDI insulin dosing or POC glucometer blood sugar monitoring frequency during the interval.
- They may have samples to replace missing supplies or be able to send new prescriptions.
- When in doubt, reach out!

**Beware and Seek Care!**

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# Beware

## And seek immediate emergency medical care

Seek immediate medical attention if:

- You are having trouble breathing or develop pressure or persistent pain of the chest
- Unable to eat/drink or having recurrent vomiting/diarrhea (risk for dehydration/DKA)
- Persistent large urine ketones unresponsive to provide guided corrections
- Altered mental status and/or lethargy
- Instructed by your medical provider to do so.



# In Summary



Remember your B's:

Be aware of your diabetes and the effect of illness and medications on your diabetic control.

Be prepared, and ready for when you might get sick. A stitch in time saves nine.

Be alert during your illness and have back up plans and support networks set up to help.

Beware of serious complications and indications for medical escalation/hospitalization.



# Questions and Comments?

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**Thank You!**