KETONES AND SICK DAY MANAGEMENT

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Hyperglycemia is NOT good.

- Hypoglycemia is NOT the only concern.
- Persistent Hyperglycemia may be a sign of a problem.
  - A pattern of 3 or more BG readings > 180 mg/dL at the same time of day may need a dose adjustment.
- Talk with your diabetes educators
- (Unexplained) BG values > 250 mg/dL times x 2
- Think about ketones!
What are ketones?

- Insulin is needed by the body to lower BG values
  - It allows glucose to enter the cells
  - It also signals the body to use glucose as a fuel source
How do ketones make you feel?

- Without insulin the body needs to use other sources of energy
- Fat is a source of energy
- The breakdown of fat leads to formation of ketones
- Ketones are “acidotic” and can cause
  - Nausea
  - Abdominal Pain
  - …Not feel good.
When should you check for ketones?

- Two unexplained highs over > 250 mg/dL
- BUT ALSO WHENEVER....
- You feel sick and/or vomiting
- You missed your injection of Lantus or Levemir
- Your pump site or pump stopped working
- Whenever you do not have enough insulin (ie coming out of the honeymoon period and your insulin dose has not been adjusted)
- Whenever there is extra stress to the body
How you may be able to tell there are ketones present....

- Upset stomach or stomach pain
- Fruity odor
- Vomiting
- Dry mouth
- Drowsiness
- Deep breathing
How do you check for ketones?

- Choice of urine or blood
- Urine is quick and easy
- Blood is recommended for
  - Young children
  - Those on pump therapy
  - If you are dehydrated
- But may not be covered by insurance and it may be very expensive.
# How to Interpret Ketone Testing

<table>
<thead>
<tr>
<th>Urine Ketones</th>
<th>Blood Ketones</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td>&lt;0.6 mmol/L</td>
</tr>
</tbody>
</table>

Normal schedule and activities
How to Interpret Ketone Testing

<table>
<thead>
<tr>
<th>Urine Ketones</th>
<th>Blood Ketones</th>
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<tbody>
<tr>
<td>Trace or Small (15 mg/dL)</td>
<td>&lt;0.6 mmol/L</td>
</tr>
</tbody>
</table>

Drink extra water and recheck in 2 hours
No Exercise
How to Interpret Ketone Testing

<table>
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<th>Urine Ketones</th>
<th>Blood Ketones</th>
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<tbody>
<tr>
<td>Moderate (40 mg/dL)</td>
<td>0.6 - 1.5 mmol/L</td>
</tr>
</tbody>
</table>

Extra insulin (5-10% of your total daily dose or TDD)
Fluids (May need sugar containing drink to keep BG up while insulin is needed to get rid of the ketones)
No Exercise and Call your diabetes team
How to Interpret Ketone Testing

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<th>Urine Ketones</th>
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<tr>
<td>Large (&gt;80 mg/dL)</td>
<td>&gt;1.6 mmol/L</td>
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</table>

Extra insulin and fluids may be needed by IV
No Exercise
Immediately go to the nearest Emergency Room and on your way Call your diabetes team!
Why are ketones dangerous?

- The amount of ketones increases over time and you will become more “acidotic”
- What you want to avoid is Diabetic Ketoacidosis or DKA
  - Lethargy
  - Coma
- 1% chance of stroke, brain swelling and death with each episode
Common mistakes regarding ketones

- “My child with diabetes is sick and not able to eat so I don’t need to give him/her insulin.”

- Always give the background or basal insulin
  - May need an adjustment to dose
  - In as little as 3-4 hours ketones can start forming in the body
Common mistakes regarding ketones

- “My child is sick and has low blood sugars so he/she will NOT have ketones. I also gave him/her some the Lantus (Or he/she is still on the pump).”
  - May need sugar containing fluids if BG is less than 180 mg/dL
  - May still need to give extra insulin to drive out the ketones
Common mistakes regarding ketones

- “Although I am on insulin, I have type 2 diabetes so I don’t need to check for ketones.”
- Particularly during stress to the body, there is increased needs. If you are relatively deficient in insulin you can still have ketones.
- Up to 25% of those with type 2 diabetes still can have DKA.
Being proactive about sick days and procedures

- Get the flu shot
- Talk to your diabetes team and doctor/dentist before the procedure
- Be prepared to
  - Check your BG more often
  - Give background/long acting/basal insulin
  - Check for ketones
  - Have sugar containing liquids at home
  - Know your diabetes team’s phone number
Congratulations!

- Now you know
  - What ketones are
  - How to check for ketones
  - How to avoid ketones
  - How to handle ketones