

Medication Management on the Ketogenic Diet



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Objectives



1. Review the importance of close medication management for patients on the ketogenic diet
2. Review general medication pearls for the ketogenic diet
3. How to determine carbohydrate content of medications
4. Review common medication issues for patients on the ketogenic diet

It's a diet...Who cares about meds!?



- Success of the KD relies on the restriction of carbohydrates to promote a state of ketosis
- Almost all medications contain at least SOME carbohydrates
- Failure to monitor carbohydrate content of medications can lead to failure of the diet
- KD patients can be (and most are) on a TON of medications

It's a diet...Who cares about meds!?



- There is significant variation in carbohydrate content of medications
- A generic medication is only required to have the same amount of active ingredient as the branded medication
- Extra (non-active) ingredients can be different than those used in the branded medication and between the various generic manufacturers

Medication Carbohydrate Goals



- Ideally, we want to try and keep the total daily CHO content of medications to less than 500 mg
- When daily medication CHO contributions exceed 1,000 mg, dietary CHO need to be adjusted
 - Decreased diet tolerance
- Can be challenging to restrict to this extent
 - Felbamate 600 mg tablets contain 190 mg of CHO
 - This medication is taken three times daily, often multiple tablets per dose
 - 600 mg of felbamate suspension (600 mg/5 ml) contains 1500 mg of CHO

Examples



- 4:1 ratio for a 20 kg patient at 1200 kcal/day provides 8 grams of CHO per day
- If a child has low calorie needs (tube fed, non-ambulatory), they may only receive 2-3 grams of CHO per day from formula
- Normal CHO intake for children is around 130 grams per day!

Medication Pearls



1. Prepare for diet initiation

- ❑ Step 1 is to get a complete and thorough medication history for your patient
- ❑ Ask about current daily medications AND medications that are only used on an as needed basis
- ❑ FORMULATE A PLAN – Decide ahead of time how the medication regimen needs to be adjusted to provide the least amount of carbohydrate possible
- ❑ This will ease the transition to the diet and set the patient up for success

Medication Pearls



2. Avoid liquid medications!

- ❑ Liquid medications are often formulated with flavoring and sweetening agents which can add several grams of carbohydrates per day
- ❑ Patients typically will need to be switched to tablets or capsules



Medication Pearls

3. Don't forget about OTC's!

- ❑ Sometimes can be overlooked
- ❑ Counsel parents to read medication labels and contact their RD, MD or PharmD for help
- ❑ Sugar free ≠ Carbohydrate free
- ❑ Again....Avoid all liquids!



Medication Pearls



4. Alert all providers

- ❑ Parents should inform all of their child's prescribers after starting the ketogenic diet
- ❑ If a physician isn't aware of the diet, they may prescribe a medication that drastically increases daily CHO count, putting the patient at risk
- ❑ Parents should always notify ketogenic diet team (RD, MD, PharmD) of new medications

Tips for Determining Medication Carbohydrate Content



- 1. Medication package inserts**
 - Do not usually specify exact content, but can be used to identify carbohydrate ingredients
- 2. Institutional databases**
 - Some institutions maintain databases of commonly used medications and CHO contents
- 3. Contact Manufacturers**
 - Often necessary to call individual manufacturers for carbohydrate information
- 4. Weigh tablets**
 - Usually last resort to provide estimate
 - Subtract active ingredient content

Common Issues



1. Medication Administration

- ❑ Not all patients are able to take tablets “by mouth” (G-tube, NGT, etc)
- ❑ Tablets need to be crushed, mixed with water (or sugar-free vehicle), and properly dosed
- ❑ Can be labor-intensive and time-consuming for parents
- ❑ Administration device clogging
 - ❖ Depakote Sprinkle Capsules
 - ❖ No apple sauce
 - ❖ Ora-plus = CHO free

Common Issues



2. Medication and diet side-effects

□ Sleep

- ❖ Combinations of medications can be either sedating or activating
- ❖ Patients often require medications to help with sleep (melatonin, antihistamines)

□ Constipation

- ❖ One of the main side effects of the ketogenic diet
- ❖ Bowel regimens are almost universally required
- ❖ Miralax (polyethylene glycol) does not provide any CHO and is therefore a good first-line option

Common Issues



2. Medication and diet side-effects

❑ Kidney stones

- ❖ Side effect of both the diet and certain anti-epileptic medications (topiramate, zonisamide)
- ❖ Excess uric acid and calcium excreted in urine
- ❖ Manage with supportive care

❑ Decreased bone density

- ❖ Patients on the diet long-term develop loss of bone mineral density
- ❖ Should start vitamin D/Calcium supplementation

Common Issues



2. Medication and diet side-effects

□ Acidosis

- ❖ Low serum bicarbonate levels due to acidotic state
- ❖ Typically want to keep HCO_3^- levels >20 mEq/L
- ❖ Begin supplementation with sodium bicarbonate 1mEq/kg when $\text{HCO}_3^- <20$ mEq/L

□ Hypoglycemia

- ❖ Goal BG 50-80 mg/dL
- ❖ Treat when $\text{BG} <40$ or symptomatic; 15 mL juice or 0.25 g/kg dextrose (if NPO)

Common Issues



3. Refill consistency

- ❑ Can be difficult to manage the specific medications (manufacturers) that patients receive on an outpatient basis
- ❑ Need to work closely with outpatient pharmacy
- ❑ Patient/parent are crucial partners in this process and should be counseled to always visually inspect medications when picking up

Key Points



1. Close management of medications is crucial for ketogenic diet success
2. Avoid liquid medications, utilize tablets and capsules
3. Detailed counseling to educate patients/parents
4. Consider and manage side-effects of both the diet and medications
5. Continuous follow-up for medication consistency

Resources



- **The Charlie Foundation**
 - www.charlifoundation.org
 - Carbohydrate contents of many over-the-counter medications
 - List of carbohydrate ingredients

Resources



Carbohydrate Ingredients	Non-Carbohydrate Ingredients
<p>Glycerin</p> <p>Maltodextrin</p> <p>Magnasweet</p> <p>Organic acids: ascorbic acid, citric acid, lactic acid</p> <p>Propylene glycol</p> <p>Sugars: dextrose, fructose, glucose, lactose, sucrose, sugar, palm sugar, agave nectar, cane syrup, cane juice, corn syrup, honey</p> <p>Sugar alcohols: erythritol, isomalt, glycerol, manitol, maltitol, sorbitol, xylitol</p> <p>Starches: cornstarch, hydrogenated starch hydrolysates (HSH), pregelatinized starch, sodium starch glycolate</p>	<p>Asulfamine potassium (AceK)</p> <p>Aspartame</p> <p>Carboxymethylcellulose</p> <p>Cellulose</p> <p>Hydroxymethylcellulose</p> <p>Magnesium stearate</p> <p>Microcrystalline cellulose</p> <p>Polyethylene glycol</p> <p>Saccharine</p> <p>Superose</p> <p>Stevia (rebiana)</p>

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