

Implementing a Ketogenic Diet for Glut1DS at a Psychiatric Facility

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Background

Introduction: Glucose Transporter Type 1 Deficiency Syndrome (Glut1DS) is a rare genetic disorder characterized by deficiency of a protein required to transport glucose across the blood-brain barrier. The current gold standard treatment for Glut1DS is the ketogenic diet (KD). The KD for Glut1DS is a medically prescribed diet tailored to individual patients. The KD diet can be a challenge to implement in a Psychiatric Residential Treatment Facility (PRTF). The purpose of this case study is to share the collaborative work between Children's Mercy Hospital (CMH) and a PRTF. This collaboration was necessary for the PRTF to accept for admission a patient with Glut1DS on a KD.

Method

This case study is a 13-year-old male followed in the Epilepsy Center at CMH with the diagnoses of Glut1DS.

- Oral eater, follows a KD at home
- Ratio of 2:1
- Known dairy allergy.

The patient required admission to a PRTF for behavioral and family concerns.

Finding a PRTF that was able to provide a KD was a challenge. One facility agreed to accept the patient for admission on modified ketogenic diet plan

CMH multidisciplinary ketogenic diet team

- **Nurse practitioner** ordered and reviewed appropriate labs to assess the safety and efficacy of the KD in the PRTF facility
- **Dietitians** assessed nutrition needs and recommended adjustments in the meal plan based on growth trends and labs.
- **Social worker** provided education regarding specific behavioral concerns and needs.
- **Chef/educator** created weekly menus with meals and snacks adapted to fit a modified form of the KD including adjusting recipes from grams to household measurements.

PRTF staff

Medical director ensured medical needs and updates were relayed accurately between the two facilities. Purchased soy-based formula to be used for meals to provide adequate fat intake.

Dietitian and Nurse Manager communicated with staff at PRTF on availability of specialized foods needing to be utilized for modified ketogenic diet..

Table 1: Weights/BMI/Labs

	Weight	BMP	CBC	Betahydroxybutyrate
	BMI/%ile			
3/3/2021 (Before PRTF admit)	39.2 kg 20.9/80%ile	Normal	Normal	4.95 mcmol/L
3/18/2021 (PRTF admission)	40.4 kg			
4/6/2021	39.7 kg	Normal	Normal	5.45 mcmol/L
5/3/2021	39.0 kg			
5/24/2021	37.9 kg			
	20.1/72%			
5/27/2021		Normal	Normal	Pending

Results

KD related labs obtained 2 weeks after admission were found to be within normal limits including a therapeutic level of ketosis (betahydroxybutyrate level of 5.45 mmol/L). A weight loss of 1.5 pounds was reported 3 weeks after admission therefore an increase in calories was recommended. Another 1.5-pound weight loss was reported 7 weeks after admission, and it was determined the weight loss was likely related to behavioral food refusal. A follow up telehealth appointment was scheduled with the CMH ketogenic diet team to help troubleshoot the challenges the PRTF staff were having with behavioral food refusal.

Table 2: Sample Meals with Macronutrients

Breakfast	Lunch	Dinner	Snack	Macronutrients
2 Eggs 2 sls Bacon 2 TBL Mayonnaise ¼ cup Fruit 10 oz Keto Shake	Taco Salad 3 oz ground beef 1 TBL oil Lettuce/tomato 1 tsp salsa mixed with 3 TBL mayonnaise	Hot dog 1 teaspoon ketchup mixed with 1 tablespoon oil ¼ cup Vegetable 2 Tablespoons Country Crock 10 oz Keto Shake	1 Saltine cracker 1 TBL Country Crock	Calories: 2043 Ratio: 1.8:1 Fat (g): 184 Protein (g): 56 Carb (g) 49 Fiber: 3
2 Eggs (no cheese) 1 tablespoon country crock 2 sausage patties ¼ cup Pears 6 oz keto shake	2 oz Meat sauce Tossed salad no cheese or croutons w/ 2 TBL dressing (vinaigrette) 1 TBL mayonnaise ¼ cup applesauce 1 TBL Country Crock	3 ounces Ham 2 TBL mayonnaise ¼ Cup Vegetables 1 TBL Oil ¼ cup Fruit 6 oz Keto Shake	¼ banana blended with 4 oz keto shake	Calories: 1975 Ratio: 2:1 Fat (g): 181 Protein (g): 31 Carb (g) 67 Fiber: 8
2 eggs 2 sls. Bacon 2 tablespoons country crock spread ¼ cup Fruit 6 oz Keto Shake	2 oz Chicken 1 oz Ham 2 TBL Mayonnaise ¼ cup vegetables 1 TBL oil	3 oz Chicken ¼ cup corn 2 TBL Mayonnaise 1 tsp Oil ¼ cup Fruit 8 oz Keto Shake	2 oz Keto Shake ¼ cup fruit	Calories: 1953 Ratio: 1.8:1 Fat (g): 184 Protein (g): 56.46 Carb (g) 49 Fiber: 3

Adapted from PRTF current menu.

Conclusion

This case study indicates a modified form of the KD can provide an adequate level of ketosis in a PRTF setting. A modified form of the KD allowed the PRTF to prepare appropriate meals and snacks for a patient with Glut1DS. The patient experienced weight loss after admission. Regular and on-going communication between staff allowed this patient to get appropriate psychiatric treatment while maintaining an appropriate level of ketosis.