Capstone for Impact Submission | GY2020

Project Title: Development of Educational Resources on Very-Low Carbohydrate, Ketogenic Diets

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Branch: Patients and Populations

Path of Excellence: Scholarship of Learning and Teaching

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Summary: Low-carbohydrate diets have become increasingly popular among the general public, however, there remains a lack of quality resources surrounding their clinical implications and safe implementation. My Capstone for Impact Project focused on the development of quality resources on very-low carbohydrate diets for the general public, people with prediabetes or diabetes and healthcare providers. This included development of a diverse range of resources including a group-based lifestyle curriculum, clinician-oriented resources, a peer-reviewed publication and revision of multiple Wikipedia pages.

Methodology:

Literature on the efficacy, safety, clinical effects and physiology of very-low carbohydrate, ketogenic diets were reviewed and guided resource development.

Diabetes Prevention Program Resources

The Diabetes Prevention Program (DPP) is an established evidence-based group lifestyle program for people with prediabetes that is currently available in communities around the United States. The traditional DPP curriculum teaches fat and calorie restriction and recommends 150 minutes of exercise per week. This curriculum was adapted to teach a low-carbohydrate eating pattern while retaining the group-based structure and exercise component.

A clinician guide was developed in collaboration with physician experts and was distributed to primary care physicians of participants of the low-carbohydrate lifestyle program. The guide included information on the diet details, medication management and side effect palliation.

These resources were utilized in a pilot study of a Low-Carbohydrate Diabetes Prevention Program held at Canton Health Center from October 2017 to September 2018. Qualitative feedback was gathered from the lifestyle coach, program participants and primary care providers receiving the clinician guide in the form of interviews and surveys. Participants' weight changes were tracked over the course of the program.

Wikipedia Pages

Wikipedia was identified as an accessible resource utilized by the general population as well as healthcare providers. The pageviews, edit histories, and ratings of Wikipedia articles relevant to low-carbohydrate, ketogenic diets were reviewed. Pages central to low-carbohydrate physiology or clinical applications that were rated as low-quality articles were identified for revisions.

Results:

Low-Carb Diabetes Prevention Program Curriculum

24 sessions of handouts & the accompanying lifestyle coach manual were adapted and delivered over one year to 22 participants in the pilot study. An average of 5.9% body weight loss at 12 months was achieved compared to an average of 4.2% in traditional DPPs. Participants reported ease of understanding the curriculum and enjoyment of the program without side effects, but also reported frustration with conflicting messaging from the media, healthcare providers and other resources regarding low-carbohydrate eating patterns and dietary fat.

Clinician Resources

Physicians of the pilot study participants (n=9) had low engagement with the clinician guide and the subsequent survey (2 completers). The physicians reported they were already recommending general carbohydrate restriction to their patients and that a different method of dissemination would increase engagement with the resource.

The clinician guide was expanded in collaboration with physicians using carbohydrate in inpatient and outpatient clinical settings and published as "A clinician's guide to inpatient low carbohydrate diets for remission of type 2 diabetes: toward a standard of care protocol," in *Diabetes Management* in 2019. This publication was made available to physicians of the participants in the study as well as clinicians involved in future programs.

Wikipedia Pages

"Ketosis" and "Ketoacidosis" were identified as relevant articles rated as "C" and "start," signifying low quality articles. "Ketosis" received an average of 1500 views per day and "Ketoacidosis" received an average of 780 per day from 1/2019-12/2019. These articles were updated with updated content and citations and are under review for an updated quality rating.

Conclusion:

Low-carbohydrate lifestyle interventions can be a powerful approach for people with prediabetes or diabetes, but will require accessible, reputable resources for patients and clinicians. Continued development of high-quality resources as well as evidence-based lifestyle programs will be crucial to widespread uptake and safety of this approach. Development of clinical practice guidelines and official CME resources will be an important step to more widespread acceptance.

Reflection/Impact Statement:

My Capstone for Impact has encompassed a range of projects that have been rewarding and engaging over the past three years. I believe that improving education on nutritional topics is crucially important for the general population as well as healthcare professionals, especially given our current burden of metabolic disease. However, I have increasingly realized throughout my work on my Capstone just how controversial and frustrating this topic can be. It has been an interesting time to be engaged in this topic as its visibility has skyrocketed since I began these projects in 2017, however it has highlighted the power of the media and the difficulty in nuanced discussion on this topic. It is unfortunate that nutrition is such a polarizing topic as it is something that the healthcare community needs to find common ground on for the benefit of our patients.

I am hoping to continue the work I have done through my Capstone in several ways. I am continuing to work on the implementation of a similar low-carbohydrate Diabetes Prevention Program in the Ann Arbor VA. Given the burden of metabolic disease in the veteran population as well as the potential for integration with primary care and scalability across VA sites, I am excited about the potential of this pilot. Additionally, I hope to continue this work in my career in Physical Medicine and Rehabilitation. People with disabilities have a high prevalence of diabetes and metabolic syndrome and often have challenges to exercising. Building care systems that offer nutrition and lifestyle programs for these patients could have significant potential for impact as well.