

[MUSIC PLAYING]

**EMILY HALLER:** The focus of my presentation this morning is going to be to review the nutritional implications of IBD. Talking a lot about patients interest in food, as well as their fear of food. We'll talk about fiber, the use of exclusion diets, such as the specific carbohydrate diet, and the low FOMDAP diet. We're going to touch a little bit on the use of exclusive enteral nutrition, and its impact on the microbiome. And then we'll also talk a lot about counseling patients with IBD, whether they're in remission or during a flare. If we've got time at the end we're going to wrap it up with a review of low oxalate diets, and then rehydration strategies.

Nutritional implications of IBD include micronutrient deficiencies, which are much more common than macronutrient deficiencies. Both unintentional weight loss and weight gain are seen in our patients with IBD. Over nutrition is now encountered in an increasing proportion of our patients. As a consequence, obesity is rising. It's important to remember that our patients with obesity can still be malnourished. OBCD doesn't exclude malnutrition. And that dehydration can be an issue in our patients with IBD due to various reasons, diarrhea, high ostomy outputs, vomiting, poor PO intake.

So there are many factors playing a role in the nutrition status of our patients with IBD. They are at high risk for nutritional deficiencies and malnutrition, decreased PO intake, nausea, vomiting, food fears, which we'll talk a lot about, different anatomy changes regarding strictures or surgery. This just highlights the role or the importance of having a dietitian work with these patients, because there's a lot of different things going on, and they might not get enough time with their doctor to handle all of these issues.

Potential nutrient deficiencies, patients with IBD are considered, again, to be at nutritional risk for the following deficiencies. We talked a little bit about decreased intake, reduced absorption might lead to several of these.

Normalization of their levels is the goal of therapy. So if a patient has a vitamin or mineral deficiency, these are fairly easily corrected with supplementation, and this will have considerable and measurable effects. Patients with small bowel Crohn's disease are usually going to have more prominent, nutritional deficiencies, compared with patients without small bowel involvement. So that's one thing to keep in mind with your patients with IBD.

I really like this table. This is usually included in my presentations regarding dietary management. This paper came out in 2015. If we look down the center with the blue boxes, these four different steps, or areas, are places where we can use dietary management in those with IBD. So whether our patients are under or over nourished, and we will have specific interventions if they're in an active flare versus in remission, there might be some specific therapies or things to try. And then outside of that, just having certain symptoms, whether it's related to functional gut symptoms, which we'll talk about, stenosis, fat malabsorption, or kidney stones.

Patients with IBD have a strong interest in dietary modifications as a part of their holistic approach in managing their disease. Diet is the number one reason patients are calling the Crohn's and Colitis Foundation of America hotline. Patients often correlate changes in their diet with food-related changes in symptoms. And this is often, as Dr. Stidham mentioned, without a change in their disease activity. And it's been reported that over 75% of patients with IBD, they restrict food groups based on their symptoms. So they're thinking that these things are causing inflammation, they're restricting their diets, thus leading to specific deficiencies.

So a UK collaboration with the James Lind Alliance was set up between patients, clinicians, and other stakeholders to develop research priorities in IBD. So the James Lind Alliance is an initiative in the UK, and it supports a partnership between patients and clinicians and other organizations. It's recognized as the gold standard to set research priorities. And this was the first one to be carried out in gastroenterology, so that's pretty cool. And the purpose was to look at, or identify, unanswered questions regarding the treatment of patients with IBD, from both the patients and the clinicians perspective. And then prioritize those based on what patients and clinicians recognized, or feel, are the most important.

So you can see, so a survey was sent out, 531 people answered. There was 1,253 uncertainties identified, and almost 350 of those were related to diet. 72% of the diet related questions came from patients. So again, highlighting, patients have a huge interest in diet. The top 10 priorities included, one broadly diet-related, and two diet-specific treatment uncertainties, which I will show you in a second.

So when the diet-related uncertainties were collated and revised, there were seven diet-related, indicative, uncertainties created, which is in table two. So these were ranked as 70 uncertainties. The second survey went out with 70, and everybody got to pick their top five that they feel are the most important to look at. And all seven of these were in the top 25 research

priorities. And then, the top 25 were voted on with a panel, and two diet-specific positions, so position three and seven, and then one broadly-related diet position, position 10, was included in the final 10. So for the tenth research question, the two questions that were combined had to do with antibiotics and the management of IBD and fecal transplantation, as well as probiotics.

Few studies have examined patient perception and beliefs on diet and the role in IBD. This is the largest European study to investigate dietary perceptions and behavior in those with inflammatory bowel disease. So this questionnaire assessed demographics, dietary beliefs, and habits in those with IBD. And among those who answered, you can see that there's a really high rate of patients looking at diet and thinking it's causing a flare. 66% percent of them are depriving them of their favorite foods in order to keep themselves in remission. There's not really any evidence to support that. 73% of patients believe that it affects their appetite. 2/3 of patients wanted more dietary information, and they requested that that information came from dietitians first, IBD nurse specialists, and then gastroenterologists, in that order.

Among the patients who had received dietary advice, so 50% of them, got their advice from dietitians, a gastroenterologist, or IBD nurse, and then only a small proportion, about 15% of patients, got their information from the internet, which is reassuring.

Patients have a strong belief about the role of their diet in the cause of IBD and in exacerbating or alleviating their GI symptoms. Dietitians are a valuable resource for patients. We're able to provide sound, nutrition information. Often in our clinic, patients will bring in different questions about something that they've seen online, or a supplement that maybe a holistic practitioner was trying to sell. And so we want to keep up on these, and we also want to be preaching evidence-based medicine.

If you've ever seen, I think it's, How to Heal, or HeallBD.com, this guy down here, is kind of a quack, and if you want a good laugh you can watch his website, but mainly, our biggest concern, is that patients are going to follow these very restrictive diets. There's no benefit in them, and that they might restrict important nutrients.

Looking at information online, this study did a web search analysis using two search engines, so both Google and Bing, and searched "Crohn's disease diet" and "ulcerative colitis diet", and then the top 30 hits on each search engine were reviewed. The food categories having a higher percentage of conflicting information were vegetables, fruits, nuts, and whole grains.

And I would say that's also pretty consistent with what I see in clinic. There's tons of confusion around that. Patients think they can never have raw fruits or vegetables if they've been diagnosed with IBD, or they're over restricting their diet in areas that might not be necessary.

So this study highlights an issue that patient-targeted dietary recommendations are often conflicting. They're more focused on what to restrict than what to eat. And this could be resolved in patients restricting their diets unnecessarily.

A retrospective chart review done at Cedars Sinai, show that a high rate of food avoidance was present in those with IBD. It's important that we help guide patients back to a diet that includes all foods from food groups, as tolerated. We want to help patients avoid over avoidance.

This is another study that helps validate or confirm the role of a dietitian on interdisciplinary team. The most common foods, you can see that were avoided, were dairy, gluten, vegetables, red meat, and poultry. Both Crohn's disease and ulcerative colitis patients were avoiding nuts. And the exacerbation of symptoms was found to be the reason patients started taking foods out of their diet.

This study observed that patients with Crohn's disease consumed a significantly more imbalanced diet in respect to calcium, vitamin A, C, D, and E, when compared to healthy controls. Micronutrient intake, mainly anti-oxidants, was greatly impaired in Crohn's disease, compared to controls. And then the results indicate that some of these deficiencies were clearly related to the exclusion of certain food items. So right after a patient received the diagnosis of Crohn's disease, they immediately started pulling out certain foods out of their diet, which led to these low level intakes.

Both Crohn's disease and ulcerative colitis patients in clinical remission are more likely to be malnourished than healthy controls. The most prevalent form of malnutrition and Crohn's disease patients, right now, is an excess of body weight accompanied with inadequate dietary intake, namely micronutrients. So again, our patients might not always look like they're malnourished, but if we do some digging, and do a proper nutrition assessment, maybe look at lab values, and see how limited of a diet they're eating, you would likely find that they wouldn't meet malnutrition criteria. And that's really important for us to identify in our patients. We would have specific interventions to address that. And then from a billing standpoint, it's also good for your health system.

So Dr. Stidham talked a little bit about this. There's been a lot of studies looking at diet and risk of inflammatory bowel disease. There's been several attempts to use epidemiological data to link dietary factors to the onset of Crohn's. A meta analysis suggested that a positive association between high intakes of fat, polyunsaturated fatty acids, omega 6 fatty acids, and meat intake, with a risk of developing Crohn's disease. And then fruit and fiber appear to be protective. It should be noted that data's heterogeneous. There's a lot of retrospective studies and sometimes it can be difficult to clarify the strength of any association.

All Right, so we have reviewed that our patients care about diet and nutrition. Dietitians serve an important role. We're going to talk a little bit about specific diets, how diets might impact inflammatory bowel disease. We had a really great talk yesterday by Dr. Vaner about how diet can affect the microbiome. Friday we talked a lot about FODMAPs, so we know that foods can alter gas production, and influence or affect how fluids are absorbed. And this can also play a role in our patients with IBD.

So exclusive enteral nutrition. This is much more popular in the pediatric population as well as in Japan. A Cochrane systematic review published in 2007 demonstrated that corticosteroids were more effective than EEN to induce remission in patients with active Crohn's disease. In children with active Crohn's disease, exclusive enteral nutrition can be used in place of corticosteroid steroid therapy, and has been shown to improve time to relapse. This approach has also been shown to positively impact inflammatory changes, mucosal healing, enhance growth, and improve overall nutrition status. So all good things, and we don't have the negative side effects that steroids bring, especially in our pediatric population.

In adults outside of Japan, this isn't as popular as a therapy. I don't know if anybody uses exclusive enteral nutrition. Show of hands, anybody has experience. OK, one, two-- I knew you, Lauren. OK, so a few people, about four, in this room.

So enteral nutrition can be provided from anywhere from six to 12 weeks, and then an oral diet is gradually reintroduced. There's some evidence to support the use of exclusive enteral nutrition as a treatment option in a select group of adult patients with Crohn's. Specifically those with a new diagnosis, those with ileal involvement, and then those who are motivated to adhere to the regimen. So a major issue in these studies, looking at adult patients, is that there's a lot of non-adherence. So we're thinking that maybe if patients adhere to it better, we would have better results.

There is a new systematic review with meta analysis that just came out for pediatrics, showing that there was no difference in efficacy between exclusive enteral nutrition and corticosteroids and induction of remission, which is exciting. So this should be an option if anybody works with peds, that you're thinking about or are considering in your clinics.

All right, so the mechanisms by which EEN reduces both physiological and metabolic markers of inflammation in Crohn's are largely unknown. However, mounting evidence is supporting that the enteral nutrition regimen modifies microbial communities residing within the gut. And if we can look at what's going on in there when these patients get into remission, maybe we can make some correlations or understand how we can more effectively treat Crohn's disease. So if exclusive enteral nutrition works through a favorable modification of the microbial base gut inflammation, looking at these changes, again, could offer clues to which microbes and, or, microbial metabolites play a role in the etiology.

So two recent reviews which are really great came out this year in *Nutrients*, and they've summarized the current literature regarding the impact of exclusive enteral nutrition on the gut microbiome in Crohn's disease. And then they highlight the emerging themes from these studies, which is that exclusive enteral nutrition causes a broad reduction in bacterial diversity, it changes community level metabolic functions, and, at least initially, it may increase dysbiosis. So it should be noted that the lack of standardized methodology and the high intervisual variability of the microbiome structure across studies, have generated some conflicting information. Specifically concerning taxonomic shifts, especially at classifications lower than the phylum level.

This study was one of the first perspective observational study that looked at the efficacy of exclusive enteral nutrition in patients with Crohn's disease who had complications. So typically patients who have intestinal fistulas, or abdominal abscesses, are excluded from exclusive enteral nutrition trials. So 44 patients with Crohn's were recruited. Two patients were lost to follow up, and one dropped out because of non-adherence. The remaining 41 patients were included and followed up for the rest of the study. So these patients were offered exclusive enteral nutrition for 12 weeks, and they received it at 30 to 35 kcals per kilogram. And either via an NG tube or orally, and this was adopted as the only remission-inducing regimen for these patients. 37 patients completed the 12 weeks of exclusive enteral nutrition-- Sorry. This just went back, why though? Sorry, all right, so 80% achieved complete clinical remission. Four patients had partial, and then four patients did not respond at all.

OK sorry, my computer screen went off.

So primary outcomes included clinical remission rate and mucosal healing rate. Endoscopy was performed at baseline and at week 12 and after exclusive enteral nutrition. And the patients, specifically, who had inflammatory strictures, so 10 patients, two had no response, two had partial response, and six achieved clinical remission. Patients with intestinal fistula, or abscess, 27 achieved clinical remission, four achieved partial, and two had dropped out.

A group out of Israel, kind of switching gears, but staying with the enteral nutrition, but using only about 50% of need. So some studies are looking at the use of partial enteral nutrition, and then specific exclusion diets. So this group out of Israel has conducted two studies using partial enteral nutrition, and an exclusion diet called the Crohn's disease exclusion diet, and their most recent study addresses the issue of loss of response to biologics in Crohn's disease. As this is a significant clinical problem. So these patients, the biologics that they were on were Remicade and Humira, in this study, and dietary therapy was used as a treatment step strategy, in this setting, and it hasn't been looked at before. So baseline, patients were seen at baseline, six weeks, and if responsive to dietary therapy, they were seen again at 12 weeks.

All patients receive dietary counseling regarding the use of the specific diet. They have a three-page handout, clear written instructions, recipes, allowed foods, there's a hotline where patients can call their dietitian and ask different questions. Several foods contain specific minimal quantities that must be ingested, and then others specify the maximum amount that they can have. So basically, this is a whole foods diet. They are limiting dietary components that could, hypothetically, degrade the mucus layer, and increase intestinal permeability, or that have been hypothesized to induce disabuses. So certain emulsifiers, which we'll talk about. So their diet specifically limits or eliminates exposure to animal fats, gluten, maltodextrin, monosaccharides, and then it had certain mandatory consumption of pro-inflammatory veggies and fruits, as well as resistant starch. You can see the dietary specifics in the study that was published in 2014, so the references at the bottom of the slide, and that's in the appendix. It's interesting to look at.

And what they found was that clinical response was obtained in 90% of patients, and remission in 62%. Among patients failing combination therapy, 53% of them entered remission. Improvement was previously elevated in-- Inflammatory markers that were previously elevated improved, in 81% of patients, and normalized in 40%. So it's kind of cool, this study

demonstrated that a specific feasible dietary strategy may be able to play a pivotal role in regaining remission among patients. I don't think this is mainstream, we should start putting all of our patients on this, but it's good to know that there are doctors and dietitians out there looking at dietary therapies in combination with enteral nutrition or not, to help our patients stay in remission.

Commonly used food additives, such as carrageenan and carboxymethylcellulose, cellulose or CMC, are administered in animal models consistently, and they result in intestinal ulcerations that are similar to humans with inflammatory bowel disease. Similar trials have directly assessed the influence of these two emulsifiers in humans, or they can't do that because it's unethical to conduct the exact same way that we do in rats. However, recent studies of human epithelial cells and human microbiome, support the findings from animal studies. So the proposed mechanisms of this is that carrageenan and CMC and processed foods result in the erosion of the protective mucus layer, and in the abnormal expression of tight junction proteins. So Dr. Stidham showed that mucous layer. If these emulsifier erode that undigested food particles, toxins, microorganisms, are then able to pass through the intestinal epithelium, resulting in translocation of microbes, and over colonization by resident microbes with pathogenic potential, thus leading to inflammation.

So I've had a few IBD patients ask about emulsifiers. So it's also good to be aware of this. We don't want to create more fear in an already fearful patient population. But it does say something. A lot of these exclusion diets, and exclusive enteral nutrition don't have these emulsifiers in them. So this is another reason to promote and advocate for a more whole foods, unprocessed diet. A lot of our patients eat a lot of refined foods, so it just kind of makes you think how many of these emulsifiers are they being exposed to, and could this be impacting their GI tract.

I was also interested, has anybody used a specific carbohydrate diet in their patients, because this is gaining a lot of popularity. Nobody, OK. So it's good to know about this, because you will definitely get questions if you work with patients with inflammatory bowel disease. It was initially proposed in the 1920s for the treatment of celiac disease. That was obviously debunked. It was repopularized by Elaine Gottschall in the 1990s.

So what's involved is this diet allows specific carbohydrates, and those are monosaccharides. It restricts primarily disaccharides and polysaccharides, so lactose, sucrose, maltose, isomaltose, we had a nice review of those yesterday, and then starches. So some legumes



are allowed after three months, but they have to be soaked for 10 to 12 hours. Pretty much all dairy is off, except you can do homemade yogurt. It does require a significant amount of time and commitment. Pretty much all meals have to be made at home, and patients are advised to follow this diet fairly strictly for at least a year.

You can see some of the foods that are allowed versus not. It does restrict all grains and most starches. So the concern is if a patient goes on this, are they going to be able to meet their nutrient needs.

There was a nice review of this diet in *Today's Dietitian*, from earlier this summer. It showed that a range of studies on SCD are now available. The evidence for this diet is based mostly on retrospective surveys and case reports, with a few prospective trials, or few prospective studies. Many of which are summarized in table two. One area of great interest is why this might be working. So again, changes or alterations of the microbiome, as well as avoidance of food additives and emulsifiers, are suggested in the literature. We definitely need a rigorous perspective, randomized controlled trials, in both peds and adults, I think, before we can say this merits management for all patients with IBD.

An interesting study came out earlier this year, out of the group from Seattle's Children's Hospital. They collected and analyzed data on over 12 weeks for pediatric patients who were on this diet. They looked at the intake of 20 key nutrients, and compared this to the DRIs, and nutrient intake from a similar aged children population from NHANES. So nine patients enrolled, really small study. Eight patients completed the study. Seven of the eight patients who completed the study, achieved remission by week 12, and the diet didn't work for one patient. Six out of eight patients in the study had gained weight, which is something we want in our pediatric population. Only one individual had weight loss, and one individual had no weight change.

So patients went on this diet as the sole intervention for this study, and they received one-on-one education and counseling by a dietitian. Kim Braly, she was the first author on this paper, and they were seen regularly on a consistent basis to make sure they were compliant with the diet, and also that they were meeting their nutrient needs. So what they found was that the majority of participants' daily intakes met or exceeded the RDA for many B vitamins, as well as C, A, and E. Nutrient intake of pediatric patients on the SCD was adequate when compared to the healthy peer reference from NHANES, which was good news. And adequacy was variable when compared to the DRIs.

The authors concluded that close monitoring with a multidisciplinary team would be recommended. I think we would all agree with that. They're using an SCD specific or approved, vitamin in their patients by GI ProHealth, and then they also concluded that vitamin D and calcium should pretty much be supplemented in all patients on this diet.

The website, Nimbals.com is by Dr. Suskind, who is out of Seattle Children's Hospital. So if you have a patient come to you with questions on this, or you're trying to plan an SCD diet for somebody, I've had two patients referred for this, this can be a helpful resource. Because we definitely don't want to not give them good information, or tell them that we can't work with them because we don't think it's a good idea. We really want to meet our patients where they're at.

Exciting, and on the horizon, the first time ever a dietary intervention will be the focus of a major national research study of patients with Crohn's disease. The Crohn's and Colitis Foundation of America awarded \$2.5 million to fund this study. And so they're going to look at the effectiveness of the SCD and the Mediterranean-style diet. So they're going to compare the two. They're going to look at mucosal inflammation and patients. And I think this is going to tell us a lot of information.

So moving on to what we should be recommending our patients to eat during a flare, versus not. During a flare our patients are not feeling good. They're also not eating well. We want to make sure that we help them achieve adequate calorie intake, and adequate protein intake. These patients are hypermetabolic, they have increased protein needs. We might want to temporarily reduce fat and fiber intake, as those can be irritating to the gut. Smaller, frequent meals and snacks typically work a lot better. Large volumes are usually not well tolerated. So some of these kind of overlap.

Maybe some gastroparesis nutrition information that you might be familiar with. We want to encourage protein sources at all meals and snacks. Doing shakes or smoothies or oral supplements can be very helpful. And then avoiding trigger foods. So often things like high fat foods, and spicy foods, or maybe a patient becomes temporarily lactose intolerant during a flare, these would be things that we would want to put on hold.

Eating during remission is a lot more fun, and we should be encouraging a lot more variety. So we want to encourage a high quality, complete diet. There is strong evidence to support

increasing intakes of dietary fiber from foods, especially from fruits and vegetables. As well as avoiding omega 6, polyunsaturated fatty acids. So things like safflower oils, corn oils, and margarine, as well as trans unsaturated, fatty acid consumption. These have been shown to be pro-inflammatory.

We also want to recommend to our patients to limit the intake of red and processed meats. Given that vitamin D status appears to be an independent risk factor for potential poor outcomes, we should be checking the vitamin D levels of all of our patients with IBD, and optimizing that with supplementation. We only restrict fiber during acute exacerbation or with strictures, which we'll talk about. Otherwise we want our patients to eat a diet with adequate fiber, as tolerated.

So as soon as possible, patients should add back all foods to their diet, and we would recommend increasing fiber slowly, if they're coming out of a flare. That way we don't exacerbate a lot of symptoms going from a low fiber diet to a high fiber diet.

So a systematic review of randomized controlled trials, found that three out of 10 studies for ulcerative colitis supported fiber supplementation to benefit disease outcomes. There were no studies in Crohn's, and then there was one out of one study in pouchitis, that reported a benefit on disease activity. So patients will probably ask you about fiber. This is good to know. There may be some role for patients with ulcerative colitis, particularly with psyllium fiber.

Despite this, a number of studies that were looked at, they did report favorable intergroup effects on physiological outcomes including, fecal butyrate, fecal calprotectin, inflammatory cytokines, as well as improvement in GI symptoms.

We should also be noted that the interventions that have used fiber intake, they've all used different supplements. So it makes it hard to understand what's going on. So non-starchy polysaccharides, oligosaccharides, germinated barley, cilium, and a lot of these studies also didn't take into account habitual fiber intake. So that's something else we would want to know, are these patients at baseline eating a really high fiber diet, or a really low fiber diet.

A recent study did show, though, that patients in remission with Crohn's disease, they had a lower risk of having a flare. The patients in the highest quartile, 40% lower risk of having a flare, compared to patients who ate the least amount of fiber. So that's just another, smaller study, but still supporting the beneficial role of adequate fiber and an unprocessed diet in patients with Crohn's disease.

A systematic review with meta analysis estimated that 35% of patients with IBD meet criteria for IBS. These persistent, functional-like gastrointestinal symptoms include abdominal pain, bloating, flatulence, and diarrhea, which will greatly impact our patients health, quality of life. And they often think that they are in a flare. And as Dr. Stidham mentioned earlier, symptoms usually do not correlate with disease activity, particularly in Crohn's disease.

Sometimes these patients have functional GI symptoms. It's not related to inflammation. The FODMAP diet might be helpful in them. There's definitely retrospective data to support the use of this diet. This is what we primarily do at U of M with patients. So our doctors will refer our patients to us, we do a low FODMAP diet, we've had good success.

This is the first randomized placebo-controlled crossover, rechallenge trial to investigate the effect of FODMAP challenges in patients with IBD who present with functional GI symptoms. And this was published earlier this year. So these participants were instructed to follow a strict, low FODMAP diet throughout the trial. They responded they felt well. And then the day before starting a challenge at baseline, they completed all outcome measures, and then would start this challenge. So the authors looked at fructan, GOS, and sorbitol, and they used amounts that were reflective to what's typical in a UK diet. The patients did three-day challenges, they would record their symptoms, and then they had a four-day wash out in between these different high FODMAP challenges. And patients were not allowed to start another challenge if they had symptoms.

So fewer patients reported adequate relief of GI symptoms on the final day of their fructan challenge, compared with glucose. And they use glucose as a placebo. And there was greater severity of pain, bloating, flatulence, and fecal urgency on the final day of the fructan challenge, also compared with glucose. There was no significant differences found between the GOS or the sorbitol, compared with glucose.

So we had a nice explanation of what strictures are. I'm not going to go too much into detail with that just for time's sake, but we will see patients with this. And we want to alter or modify their dietary content so they don't have a lot of fibrous, hard-to-digest foods coming through. We don't want to cause or worsen GI symptoms, we don't want to cause a partial or complete blockage, with fibrous fatty meats, raw veggies, popcorn and nuts, are typical things that we might have a patient avoid. Basically insoluble fiber, so the skins of things, if we can get rid of those, that's also recommended

Symptoms might include nausea, vomiting, bloating, visible distension, as Dr. Stidham had mentioned. And often these diet changes are temporary. These patients, if they have surgery to remove a severe stricture, we're going to get them back to a regular diet. Another thing to keep in mind, though, the more patients have surgery the more likely they're going to have adhesions develop over time. So a patient might have to go on a lower fiber diet more than once, based on the anatomy of their GI tract.

So some goals for eating with the stricture. We don't want our patients to become malnourished, we want to make sure they are getting enough calories and protein. So coming up with recipes that they like, different soups and smoothies and shakes and oral supplements can be very handy and convenient. Using moist cooking methods, so versus dry roasting methods, like grilling or barbecuing, things that make things harder to digest, particularly proteins, we would want to avoid. Crockpot meals are generally more well tolerated from a protein standpoint. And then volume matters. So we'd want to make sure patients are not eating large meals. This typically causes more discomfort. So trying to have five or six smaller meals and snacks, spread throughout the day, cutting food into really small pieces, focusing on behaviors, such as eating slow and chewing foods well, can make a big difference in these patients who are eating with a stricture.

All right so, in patients with Crohn's disease, we may have issues with kidney stones. And this is because oxalate, that's present in many foods, is typically in a normal, healthy person, only absorbed in really small amounts. And that's because it binds with dietary calcium in the small intestine, and it reduces the absorption. So if you have a patient with Crohn's disease who has had a resection or they're having a lot of fat malabsorption for whatever reason, this fat malabsorption, or the fat binds to calcium. So that leaves oxalate available to be absorbed in the colon. It's brought to the kidney, and thus can create calcium oxalate stones. So we might need our patients to reduce their oxalate intake from the diet, as well as increase fluid intake. So the fluids is huge. That would probably be the first thing I would focus on, as well as reducing oxalate intake.

So here are some high oxalate foods. You can find other lists online. The nutrition care manual has one, if you have access to that. We also want to look at calcium and fat intake. So a fat is biting into calcium. We don't want our patients eating a really high fat diet. That's one area to make an intervention. And then also, calcium, primarily from foods would be great. Because if we increase calcium at meals, that would be there and available to bind to the

oxalate. If patients aren't able to get their calcium from foods, then we would use a calcium supplement. But I would definitely recommend going the food first route, and then supplements. You don't want to have patients taking more than 1,200, 1,500 milligrams of calcium a day.

And then vitamin C, if our patients, it's winter time, and they think that taking 500 milligrams of vitamin C is going to prevent them from getting a cold, and they have a history of kidney stones or oxalate stones, we want to tell them that's not true. Stop taking the supplement. Vitamin C in excess like if you have excess part of it can turn into oxalate. And that would, again, promote the formation of stones.

So as dietitians, we're pretty much all familiar with common signs of dehydration. This is something you want to educate your patients on. They might not be aware they're dehydrated. Our at-risk patients are those with high ostomy outputs, diarrhea, and then inadequate intake of fluids, because they're not feeling good. So be on the lookout for these and educate your patients.

Patients who do have a lot of diarrhea or high ostomy output, we want to use an oral rehydration solution. This is much better than a sports drink. Sports drinks are formulated to replace the electrolytes that are lost in sweat. And so we lose a little bit more in our stool. And these are formulated to replace those electrolytes. And they're also formulated to promote the absorption of fluid in the GI tract. So these are best. You can buy them over the counter. You can find them at Walgreens. You can make them at home. There's some do-it-yourself options available on the United Ostomy Association of America. It's a good site for any patient who has an ostomy.

I know this is a really busy table. I just wanted to show you why these oral rehydration solutions are more important. So it really has to do with the osmolarity. If you have something with a really high osmolarity, it's not going to be effectively absorbed. So Dripdrop, I'm not promoting them, but this table came from their website, and they've created a formula that's isotonic. There are other ones out there, and you could use something like Pedialyte, or if you make one, again, at home, that would have similar osmolarity. But we'll have patients come in who have high ostomy outputs, or a ton of diarrhea, and they're just drinking Coke or ginger ale and apple juice, because that's what they feel it's best in their stomach. And that has a lot of sugar. It's very high osmolarity, and it's likely not helping the absorption of fluids, so you need both glucose and salt.

There is an app for patients with IBD. So if they're having a hard time staying on top of their eating or medications or symptoms, this is a free online tracking tool by the Crohn's and Colitis Foundation. It's designed to help track important aspects of IBD. They can track their food and their medications and symptoms, overall well-being. It compiles and organizes this data, and then they can bring it to their appointment with you, or their doctor. Or it can just be eye opening for them to see what they're going through every day, and stay on top of their disease management.

So to wrap things up, we know IBD patients care about nutrition. We, the dietitians, are best suited to assess their nutrition status and implement appropriate nutrition therapy. Diets are helpful in reducing symptoms and may be a factor in lessening the effects of IBD complications. Unfortunately we don't have one, specific, best diet for patients, for all patients with IBD. However, we do know that a more whole foods diet, we've gone over that for a lot of other disorders that we've talked about this weekend, so anywhere from GERD and NAFLD and now IBD, there's some common, underlying themes, that we can work with patients to help improve the quality of their diet, improve their overall health status, and that may have an effect on their inflammation.

Thanks.