

A Qualitative Research Study of Current Practices in Residential Treatment Facilities of Eating Disorder-Diabetes Mellitus Type 1 (ED-DMT1)

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Citation: Austin MM, Patten EV, Thatcher B, Wright HM, Fullmer S (2022) A Qualitative Research Study of Current Practices in Residential Treatment Facilities of Eating Disorder-Diabetes Mellitus Type 1 (ED-DMT1). J Clin Nutr Diet Vol.8 No.2: 173.

Abstract

Context: Patients with an eating disorder and type 1 diabetes require specialized care. There is a lack of information on current treatment practices for these patients in a residential eating disorder treatment setting.

Objective: Identify current practices for treating patients with an eating disorder and type 1 diabetes in a residential eating disorder treatment setting.

Design: This was a qualitative research study. Interviews were conducted *via* zoom video conferencing and later transcribed verbatim. Four researchers conducted qualitative data analysis using a case study design approach.

Participants/Setting: Data from transcribed interviews of 18 clinical nutrition managers at 18 different eating disorder treatment facilities across the United States were analyzed. Only clinical nutrition managers employed at eating disorder treatment facilities that offered a residential level of care were eligible for participation.

Results: Four themes were identified through qualitative case study analysis: 1) Nutrition interventions for patients with diabetes, 2) Medical diabetes management, 3) Interdisciplinary diabetes team, and 4) Clinical nutrition manager's assessment of diabetes care. Clinical nutrition directors were knowledgeable about nutrition related interventions at their respective treatment facilities. There was an apparent lack of communication and lack of knowledge across disciplines. The most frequent feedback was the need and desire for more education related to treating patients with type 1 diabetes.

Conclusion: There is a need for future research to develop education and training materials for residential treatment center staff and for standard of care recommendations for patients with an eating disorder and type 1 diabetes.

Keywords: ED-DMT1; Eating disorders; Type 1 diabetes; Residential treatment; Qualitative research

Received date: February 24 2022, Manuscript No. Ijpcnd-22-12415; **Editor assigned date:** February 28 2022, PreQC No. Ijpcnd-22-12415 (PQ); **Reviewed date:** March 10 2022, QC No. Ijpcnd-22-12415; **Revised date:** March 17 2022, Manuscript No. Ijpcnd-22-12415 (R); **Published date:** 24 March 2022, DOI: [10.4172/2472-1921.100173](https://doi.org/10.4172/2472-1921.100173)

Introduction

Type 1 Diabetes Mellitus (T1DM) is an autoimmune disease that destroys pancreatic beta cells, leading to insulin deficiency [1]. About 1.25 million Americans have T1DM. Treatment with exogenous insulin is required to maintain normal blood glucose levels and is necessary throughout life [2].

About 30 million people in the United States are affected by Eating Disorders (EDs). EDs are serious mental illnesses with the highest rates of suicide and co-morbid mental illness [3]. EDs include anorexia nervosa, bulimia nervosa, binge eating disorder. Eating Disorder-Diabetes Mellitus Type 1 (ED-DMT1) is the term used to describe someone with type 1 diabetes and a co-occurring ED. Diabulimia has been used to describe EDs in people with T1DM, referring to intentional withholding of insulin for weight loss [1].

ED-DMT1 is a more correct and inclusive term when referring to a person with an ED and T1DM because it includes all ED behaviors a person may be engaged.

Treatment of T1DM itself may increase the risk of developing an ED due to weight gain with insulin initiation, dietary restraint, the ability to lose weight through insulin omission and other factors [4]. About one-third of people with T1DM intentionally omit insulin, and this behavior is a cause of recurrent episodes of diabetic ketoacidosis [5]. Diabetic ketoacidosis is a serious, potentially life-threatening condition that can result from untreated high blood glucose levels.

Women with T1DM have 2.5 times the risk of developing an ED when compared with peers who do not have diabetes [6]. Omitting insulin is associated with a threefold increased risk of death, increased rates of nephropathy, and higher rates of foot problems when compared with those who administer appropriate doses of insulin [7]. Women with ED-DMT1 experience poorer glycemic control and higher rates of hospitalizations, retinopathy, nephropathy and premature death when compared with women with T1DM who do not have EDs [8].

A multidisciplinary team approach is recommended to treat EDs, including a psychiatrist, therapist, psychologist, physician, nurse, and dietitian as part of the treatment team [9]. Longer residential treatment stays are associated with better outcomes in those with ED-DMT1 [6], and patients reported feeling more hopeful about treatment and recovery when their ED and diabetes were addressed simultaneously in treatment [10]. However, there are currently no known standards of care for treating patients with ED-DMT1 in a residential ED treatment setting. This study aimed to describe the current practices for treating patients with ED-DMT1 in a residential ED treatment facility setting, to determine any commonalities and differences among various treatment facilities, and to determine what challenges currently face providers in this treatment setting.

Materials and Methods

Participants

A list of 333 ED treatment facilities in the United States was obtained *via* e-mail from the alliance for eating disorders awareness. Facilities were excluded from participation if they were not located within the United States, did not offer residential level of care, were not an ED-specific facility, or did not have identifiable contact information. The point of contact at each facility was the Clinical Nutrition Manager (CNM). Of potential participants, 104 facilities met the inclusion criteria.

The CNM at each facility was contacted *via* one to four rounds of phone calls and/or e-mails and the interview process was explained. Of those contacted, 29 CNMs at facilities located in 16 different states were willing to participate.

Data collection

An interview guide of 19 items was developed with questions related to nutritional practices and philosophies, diabetes management (*i.e.*, blood glucose monitoring, insulin administration, etc.), medical monitoring and screening practices

and overall satisfaction with the current treatment practices. Interviewers asked about policies and protocols at their facility of employment, but individual patient information was not discussed. The interview guide was based on methods previously described [11,12] and was reviewed by qualitative researchers.

If the CNM was willing to participate, they were sent an e-mail containing an informed consent and a demographic survey link on Qualtrics®. The final question of the survey prompted CNMs to identify up to three times they were available for an interview over zoom video communications. One CNM did not complete the survey but scheduled an interview directly *via* e-mail; they stated intention to complete the survey but did not.

Interviews ranged from 30 minutes to 60 minutes in length, both audio and video were recorded. All interviews were conducted by the same trained researcher (MA). CNMs were allowed to decline any questions they were uncomfortable answering. Upon completion of the interview, CNMs were sent an electronic \$25 Amazon gift card. Interviews were conducted until data saturation was met [13]. A total of 19 CNMs were interviewed.

Institutional review board approval

All study procedures were approved by the university's institutional review board. The survey was deemed exempted and all participants provided oral informed consent for the video interview.

Data Analysis

Audio/video recordings of interviews were transcribed verbatim and read by four researchers multiple times for data immersion [14]. One interview was excluded from the study because the participant worked at the same facility as a member of the research team, thus the final sample size for analysis was 18. A qualitative case study design was used for analysis [15]. Consistent with this approach, four researchers individually read the transcripts and then met to identify a descriptive framework (*i.e.*, headings to organize the interview content) by which to organize each CNM's experiences into consistent and coherent narratives [16]. After agreeing on a descriptive framework, two researchers were trained to write case descriptions and used the framework to construct a case description for each interview. These researchers reviewed each other's case descriptions, and two other researchers then independently reviewed each case description. Revisions and edits were made until all researchers agreed that the case descriptions were representative of the corresponding interview. All four researchers then immersed themselves in the case descriptions and then met together to identify uniform categories. Fourteen uniform categories were identified and word/coding tables for each category were created by two researchers and reviewed by two other researchers. Word tables were used to organize information from each case description by uniform categories [15]. All four researchers met to identify representative themes from the uniform categories. Four themes were identified.

To ensure result trustworthiness, member checking (inviting participants to review their comments as presented in the findings) was employed [17] by asking participants to evaluate

the accuracy of the written results. The complete results section was e-mailed to all participants with functioning e-mail addresses (n=17). Participants were asked to consider the accuracy of the results from their own and their peers' experiences and to recommend any changes. No changes were recommended by participants from this process.

Results

Results from this study are reflective of the experiences of 18 CNMs from 18 residential eating disorder treatment facilities across the United States. Table 1 contains self-reported descriptive information about each facility. Four themes were identified through qualitative case study analysis: 1) Nutrition interventions for patients with diabetes, 2) Medical diabetes management, 3) Interdisciplinary diabetes team and 4) Clinical

nutrition manager's assessment of diabetes care. Below is a description of each theme including direct CNM quotes (Table 1).

Theme 1: Nutrition interventions for patients with diabetes

CNMs described the nutritional philosophies used with patients with diabetes at their facility. The majority of dietitians (n=16) described having an all foods fit model or using health at every size or intuitive eating® principles in their nutrition counseling. One dietitian stated, our philosophy could be summarized with the ideas of flexibility and trust and balance, they help patients build trust in their bodies again. CNM 7 said, we work off of a health at every size® paradigm. We're non-diet. CNM 10 taught patients that all foods are equal and neutral in a sense. CNM 2 described utilizing the food addiction model which is a no sugar, no flour, no starch food plan.

Table 1: Residential facility demographic information as reported by the clinical nutrition managers.

Participant	Levels of care offered	Number of beds	Gender/gender identities accepted	Minimum age of patients in years	Levels of care that accept patients with type 1 diabetes	Estimate of patients with type 1 diabetes treated in 2019
1	Residential, partial hospitalization, intensive outpatient	11-20	Male, female, transgender, gender non-conforming, non-binary	18	Residential, partial hospitalization, intensive outpatient, outpatient	1-5
2- No survey was returned						
3	Residential	1-10	Male, female, transgender, gender non-conforming, non-binary	11	Residential, partial hospitalization, intensive outpatient	0
4	Residential, partial hospitalization, intensive outpatient	1-10	Male, female, transgender, gender non-conforming, non-binary	18	Residential, partial hospitalization, intensive outpatient	6-10
5	Inpatient, residential, partial hospitalization, outpatient	31-40	Female	11	Inpatient, residential, partial hospitalization, outpatient	1-5
6	Inpatient, residential, partial hospitalization, intensive outpatient	≥ 71	Male, female, transgender, gender non-conforming, non-binary	8	Inpatient, residential, partial hospitalization, intensive outpatient	≥ 21
7	Residential	31-40	Female, transgender (male to female), gender non-conforming, non-binary	11	Residential, partial hospitalization, intensive outpatient, outpatient	1-5
8	Residential	21-30	We accept females that identify as male or non-binary but haven't undergone hormone or surgical treatment.	11	Residential	0
9	Residential	1-10	Male, female, transgender, gender non-conforming, non-binary	10	Residential	1-5

10	Residential	1-10	Male, female, transgender, gender non-conforming, non-binary	16	Residential	1-5
11	Residential, partial hospitalization	11-20	Female, transgender (female to male)	18	Residential, partial hospitalization	6-10
12	Residential, partial hospitalization, intensive outpatient, outpatient	1-10	Male, female, transgender, gender non-conforming, non-binary	16	Residential, partial hospitalization, intensive outpatient, outpatient	0
13	Residential, partial hospitalization, intensive outpatient	21-30	Male, female, transgender, gender non-conforming, non-binary	10	Residential, partial hospitalization, intensive outpatient	6-10
14	Residential	1-10	Male, female, transgender, gender non-conforming, non-binary	10	Residential, partial hospitalization, intensive outpatient, outpatient	1-5
15	Inpatient, residential, partial hospitalization, intensive outpatient	31-40	Male, female, transgender, gender non-conforming, non-binary	12	Inpatient, residential, partial hospitalization, intensive outpatient	1-5
16	Residential, partial hospitalization, intensive outpatient	11-20	Female	18	Residential, partial hospitalization, intensive outpatient	1-5
17	Residential, partial hospitalization	21-30	Male, female, transgender, gender non-conforming, non-binary	10	Residential, partial hospitalization	1-5
18	Residential, partial hospitalization, intensive outpatient	11-20	Female	18	N/A	N/A

CNMs were also asked about practices regarding weighing patients. Fifteen CNMs performed blinded weights daily (n=10), weekly (n=1), or biweekly (n=4). Many (n=14) stated they would do a weight exposure with patients (*i.e.*, discuss weight numbers or general weight trends) if the treatment team determined this would be clinically appropriate. This was more likely for a patient with diabetes who attends frequent doctor appointments where they may be exposed to their weight. However, another CNM indicated that discussing weight with the patient was standard practice.

When asked about meal plan structure, most CNMs (n=11) reported providing three meals and two to three snacks daily. Thirteen CNMs reported that the diabetes meal plans matched the standard for all patients. The majority of programs (n=13) used an exchange-based system. CNMs described using the exchange-based systems somewhat differently, with some indicating strict adherence to diabetes exchanges and others reporting modified, flexible approaches to the system. Non-exchange-based strategies included having a carbohydrate counting system, being moderately less flexible, individualizing adjustments based on blood glucose trends, the patient weighing and measuring food during preparation, a facility-specific percentage system, and eliminating carbohydrates at snacks if a patient was unable to

calculate the insulin on board. One CNM reported serving half portions of carbohydrates at breakfast with two low carb add-ons and snacks from a specific low carbohydrate list. Most CNMs (n=16) described allowing patients to self-select or portion food at meals and/or snacks under staff supervision, with patients typically increasing in opportunities to practice these skills as treatment progressed.

Regarding dietitian monitoring of carbohydrate intake, five CNMs reported not having target macronutrient ranges but two of those indicated having carbohydrate counts for menu items with actual intake monitored by the dietitian. CNM 2 stated there were no set target ranges, but there's always a little more protein than there is carb. There's always fat, there's vegetables. More monitored approaches included having target macronutrient ranges (e.g., 45%-60% calories from carbohydrates) and limiting the number of carbohydrate exchanges at meals (e.g., no more than 4 carbohydrate exchanges or 2-3 carbohydrate exchanges). Other approaches included individualized macronutrient ranges, patients logging carbohydrate intake at meals, and having a goal total in mind of carbs and have it split up pretty evenly throughout the day (CNM 17).

Most CNMs (n=11) reported use of oral supplements (e.g., boost®, ensure®, and glucerna®) for patients who were unable or

unwilling to complete their food at meals/snacks. Only CNM 12 identified using a diabetes-specific formula if the standard facility formula was not tolerated. CNM 10 stated that patients were expected to consume 100% at meals and snacks and that they did not use nutritional supplements because, our staff is very, very skilled in techniques and strategies and motivational techniques to get clients through those difficult (eating) experiences. Only three facilities offered tube feedings and typically bolus or nighttime tube feedings were used.

Theme 2: Medical diabetes management

CNMs described medical diabetes management. Regarding approaches used to monitor blood glucose, nine CNMs stated their facility allowed Continuous Glucose Monitors (CGMs) if the patient had used one before admission. One CNM stated their facility required all patients with diabetes to bring a CGM to treatment. Finger sticks were used in conjunction with CGMs, however, five CNMs reported their facility used only finger sticks to check blood glucose. Two facilities allowed patients to check their blood glucose with staff supervision, while others (n=4) had the nurse perform all finger sticks. Blood glucose monitoring frequency varied across facilities. Blood glucose was most frequently checked before meals (n=7) or after meals (n=7).

One CNM stated: If someone's really well-controlled and they're following through with treatment recommendations appropriately, pretty compliant, then we might only be checking blood sugars, don't know, maybe once or twice a day (CNM 17).

Regarding insulin administration, one CNM reported they only used injections and discontinued insulin pumps at admission. Of five CNMs who allowed insulin pumps, three reported that the patient exclusively used injections upon admission and gradually returned to the pump before discharge.

One CNM stated that only nurses administered insulin because the nursing director last time was not open to patients having more freedom and flexibility (CNM 8). Six CNMs reported patients administered their insulin under staff supervision, but CNM 7 stated that sometimes the patient's insulin is based on self-report and not supervised by staff. Six CNMs stated that nursing staff initially administered all insulin and patients gradually assumed responsibility under supervision.

CNMs described patients' insulin regimens. Seven stated that insulin is administered to match carbohydrate intake, they use carbohydrate to insulin ratios, or dose insulin based on exact carbohydrate counts. Only two CNMs mentioned patients using a form of long-acting insulin, one shared:

Most patients are on some form of 24-hour insulin, and then most have a sliding scale or a correction factor, and...they're receiving insulin right after each meal. So a lot of times our goals are to not have to do insulin at snacks...Most of the time the background insulin is catching any higher blood sugars for the snacks (CNM 15).

For managing out-of-range blood glucose levels, nine CNMs indicated they gave patients fast-acting carbohydrates (e.g., juice, gummies, glucose tabs, etc.) for low blood glucose levels and then monitored. Of those, three reported treating low

blood glucose levels at 70 mg/d, while three others gave 15 grams of carbohydrate and rechecked blood glucose after 15 minutes. Approaches to managing high blood glucose included administering insulin (n=5) and decreasing carbohydrate and increasing protein and fat at that meal or snack (n=2). Only three CNMs indicated their facility had official written policies related to managing out-of-range blood glucose levels.

CNMs described biochemical monitoring and screening related to diabetes. Hemoglobin A1C (HbA1c) was the most common unique lab monitored for patients with diabetes (n=15). Seven stated they were unsure which labs were monitored or guessed how frequently HbA1c was checked. Of the CNMs familiar with HbA1c protocols, they described checking at admission (n=4), monthly (n=2), every three months (n=4), or not checking HbA1c due to short patient lengths of stay (n=1).

Eight CNMs reported they were unsure of urinary ketone testing protocols. CNMs who reported testing indicated it was primarily done at admission (n=8). Additional testing included randomly (n=2), with symptoms of hyperglycemia (n=3), or with scheduled labs ranging from weekly to every four weeks (n=2). One CNM stated that ketosis doesn't really happen. CNMs were asked to share their facility protocols for additional diabetes complication screening. Only two identified specific complications for which they screened (*i.e.*, retinopathy, wound healing, neuropathy and kidney disease). Screening happened primarily before or at time of admission (n=6). Additional screening was reported weekly (n=1) or with presentation of symptoms (n=1). One CNM stated they did not screen for complications due to the young age of their patient population.

Theme 3: Interdisciplinary diabetes team

CNMs were interviewed about members of the treatment team, their level of experience, and their roles in treating patients. The most common treatment team members were the dietitian, therapist, medical provider, psychiatric provider, nurse or nurse manager and as needed a consulting endocrinologist. Only one CNM reported having a Certified Diabetes Care and Education Specialist (CDCES) on staff (**Table 2**).

CNMs' knowledge and expertise related to diabetes were assessed. Multiple CNMs made comments about their lack of knowledge, while others made their level of knowledge clear through their responses. All were knowledgeable about nutrition interventions. Five CNMs had either never personally worked with a patient with type 1 diabetes (*i.e.*, a coworker was the primary dietitian on the treatment team), described their own experience as limited, or reported they had not treated any patients with diabetes recently. Most (n=13) were not aware of medical policies or protocols (lab values, ketones, insulin, etc.), stating it's more of a nursing staff/doctor question or that diabetes is probably not my specialty.

Five CNMs did not comment and three stated they did not know about patients' insulin regimens. One dietitian stated, don't really have a part in that. Another discussed how staff at their facility learned about diabetes and manipulation with the co-occurring ED from past patients, stating some of our patients have really taught us a lot on what can be done. In response to questions

Table 2: Members of the ED-DMT1 treatment team as reported by clinical nutrition managers.

Treatment team members	Interview participants																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Dietitian or nutritionist	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Therapist	•	•	•	•	•	•				•	•	•	•		•	•	•	•
Medical provider	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•
Psychiatric provider	•	•	•			•	•			•	•	•	•	•	•	•		•
Nursing manger or nurse	•	•	•	•	•	•	•	•	•	•	•			•	•	•	•	•
Social worker or case manager	•	•					•											
Eating team manager	•																	
Clinical manager	•							•										
State director	•																	
Psychologist						•												
Behavioral specialist						•												
Patient							•											
Program director									•					•				
Facility manager														•				
Behavioral director								•							•			
Diet technician																		
Behavioral technician															•			
Certified Diabetes Care and Education Specialist (CDCES)				•														
Endocrinologist as a consultant	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•

regarding managing out-of-range blood glucose levels, five CNMs did not comment, and two CNMs were unsure of management strategies. Eight CNMs did not know what their facility protocols were for monitoring ketone levels. Five CNMs were unsure of any details related to screening for diabetes complications in patients. CNM 6 emailed a physician at her facility to answer questions about medical management.

CNMs discussed approaches to diabetes education and counseling. Providers involved in diabetes education included combinations of the registered dietitian (n=16), medical provider (*i.e.*, medical doctor, nurse practitioner, etc.) (n=7), nursing staff (n=7), CDCES (n=1), and/or diet technician (n=1). The most commonly reported diabetes education topics included insulin (*i.e.*, function, dosing, manipulation consequences, relationship between weight and insulin, etc.) (n=8), blood glucose (*i.e.*, managing highs/lows, stability, target ranges, impact of ED behaviors, etc.) (n=8), the role of carbohydrates in the body (n=4), and weight (*i.e.*, history, changes with insulin initiation, etc.) (n=3).

CNMs reported diabetes-related therapeutic topics addressed with patients, including stages of grief and accepting diabetes

(n=5), diabetes burnout and fatigue (n=4), diabetes etiquette (*i.e.*, dealing with comments about diabetes or food, etc.) (n=3), eating out with diabetes (n=2), effect of the ED (n=1), insulin safety (n=1), gaining independence with diabetes management (n=1), finding balance (n=1), fear foods (n=1), preparing for endocrinology appointments (n=1), and relapse prevention (n=1). Two indicated they would focus more on the ED rather than diabetes. All topics were addressed in individual therapy sessions. None of the facilities offered a group specifically for patients with diabetes, with the most common reasons being not wanting to single one person out or that there's not often enough patients with diabetes to have a group.

Theme 4: Clinical nutrition manager's assessment of diabetes care

CNMs described their level of satisfaction with their current practices for treating patients with diabetes. Two CNMs specifically stated they were satisfied with their facility treatment practices, stating, I am proud of us. I feel like we do a great job, or overall we do a pretty good job. Six CNMs did not identify any strengths or areas of satisfaction related to current diabetes

treatment practices, stating it's a work in progress, or that we need to commit to (treating patients with diabetes) 100%. Areas specifically identified as having strengths or satisfaction were medical management (n=3), treatment team communication and/or collaboration (n=3), and an individualized approach to patient care (n=4).

CNMs also described suggestions for improvement, with only one CNM having no suggestions. The most common suggestion was improved or increased education for staff (n=8). CNMs also expressed desires for more formal diabetes treatment policies (n=3), stronger medical support (*i.e.*, endocrinologist, ED informed physician, 24-hour nursing, etc.) (n=3), hiring a CDCES (n=3), and quicker access to labs and blood glucose logs (n=2).

Discussion

Individuals with type 1 diabetes are at a higher risk of developing an ED, and those who have T1DM and an ED are at higher risk for diabetes-related complications, yet there is a lack of research about treatment strategies for this population [18,19]. This study aimed to shed light on current practices in treating individuals with ED-DMT1 in a residential ED treatment setting.

Nutrition philosophies frequently included the ideology that all foods fit and intuitive eating® principles. There are possible pros and cons of applying these concepts in patients with ED-DMT1. Intuitive eating® incorporates principles such as making peace with food, challenging the food police, honoring hunger, respecting your body, and learning about gentle nutrition [20]. These principles facilitate less food judgment, more flexible eating and less emotion-driven eating. Adolescents with type 1 diabetes have been shown to have worse glycemic control when they report disordered eating behaviors and eating that is driven by emotions. This is also linked with higher HbA1c [21]. However, eating intuitively with type 1 diabetes may be challenging due to situations in which one may need to eat based on blood glucose levels or insulin (e.g., eating fast-acting carbohydrates for low blood glucose or needing to eat a certain amount of carbohydrate due to insulin on board).

When CNMs discussed actual meal plan practices, three meals and two to three snacks per day was the most common meal plan distribution, with most facilities utilizing an exchange-based meal plan. Since the standard meal plan structure is already based on meal exchanges, it is well suited for patients with diabetes. Exchanges provide a balance of macronutrients and carbohydrates distributed throughout the day. Carbohydrate counting involves counting either exact carbohydrate content of foods in grams or normalizing portions of carbohydrate-containing foods to about 15 grams. Carbohydrate counting is associated with improved glycemic management [22]. The exchange-based meal plans described by CNMs interviewed would provide a basis for carbohydrate counting.

When discussing the medical management of diabetes, CNMs reported use of diabetes technology (*i.e.*, CGMs and insulin pumps). CGMs can provide more complete blood glucose information, help identify out-of-range patterns, and alert users to hypo- and hyperglycemia [23]. Using a CGM also decreases

finger sticks. CGM use also has potential disadvantages, including the risk for inconsistent and unpredictable behavior that can lead to poor blood glucose management [24]. Insulin pumps decrease the need for injections and can allow for more flexibility with insulin dosing due to the ease of dosing and the ability to adjust long-acting insulin throughout the day. Pumps have also been associated with lower HbA1c levels [25]. However, insulin pumps are highly specialized equipment that facility staff members may need additional training to monitor. Since patients may be more knowledgeable than staff on how to use these technologies, there is the potential for patients to misuse or manipulate their treatment [19].

Due to the potential for patients with diabetes to manipulate their care due to staff's lack of knowledge, it was concerning that not all CNMs reported staff supervision of diabetes care (*i.e.*, blood glucose checks and/or insulin administration). CNM 5 stated that past patients had taught the staff a lot about how diabetes care can be manipulated in an eating disorder treatment setting. The ability for patients to blind staff to potential disordered behaviors is an area of concern for clinicians [19].

Another area of concern was the lack of formal written policies regarding diabetes treatment. Only three CNMs identified having written policies, meaning the remaining 15 CNMs either did not have or were unaware of these policies at their facility. This is a potential area to target more streamlined practice and the creation of resources for clinicians when working with patients with ED-DMT1.

American diabetes association recommendations for monitoring HbA1c are to test at initial assessment and approximately every three months as part of continued care, but some situations may require more frequent interim testing [26]. In a residential ED treatment setting, many patients' treatment lengths of stay are shorter than three months, so HbA1c may not be retested after admission. Testing HbA1c more frequently (*i.e.*, monthly or before transition to a lower level of care) could shed light on how HbA1c is trending or how it changes on different levels of care. Biochemical monitoring (*i.e.*, HbA1c, labs, urinary ketones, etc.) is important to monitor to evaluate medical safety and stability and can also provide checks and balances for insulin-related eating disorder behaviors (*i.e.*, skipping insulin doses, etc.).

An interdisciplinary team, including nutrition, medical, and mental health professionals, is recommended for both ED and diabetes treatment [27-29]. Patients with ED-DMT1 have highlighted the importance of having an interdisciplinary team that is willing to communicate and collaborate to provide improved treatment [19]. The CNMs endorsed having an interdisciplinary team, but the team members were lacking knowledge across disciplines. This was evident in the present study by the CNMs' inability to answer questions related to interdisciplinary care. While professionals need to stay within their scope of practice, team members need to communicate and understand the role of other team members and how their roles may impact each other.

Diabetes education is an important part of treatment. The CNM primarily provided nutrition-related diabetes education, while the nursing team addressed insulin management. Only one

facility employed a CDCES, which was unsurprising due to the infrequent patients seen at many facilities. However, diabetes education requires specialized knowledge and a CDCES credential demonstrates additional training and mastery of knowledge [27]. It may be more realistic to consult with a CDCES professional in the local community as needed.

In addition to education, CNMs reported addressing therapeutic topics related to diabetes at their facilities. They reported this would be done in individual patient sessions due to lack of adequate patients with diabetes to form a group or not wanting to single one person out. However, patients with ED-DMT1 have discussed the importance of peer support and expressed connecting with others who have ED-DMT1 to be helpful for their recovery [19]. Allowing patients with ED-DMT1 to meet together or connecting patients with virtual support resources could provide peer support and the ability to connect with others similar to themselves.

This study demonstrated a need and desire for more specialized education and training about treating patients with ED-DMT1. The need for more education was the most suggested improvement by the CNMs. This is consistent with other professionals who have worked with patients with ED-DMT1 [19]. ED-DMT1 is a highly specialized diagnosis, but there is not always a constant population of patients in treatment. This makes how to approach training and education difficult because management staff at eating disorder treatment facilities are not likely to dedicate extensive time and resources to such a small subset of the patient population. Regular education and training for staff can include a variety of approaches, such as in-service trainings, webinars, professional conferences and/or clinical supervision with a specialist. Collaboration with the outpatient team is also important for coordination of care when the patient discharges from treatment.

One limitation of this study is that interviews were only conducted with CNMs and may not be representative of all treatment team members or the entire facility where they work. However, CNMs were able to shed light on detailed nutritional practices and demonstrated a lack of interdisciplinary communication and collaboration.

Conclusion

In conclusion, ED-DMT1 represents unique co-occurring disorders that require specialized treatment by an interdisciplinary team of professionals. This team must be educated about EDs and T1DM. There is a great need for future research to address the development, application and efficacy of education materials for clinicians and to develop standard of care recommendations for the treatment of ED-DMT1 in residential ED treatment settings.

Author Contributions

SF, MA, EP and BT contributed to the design of the study. MA collected the data. HW transcribed the data. MA, EP, HW and SF analyzed the data. MA wrote the first draft. All authors have reviewed and commented on subsequent drafts of the manuscript.

Funding Disclosure

The study was funded by the department of nutrition, dietetics, and food science, Brigham Young University.

Conflict of Interests Disclosure

The authors have no conflicts to declare.

Acknowledgements

The authors gratefully acknowledge Micah Bergsma and Kenzey Aukema, undergraduate students at the time the research was conducted, who assisted with participant recruitment and interview transcription. (These individuals have given written permission to be acknowledged).

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