
Eating Disorders Review

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OSFED: Better Definitions Needed

Established diagnostic criteria would help patient care and quality of life.

The *DSM-5* category "Other Specified Feeding or Eating Disorders (OSFED)" includes atypical anorexia nervosa (AAN), purging disorder (PD), night eating syndrome (NES), and subthreshold bulimia nervosa and binge eating disorder (Sub-BN/BED). Three clinicians from the University of Melbourne and Murdoch Children's Research Institute, Melbourne, Australia, have written that the current OSFED diagnostic criteria fall short of accurately describing these conditions, and have overlapping symptoms that can be misleading (*Trends in Molecular Med.* 2024. 30:403). Authors Dr. Isabel Krug and her colleagues also stress that agreed-upon diagnostic standards for OSFED are needed for consistent study results.

For example, for AAN, the definitions for low weight, weight loss, and the timing of weight loss are inconsistent. For NES, co-morbidity with BED and other sleep-related symptoms has not yet been defined. In addition, symptom frequency and duration have yet to be specified for sub-BN/BED. These are but a few of the areas where diagnosis can be affected.

Another area to consider involves the criteria for NES, and its high comorbidity with BES. Overlapping symptoms between NES and other sleep-related and mood disorders is yet another area of concern. For example, those with NES may have symptoms of insomnia, making it difficult to determine whether the patient has NES or something else. Subthreshold BN and BED involve fewer than weekly binge-eating or purging episodes or episodes that have been present for fewer than 3 months.

According to the authors, the *DSM-5* has provided severity ratings for AN, BN, and sub-BN/BED but not for OSFED subtypes

(American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders: DSM-5.* 2013). According to the authors, the ratings are primarily based on specific diagnostic criteria for AN, BED, and BED. More recent studies have begun exploring alternative severity indices, including the number of purging episodes, which has been helpful as a predictor of eating disorders pathology in individuals with BN. In one study, where a cluster analysis was made of 223 participants with PD, researchers found that those who engage in multiple types of purging behavior, including vomiting and laxative and diuretic use, had more severe eating disorders and general psychopathology than those who only reported vomiting

Highlights

- **Current OSFED diagnostic criteria fall short of accurately describing the disorders grouped under this category, and have overlapping symptoms that can be misleading.**
- **The *Diagnostic and Statistical Manual 5* has provided severity ratings for AN, BN, and sub-BN/BED, but not for OSFED subtypes.**
- **Agreed-upon diagnostic standards for OSFED are needed for consistent study results.**

(*Int J Eat Disord.* 2017. 50:578).

Increased awareness of the five diverse OSFED subtypes and how they differ from AN, BN, and BED is necessary for early and accurate diagnosis, according to the Australian researchers. Establishing the diagnostic criteria for OSFED conditions and applying established diagnostic criteria will help in many ways, including enhancing the quality of life for patients.

From Across the Desk

Finding Better Definitions and Techniques

In this issue, several articles turn to better ways to define less frequently seen eating disorders. Two examples are OSFED, or Other Specified Feeding or Eating Disorders, and ARFID, or avoidant restrictive food intake disorder.

The *DSM-5* category for OSFED includes a number of subcategories, including atypical anorexia nervosa, purging disorder, night eating syndrome, and subthreshold bulimia nervosa and binge eating disorder. Researchers from the University of Melbourne and Murdoch Children's Research Institute have drawn attention to the fact that current OSFED diagnostic criteria fall short of accurately describing these conditions, and have overlapping symptoms that can be misleading (see the article elsewhere in this issue).

Another challenge is inpatient management of younger patients with ARFID. A group in Boston developed a standardized inpatient clinical pathway to help guide use of psychiatric, psychological and social work consulting for these young patients (see "ARFID and Hospital Admittance of Children and Teens" elsewhere in this issue).

Finally, a research group in Italy has described their use of virtual reality to reduce anxiety and fear among a group of AN patients. The technique was helpful, although an unexpected drawback was the virtual reality program's use of unpleasant avatars. Summer and innovation march on in eating disorders research.

— MKS

Multi-Family Therapy for Eating Disorders

Treating several families at the same time can improve some aspects of a patient's life.

The concept of multi-family therapy (MFT) for eating disorders, or treating more than one family at the same time and in the same setting, was first reported in the 1960s (*Curr Psychiatr Ther.* 1964;4:150). MFT is increasingly being used by eating disorder services worldwide.

MFT models differ significantly, depending on the country and services, but all are: (1) group-based, (2) involve several families working together with the support of a clinical team, and (3) most commonly delivered over several hours or several full days of treatment. During child and adolescent MFT, parents and siblings are typically invited to attend, whereas working with adults may also include partners, other significant people in the participant's life, and/or parents/caregivers.

MFT has been associated with improved quality of life, better self-perception and self-image, improved self-esteem, reduced caregiver burden, changes in expressed emotion, and improved family functioning

and communication.

Increased empowerment and confidence emerge

Results of a study of the feasibility, acceptability, and short-term treatment outcomes of a newly developed five-day treatment program for adults with eating disorders were recently reported by Drs. Julian Baudinet and colleagues from the Maudsley Centre for Child and Adolescent Eating Disorders and King's College, London. The study centered on outpatient child and adolescent MFT models for anorexia nervosa (MFT-AN) (*Curr Psychiatry Rep.* 2024. 26:323).

Typically, MFT is offered in an outpatient context, although day and inpatient models have also been described. The briefest MFT models provide three to five consecutive days of MFT offered as a stand-alone intervention. The length of MFT treatment can vary. For example, the Maudsley model offers six to 10 days of MFT spread across six months to a year. Other programs offer up to 20 days or more of MFT given for several months or more.

Improved immediacy, intensity, and connections

The number of programs designed for adults with eating disorders is growing, and the concept of MFT has also been applied to patients with bulimia nervosa (*J Eat Disord.* 2022;10:91; *Eat Disord.* 2021; 29:351). Several services offer MFT for mixed eating disorder groups (*J Eat Disord.* 2021. 9:110). During child and adolescent MFT programs, parents and siblings are typically invited to attend, whereas adult models may also include partners and other significant people in a patient's life.

These data also fit theoretically with qualitative data on young people and parental experiences of intensive day program treatment. While day programs are somewhat different from MFT, some include multi-family elements. Other similarities include the intensity, increased level of support, and additional hours of intervention per week. In both settings, the importance of immediacy, intensity, and connecting with others are all described by young people and parents/caregivers as key factors in supporting people to (re)engage in less intensive outpatient treatment.

Participants, and particularly caregivers, report feeling more empowered, more confident and more able to share their experiences in the MFT setting. Many also speak of the intensity and comparisons that arise out of the group process, and how this can generate and lead to the expression of strong emotions, which can be both a challenge and a benefit.

A five-day model of MFT has been manualized in a collaborative study at the University of California, San Diego, and Oslo University Hospital, Oslo, Norway. This is the Temperament-Based Therapy with Supports (TBT-S) service. This approach uses talk therapy to help individuals understand how their temperament affects their symptoms. All patients and support members rated the quality of the service as good or excellent, and dropout was low. Last, most participants (90% of patients and 96% of support members) felt that the new approach either met or exceeded their expectations (*J Eat Disord.* 2023. 11:156).

Update: At-Home Treatment For Binge Eating Disorder

Psychological therapies are recommended for treatment of binge eating disorder (BED), and about half of those who receive treatment achieve a full and lasting recovery. Researchers at the Institute of Psychiatry, Psychology and Neuroscience at King's College, London, have reported positive results with a new home-administered treatment approach for patients with BED (*BJPsych Open.* 2024; doi: 10.1192/bjo.2024.54). The study paired variations of transcranial direct current stimulation (tDCS) and attention bias modification training (AMBT) in 82 participants who were overweight or living with obesity,

and who were diagnosed with BED.

As Dr. Michaela Flynn, Research Associate at King's College and her coauthor, Professor Ulrike Schmidt, Professor of Eating Disorders at King's College, reported, the study participants were divided into four groups, who received one of the following approaches: (1) 10 sessions of at-home self-administered tDCS during ABMT; (2) 10 sessions of sham tDCS with a headset that did not deliver electrical stimulation during ABMT; (3) 10 sessions of ABMT only, or (4) no treatment as they remained on a wait list for 8 weeks).

Greater losses among the combined treatment group

Participants in the real tDCS with ABMT group lost approximately 3.5 to 4 kg between the baseline measurements and six-week follow-up. Their mean BMI fell by 1.28 points. In comparison, over the same period, those who received ABMT with sham tDCS lost about 1.5 to 2 kg on average, and had a mean BMI loss of 0.52 points. Participants who received ABMT only had a very slight change in weight, and a mean loss of 0.07 points in their BMIs. There was no change in eating behavior or weight loss in the no-treatment group.

There was a substantial improvement in mood among the patients who received real tDCS with ABMT between baseline measurements and follow-up. No similar change in mood was reported in those who received sham tDCS with ABMT or in those who received ABMT only, and there was no change in mood in the no-treatment control group.

ARFID and Hospital Admittance of Children and Teens

A clinical pathway improves use of outside services.

Avoidant restrictive food intake disorder (ARFID) was first defined by the *DSM-5* in 2013. One area that is often overlooked is inpatient management of children and teens with ARFID who are admitted for medical stabilization. Now a team from Boston Children's Hospital and Harvard Medical School has developed a multidisciplinary standardized inpatient clinical pathway (ICP) to help guide use of psychiatric, psychological and social work consulting for these children and teens (*J Eat Disord.* 2024. 12:66).

Dr. Elana M. Bern and colleagues developed the ICP after examining various approaches to care by the admitting services at a stand-alone hospital. Dr. Bern and her colleagues included data from 110 children and teens with ARFID in their four-year study, and examined admissions from the gastrointestinal, pediatrics, and psychology departments. The study began two years before the ICP was in place, and followed 57 teens and children; 53 teens and children were admitted in the post-ICP period.

In the first part of the study, the authors retrospectively extracted electronic medical record (EMR) data for patients with ARFID admitted to the hospital for medical stabilization from January 1, 2015 to December 31, 2017 (before the pathway was developed). The team examined sociodemographic variables, including gender, age, race/ethnicity, insurance payor, approximation of the distance traveled from home to the hospital), co-morbid medical and psychiatric diagnoses based on billed *ICD-10* diagnosis codes, anthropometrics (weight and height, for example) upon admission, length of stay, all-cause medical readmissions within 30 days (excluding psychiatric causes), and information about the admitting and discharging inpatient team.

Additional chart review was performed to record use of enteral tube feeding (nasogastric tube, nasojejun tube, or gastrostomy tube) and results of endoscopy, requests for consultation by psychiatry/psychology consultation services (PCS), nutrition or social work, and use of the existing restrictive eating disorder (RED) protocol, which had been developed primarily for patients with anorexia

nervosa.

Developing the ICP

The authors then created a standardized ICP using Quality Improvement (QI) methods. The next step was examining changes in care among inpatients with ARFID in the two-year period after the new pathway had been in place. The authors studied use of the RED protocol, subspecialty consultations, use of enteral tube feeding, and diagnostic endoscopic evaluation, as well as clinical outcomes (change in BMI z-scores during hospitalization), length of hospital stay, and 30-day readmissions. Their post-ICP study was delayed due to the COVID-19 pandemic in March 2020.

Results

Patients admitted from the adolescent medicine service were older and were more likely to have private insurance than those admitted from the gastrointestinal or general pediatric services. There were no significant differences in weight, comorbid medical or psychiatric disorders by admitting services in the pre-ICP cohort. More than half of patients were underweight, and comorbid depression (18%) and anxiety were common (26% of patients had generalized anxiety and 70% had other anxiety disorders).

Adolescent patients were more likely to have been treated with the RED protocol and less likely to have social work consultations than were patients admitted from the general pediatrics division or the gastrointestinal department. No differences were found in length of stay, readmission rates, or changes in BMI. The authors did find variations in care from the admitting services for patients with ARFID prior to the development of the standardized ICP. For example, prior to the new protocol, the adolescent medicine service commonly used a feeding protocol designed for patients with AN.

When the ICP was in place, use of consultation services increased—this was especially true for social work, nutrition, and psychiatry. In contrast, use of the RED protocol was nearly eliminated. Readmission rates remained low and, according to the authors, over time there had been a greater understanding of restrictive eating disorders and ARFID among children and adolescents.

Limitations

There were some limitations to the study, including the relatively small cohort of patients examined. This probably resulted in low statistical power to detect a difference by the individual admitting services. In addition, the authors noted that the study had examined early changes after the pathway was established, although this involved a relatively small number of patients.

Additional research on the longer-term influence of the ICP will help researchers better understand the longitudinal impact on health outcomes, cost-effectiveness, provider adherence to the ICP components, and improve their knowledge of both the health care providers and those receiving care.

Book Review: Eating Disorders: The Basics (First edition)

By Dr. Elizabeth McNaught, Professor Janet Treasure, and Jess Griffiths (Routledge Publishing, Ltd, New York and London, 2024. Paperback, hardback and Kindle available).

As an internal medicine trained physician now working with hospitalized patients with eating disorders, I found this guide informative and highly relevant to my clinical practice. Evidence-based facts interspersed with lived experiences of patients provide a powerful framework to tackle understanding of eating disorders on an individual basis. I highly recommend this book for providers, carers, students, and patients. The collection of lived experiences within the letters of hope are powerful reminders that recovery is possible for anyone, no matter the stage of their illness.

One section of this book states that body mass index (BMI, kg/m²) can be unhelpful in a range of situations, and notes that many eating disorders professionals are calling for its removal in the assessment of eating disorders. One exception occurs when determining medical instability and making the decision to admit a client for in-patient hospitalization. For example, in one of our recent studies (*Int J Eat Disord.* 2024. 57:869.), BMI was the strongest risk factors for predicting medical complications, compared to weight disruption and recent rapid weight loss.

This is a wonderfully compact book to guide people on understanding eating disorders. I thoroughly enjoyed it and would love to share the letters of hope with some of my patients as the book becomes more widely available

– Reviewed by Khatri Vishnupriya, MD

Examining the Risk of Eating Disorders Among Football Players

Nearly a fifth of amateur and professional players were at risk.

Many amateur and professional football players are at increased risk for developing an eating disorder, according to the results of a recent study (*Nutrients.* 2024. 16:945). An important key to this risk lies in dissatisfaction with physical appearance and a desire to lose weight to improve performance. This can lead to restricting food intake and using ergogenic aides or laxatives. Ergogenic aides can range from pharmacologic products to compression garments, all used to lose weight and improve performance. Certain sports that focus on thinness or low body mass index, such as figure skating and gymnastics, carry increased risk.

Amateur and professional football players

Wiktoria Stąskiewicz-Barkteka, DPH, and Marek Kardas, PhD, of the Medical University of Silesia, Katowice, Poland, recently surveyed 90 male football players aged 18 years or older from football clubs participating in the 4th and 5th leagues in the Upper Silesia Metropolitan area. The authors' goals were to assess the risk of eating disorders among these athletes and to examine the professional and amateur athletes' own perception of their bodies.

Several questionnaires were used in the online study. The first included the respondent's age, height, body mass index (BMI, kg/m²), any history of chronic diseases, including mental health problems such as depression, eating disorders, and neurosis, current medications, education, team field position, sports seniority, number of training sessions per week, sources of nutritional knowledge, exclusions of certain foods, and information on social media use. The participants also filled in two questionnaires, the *Eating Attitudes Test-26* (EAT-26) and the *Body Esteem Scale* (BES).

Body image was measured with a Polish adaptation of the BES (*Health Psychol. Rep.* 2013. 1:71). The BES allows an individual to assess his attitude toward his body and contains 35 items in three subscales, which are somewhat different for men and women. The subscales for men include physical attractiveness, upper body strength, and physical condition. Subscales for women include physical attractiveness, weight concerns, and physical condition.

One unique section of the BES is the physical attractiveness subscale for men, based on an assessment of the features that mainly determine the description of a man as handsome. It includes both facial features and body parts such as hips and feet. The body strength subscale combines assessments of

various parts of the body (such as the arms or chest), as well as their function and fitness (*Health Psychol Rep.* 2013. 1:72). Study participants were also asked about daily use of the internet, particularly the amount of time the athletes spent on social media.

Findings

Nearly 86% of the study participants responded. Based on the calculated BMIs of the players, nearly a fourth (n=22) of the professional participants, were overweight; 76% (n=68) were in the normal weight range, and no player was underweight or obese. Among amateur football players, 25% (n=15) were overweight and 76% (n=44) had normal weight.

Statistically significant differences were found between nutritional status interpreted through the BMI values, according to World Health Organization recommendations, and the total score on the EAT-26 test. Overweight athletes were more likely to have an increased risk of developing an eating disorder. Using the EAT-26 score, it was estimated that 8.9% of respondents (amateurs and professionals) were at risk for an eating disorder, and were candidates for referral to a specialist. No significant differences were found between sports level and total EAT-26 scores.

Overweight athletes were more likely to have an increased risk of eating disorders. According to the results on the behavioral questions from the EAT-26 test, it was estimated that fairly equal percentages of amateur football players (10.2%) and professional players (9.7%) were at risk of developing an eating disorder. There was no significant effect of sports level on EAT-26 test scores.

Based on the overall results and interpretation of the EAT-26, it was found that 17% of respondents (both amateurs and professionals) met at least one of three criteria that may indicate the likely existence or susceptibility to an eating disorder and the need to see a specialist for further testing and diagnosis. There was no significant effect of sports level, amateur or professional, on the overall EAT-26 score. No statistically significant difference was found in the physical attractiveness and upper body strength subscales.

The authors note that BMI findings can be limited or even misleading, especially for athletes. For example, the BMI score does not account for differences in body proportions, nor does it distinguish between muscle mass and body fat. In the case of most football players, who often have increased muscle mass associated with high levels of physical activity, a high BMI may be the result of high muscle mass rather than overweight or obesity (*Front. Nutri.* 2022.9:981894).

In a study of 121 male and female "lean" versus "non-lean" athletes (*Eat Weight Disord.* 2020. 25:745), there was a significant effect by type of sport on personal attitudes and eating behavior. Men who played "non-lean" sports scored higher on the attitudinal part of the EAT-26, while men who played "lean" sports scored higher on the behavioral part of the questionnaire. The study results showed that athletes, regardless of gender or sport type, may have eating disorder symptoms, and gender differences may be smaller in athlete populations than in non-athletic populations.

How the athletes learned about sports nutrition

The study participants reported that the main sources of their knowledge about sports nutrition were the internet (40 participants), a nutritionist (18), coaches (11), other players (10), and friends (9). Daily time spent using social media was statistically different between professional and amateur athletes. Athletes who reported using social media more than three hours a day were characterized by lower body ratings on all three subscales. Twitter users had higher self-esteem on the physical fitness subscale compared to Instagram users. Twitter users were also shown to have higher self-esteem on the physical fitness subscale, while Instagram users had lower self-esteem.

Study limitations and implications

The authors noted that the study included only football players in a single region, which may make it impossible to generalize the results to other populations. In addition, the study focused only on men, which limited the ability to analyze potential differences by gender. The use of self-assessment tools may also introduce some distortion in the results, due to the subjective perceptions of respondents. Additionally, the brief survey period may have limited the analysis of long-term trends and changes. In future studies, Drs. Stąskiewicz-Barkteka and Kardas suggest it may be more worthwhile to include body composition analysis instead of BMI, which will allow for the assessment of the proportion of muscle mass and body fat and the relationship of the values to test results.

This study showed that about 17% of amateur and professional football players were at risk of developing an eating disorder. This risk did not significantly differ between the two groups, but professional athletes rated their bodies higher in all aspects analyzed--physical attractiveness, upper body strength, and physical fitness. Analysis of BMI showed that overweight athletes were more likely to have an increased risk of eating disorders. In contrast, normal-weight athletes had higher self-assessments of physical attractiveness and body strength. The results underscored the importance of coaches, sports nutritionists, and clinicians monitoring and referring amateur and professional football players for evaluation when they suspect an athlete is at risk of developing an eating disorder.

Putting Virtual Reality to Work for AN Patients

A virtual visit to a kitchen tested anxiety and support.

Even after weight is restored, most patients with anorexia nervosa struggle with negative emotions, including fear and avoidance of certain foods and nutrients. Virtual reality (VR) may be helpful for some patients, and can provide helpful information for clinicians as well, according to a recent report. Psychologists from the University of Padova, Italy, and King's College, London, have recently reported that their use of VR and positive stimulation helped reduce anxiety and fear among a group of AN patients (*Int J Eat Disord.* 2024.57:70).

In this study of 145 AN patients older than 14 years of age, who were recruited from day care or inpatient facilities in Italy and the UK, the participants were assigned to one of three forms of VR, all including a visit to a VR kitchen stocked with a variety of foods. A VR "pet" was also in the kitchen. One group of 50 patients took a baseline visit, with no support; (2) 46 others had a visit with positive mood induction; and (3) 49 had a virtual visit using social support.

Could a VR visit help reduce anxiety?

The researchers sought to examine whether a one-time VR visit with positive mood induction and/or social support would induce a greater reduction of food related fear and anxiety, over and above VR food exposure alone. The overall idea was to help AN patients develop a "safer" memory during exposure to food.

Before the study, all participants had training where they became acquainted with the VR program and tools. Once they entered the virtual kitchen, they could freely move about, open the cupboards and the refrigerator, and touch and hold the food. They could also use joystick-driven smooth locomotion and teleportation, as an alternative way to explore and interact with the environment. Two participants dropped out early; one found the exposure to virtual foods too stressful, and a second patient was afraid of falling, due to osteoporosis.

Later, the remaining participants completed self-report assessments of anxiety (the *Eating Disorder Examination Questionnaire* (EDE-Q) and the *Depression and Anxiety Stress Scales* (DASS-21). The DASS-21 is a 21-item self-report that uses three subscales to measure symptoms of depression, anxiety, and

stress. In the virtual environment, before and after exposure to the kitchen, patients were asked questions related to their level of anxiety, such as “How anxious do you feel right now?” and “How happy do you feel right now?” Other questions centered on social support and hunger before and after virtual food exposure. The number of eye gazes and touches toward foods were recorded during the VR exposure.

Inducing a positive and mood reduced food-related anxiety

The positive mood induction session was associated with greater reduction of food-related anxiety compared to the other two conditions. This suggests that strategies to improve positive mood might be helpful in inhibiting food-related anxiety. According to Cardi et al. (*Eur Eating Disord Rev.* 2019. 27:173), learning mechanisms play a crucial role in the development of food-related fears and anxiety in AN, and effective inhibitory learning of food fears requires developing new positive associations with food stimuli.

A secondary aim of this study was to compare the number of food touches and gazes toward virtual food items between conditions. No differences between food-directed gazes were detected, but patients in the baseline group handled foods more often than those in the social support and positive mood conditions. Interestingly, the number of food touches was not associated with reduction in food-related anxiety found in the positive mood condition. This suggests that “food avoidance” (i.e., fewer food touches) did not explain the reduction in food anxiety.

A few negatives

The authors also examined the role of the pet avatar and its effects upon virtual visitors. They noted that it was possible that the pet avatar might have given the patients feelings of safety and reassurance rather than inducing a positive mood. Further studies with larger numbers of patients might help clarify this.

While exposure to the positive mood condition was associated with greater food-related anxiety compared to the baseline kitchen condition, the authors were surprised that the same did not hold true for the social support condition. Although patients overall endorsed the idea of receiving some kind of social support in the kitchen, they also tended to find the avatar characters somewhat scary, and reported that these characters also appeared too close to the screen and the food.

At the end of the study, the authors reported that virtual food exposure enhanced by positive mood induction may be a feasible approach to strengthen the impact of food exposure in AN patients.

Questions and Answers: T1DM and Eating Disorders

Q. One of my patients, a woman in her early 20s with diabetes type 1 (T1DM) and binge eating disorder (BED) has been eating erratically, including withholding her insulin doses in an attempt to lose weight. Have you heard of any approaches that might help her counteract these practices? (A.J., Baltimore)

A. A relatively new term, 'diabulimia,' refers to the practice of skipping insulin doses to lose weight. A recent study (*Endocrinology, Diabetes & Metabolism*, 2024; 0:e473), establishes a significant connection between eating disorders and T1DM, particularly bulimia and binge eating. Moreover, female diabetics are at higher risk of insulin misuse/omission than males, although much more study is needed to differentiate any differences by gender.

No clear approaches have been reported to counteract the wish to lose weight by skipping insulin doses, followed by the risk of hypoglycemia. The best approach for this population seems to include early proactive screening and tailored, comprehensive, intervention. Early referral to a specialized psychiatrist is also recommended.

Refeeding Syndrome: Little Information is Available for Men

Most guidelines have been based on studies of female patients.

One of the earliest descriptions of the refeeding syndrome was made at the end of World War II, when one-fifth of starved Japanese prisoners of war died after they were refeed with an aggressive program of nutrition and vitamins.

Refeeding syndrome commonly occurs in populations at high risk for malnutrition, from patients with eating disorders to those with renal failure who are on hemodialysis. Despite the longstanding recognition that refeeding syndrome is a serious clinical complication with a high mortality rate and the need for immediate medical intervention, high-quality scientific evidence on the etiology and management of refeeding syndrome is limited, and has largely been based on studies of female populations. Lack of a universally accepted definition has hampered the comparison of refeeding syndrome risk across studies and refeeding protocols.

While the impact of refeeding strategies in adolescents and young adults is an area of rigorous study, only one study to date has examined gender differences in refeeding outcomes and lengths of stay (*Int J Eat Disord.* 2022;55:247). In one of the few recent studies of males undergoing refeeding, a team from the University of California, San Francisco, did not find differences in the risk of developing electrolyte abnormalities among males versus females (*J Eat Disord.* 2024. 12:67).

Dr. Jason M. Nagata and colleagues from the Department of Psychiatry and Behavioral Sciences at UC San Francisco recently reviewed the electronic medical records of 601 adolescents and young adults admitted for medical instability to an inpatient eating disorder service located at a tertiary care hospital in Northern California between May 22, 2012 and August 31, 2020.

Patients ranged from 9 to 25 years of age when admitted. The patients fit a number of criteria for admission, including a low median body mass index, or BMI ($\leq 75\%$ for age and gender), severe bradycardia (< 50 beats/minute during the daytime, or < 45 beats/minute at night), hypotension ($< 90/45$ mmHg), and hypothermia (< 96.0 °F, or < 35.6 °C). Other criteria included a sustained increase in heart rate (> 30 beats per minute in those older than 19 years of age), or sustained decreased blood pressure levels (>20 mmHg or >10 mmHg diastolic).

Refeeding syndrome risk was defined as hypophosphatemia (<3.0 mg/dL), hypokalemia (<3.5 mEq/L), and hypomagnesemia (<1.8 mg/dL). Logistic regression was used to assess factors associated with electrolyte abnormalities indicating refeeding syndrome risk.

A refeeding protocol

The authors reported that serum was drawn between 5am and 7am each day. The refeeding protocol began with 1000 kcal/day, and was increased by 200 kcal/day. Electrolytes were checked in the morning for at least seven days, to evaluate the risk of developing refeeding syndrome (unless the patient was discharged before seven days had lapsed). Refeeding hypophosphatemia, hypokalemia, or hypomagnesemia was defined as phosphorus (<3 mg/dL), potassium (<3.5 mEq/L), or magnesium (<1.8 mg/dL). The risk of the refeeding syndrome was indicated by electrolyte abnormalities beginning on the second day in the hospital, after one full day of refeeding. (Low potassium, magnesium, or phosphorus levels present at admission prior to the onset of the refeeding protocol were not included in

the classification of electrolyte abnormalities indicating refeeding syndrome risk, but the patients were still included in the study to evaluate for subsequent laboratory abnormalities.)

To minimize electrolyte abnormalities due to purging, several protocols and precautions were implemented for any patient with a history of purging, including the presence of a patient care attendant who observed the patient during all meals/snacks and for a period following the completion of the meal/snack. Other precautions included taping or sealing sinks in the room, and limiting showers to early mornings before meals.

No differences were found between males and females, but older age mattered

The authors found no differences between males and females in development of the refeeding syndrome. They did find, however, that older age was associated with a higher risk of developing low phosphorus and magnesium levels. (In the current study, the authors focused on the electrolyte abnormalities indicating refeeding syndrome risk rather than direct measures of organ dysfunction.)

The incidence of electrolyte abnormalities indicating refeeding syndrome risk is of particular interest in male patients because males generally have higher refeeding goals and longer hospital stays than females, and therefore may be at added risk of developing refeeding syndrome. Older age and greater weight suppression at admission were associated with higher odds of refeeding hypophosphatemia and refeeding hypomagnesemia. None of the investigated factors was associated with refeeding hypokalemia.

Among this group of young adults, the authors did not find significant electrolyte differences between males and females that would lead to electrolyte abnormalities, and thus indicate the risk of developing the refeeding syndrome. They surmised that higher rates of electrolyte abnormalities in prior studies were due to overestimation by counting patients who received prophylactic electrolyte supplementation or those treated because of declining (but not low) serum levels as having had an electrolyte abnormality.

In 2018, Whitelaw et al. did not find associations of electrolyte abnormalities with duration of or recent weight loss (*J Adolesc Health*. 2018. 63:717). Thus, although it is plausible that total body mineral stores become increasingly depleted as illness continues, more studies are needed to determine whether this contributes to more frequent electrolyte abnormalities during renourishment. Perhaps the most important implication is that patients with delayed or missed diagnoses will be at higher risk due to longer durations of illness.

In Nagata's study, the lack of gender differences in both individual and compound variables of electrolyte abnormalities indicating refeeding syndrome risk show great promise towards tailoring current refeeding protocols towards more aggressive treatment and advancement of diets in adolescent male populations with eating disorders. Dr. Nagata pointed out that males continue to be underrepresented in eating disorder research, despite their higher caloric requirements and longer hospitalizations. Higher initial caloric diets and rapid advancement of diet are associated with faster restoration of medical stability and shorter hospital stays, but such studies are not sex-stratified, he added.

The authors' findings that males and females with eating disorders do not have statistically significant electrolyte abnormalities indicating the risk of refeeding syndrome suggest that higher or more aggressive refeeding protocols in male populations may be warranted, and that future studies are needed to better define this.

IN THE NEXT ISSUE

More highlights of the 2024 iaedp symposium

PLUS

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- **A review of *The Emotional Eating, Chronic Dieting, Binge Eating and Body Image Workbook***
- **Body dissatisfaction in middle-aged and older women**
- **An intervention against shame and self-criticism**
- **Anorexic patients and insomnia**

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