

## Safe Management by a Pop-Up Eating Disorder Team

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### Abstract

#### **Background**

Anorexia nervosa has a high mortality complicated by risks of under-nourishment, over-nourishment and care can be compromised by behavioural issues.

#### **Methods**

This is a retrospective study of ten patients with eating disorders admitted to Sligo University Hospital, treated by a “pop-up”/on demand multidisciplinary eating disorder team.

#### **Results**

All were female, mean BMI on admission was 14.35kg/m<sup>2</sup>, on discharge was 16.59kg/m<sup>2</sup>, (p=0.001) and was significantly lower than the initial measurement and may represent water-loading or bowel retention. Admission biochemistry was normal in nine subjects. Six subjects experienced refeeding syndrome, one was hypoglycaemic (3.1mmol/L) in the setting of an aspiration pneumonia, and five exhibited treatment avoiding behaviour including food caching, micro exercising.

The mean length of stay was 38 days and was positively correlated with weight gain during admission (p=0.02). 6-month follow up BMI was higher than admission in eight subjects and the other two voluntarily withdrew from follow-up.

#### **Conclusion**

There was a high incidence of treatment avoiding behaviour, initial weights were misleadingly high, admission biochemistry misleadingly normal, hypoglycaemia associated with infection, and incidence of refeeding syndrome is high. Notwithstanding this these patients can be managed safely and effectively in a general hospital with a coordinated, well-structured approach by a multidisciplinary team.

**Keywords:** Eating Disorder; General Hospital; Pop-Up; Multidisciplinary; MARSIPAN; MEED

## Introduction

Anorexia nervosa (AN) carries the highest mortality of all psychiatric diseases, with an overall mortality rate of between five and 9% and a standardised mortality ratio of 9.6 when compared to the general population <sup>1,2</sup>. Suicide, cardiac dysfunction and medical complications account for 60% of the deaths <sup>3</sup>, followed by psychoactive substance abuse, and cancer. Good prognostic factors include younger age at initial hospitalisation and longer hospital stay, while concomitant additional psychiatric/somatic disorders lead to worse outcomes <sup>4,5</sup>. There has been an 84% increase in hospital admissions from eating disorders in the UK in the last five years, with a 128% increase among young men <sup>6</sup>. These patients can be a challenge to manage on a general medical ward, exacerbated by deficits in physician knowledge in management of refeeding syndrome resulting in high mortality rates <sup>7</sup>.

A number of avoidable deaths in the UK led to the development of the MARSIPAN guidelines for the Management of the Really Sick Patient with Anorexia Nervosa for inpatients in both specialised and general hospitals <sup>8,9</sup>. This document was updated in May 2022 (Medical Emergencies in Eating disorders: Guidance on Recognition and Management (MEED)) and provides detailed guidance for healthcare professionals and families with 12 recommendations, and increased emphasis on timely identification, and referral, as well as management of a wider range of eating disorders, with specific guidance on decision making capacity in eating disorders <sup>10</sup>. We set up an on-demand/ "Pop-up" eating disorder team with a dedicated clinical nurse specialist (CNMED), as well as a consultant psychiatrist, physician, dietician, and ward nursing staff who all have other clinical responsibilities.

The patient is admitted to a designated bed, maintains full bed rest with a commode at the bedside for toileting. We have had experience of patients micro-exercising on laptops, phones and with magazine pages, being bullied on social media, and even taking unsolicited photos of other patients/staff with smartphones. For all these reasons it is a "safe haven" in which electronic devices are not permitted.

Bedside curtains are open (except for toileting) with one-to-one supervision for 24 hours a day by skilled care attendants and twice daily serum biochemistry assessment is performed for early detection and replacement of biochemical abnormalities.

This paper looks at 10 of these patients admitted to SUH who were treated using the MARSIPAN and MEED guidelines by this team.

## Methods

This is a retrospective study of patients admitted acutely to Sligo University Hospital in a two-year period for management of their eating disorder under the care of the Pop-Up Eating Disorder Team. Clinical data was obtained by a retrospective review of the medical notes, laboratory data (Suncrest® Version 7.3) and statistical analysis was performed using SPSS 24®. Results are presented as mean ±SD.

Statistics are largely descriptive but for comparisons a log transformed two-tailed paired sample t-test, student t-tests, Pearson correlation coefficient, and linear regression were used in the analyses.

This study was approved by the Research and Ethics Committee at Galway University Hospital 2017. Data was anonymised and handled in accordance with the relevant data protection legislation. All data was collected anonymously, pooled, and not identifiable in the written document. There was no funding for the project or conflicts of interest.

## Results

Ten subjects were eligible to be enrolled in the study, of whom one had an associated depressive disorder, one had coexisting type 1 diabetes with recurrent admissions for diabetic ketoacidosis secondary to insulin omission to lose weight, and two expressed suicidal ideation on admission. All subjects were female, with a mean age of  $22 \pm 5.9$  years (range 14-33 years). Admission parameters are seen on table 1.

Admission Parameters	Parameter	Mean	Study Range	Laboratory Reference Range
Serum electrolytes	Calcium (mmol/L)	2.45	2.14 – 2.24	2.15 – 2.5
	Magnesium (mmol/L)	0.89	0.63 – 1.08	0.66 – 1.07
	Phosphate (mmol/L)	1.37	0.68 – 2.28	0.81 – 1.45
	Potassium (mmol/L)	3.69	2.9 – 4.5	3.5 – 5.1
	Glucose (mmol/L)	7.02	3.9 – 21.6	4.1 – 5.9
	Albumin (g/L)	46.9	35 – 51	35 – 52
	Haemoglobin (g/dL)	13.82	12.4 – 15.5	11.5 – 16.5
Blood Pressure (mmHg)	Systolic	108	95 - 62	
	Diastolic	69	121 - 85	
	Temperature (C)	35.87	33.1 – 36.7	
	Heart Rate (bpm)	68.5	46 – 146	

**Table 1:** Overview of admission parameters.

The mean calorie intake on admission was  $496 \pm 382$  kcal/day (range 200-597kcal/day). One patient did not receive nasogastric feeding (did not consent). The length of nasogastric feeding for the remaining 9 subjects was  $28.44 \pm 14.46$  days (range 13-44 days).

### *BMI and weight*

Nine subjects presented with BMI < 15 kg/m<sup>2</sup>. The mean BMI on admission was 14.35 ± 1.7 kg/m<sup>2</sup> (range 11.61-17.14 kg/m<sup>2</sup>).

### *Serum Biochemistry*

On admission serum glucose was normal except for a subject with type 1 diabetes. Serum albumin was uniformly normal. One subject had raised aspartate aminotransferase (AST) on admission of 555 U/L (normal range 0-32 U/L), with a further rise to a peak of 1126 U/L on day six of refeeding which normalised by day 15.

### *Weight*

Those over the age of 18 years (n=5) had highest mean weight gain of 7.42 ± 4.1 kgs over the course of admission compared to those less than 18 years of age (n=5) with a mean weight gain of 4.1 ± 3.5 kgs.

There was a significant difference between the initial admission weight and the lowest recorded on day zero, one or two (p=0.035). Eight subjects had a lower weight when recorded on day one or two in the dedicated ward as compared to day zero (initial weight in the Acute Assessment Unit (AAU)), with a mean loss of 1.93 ± 1.98 kgs (range 0 to 5.75 kgs). The overall change of this cohort during this time period was a mean weight loss of 1.25 ± 2.3 kgs.

Using this the lower weight of the first 3 days of the admission there was a mean day zero to day two weight of 36.62 ± 5.03 kgs which represented a mean rise on discharge of 6.9 ± 4.66 kgs (p=0.002).

### *Calorie intake*

The mean calorie increase from admission to discharge was 2099 ± 658 kcal/day (p < 0.001) (range 1074-2820 kcal/day). The range of peak calorie intakes during the admission was 1900 to 3882 kcal/day. Values have been calculated for combined nasogastric (NG) and oral intake.

There is a weakly positive relationship between average calorie intake and weight gain achieved (r=0.164, p=0.651).

### *Intensive care unit Admission*

During admission two patients required ICU admission. One required mechanical ventilation for respiratory failure and inotropic support secondary to an aspiration pneumonia after aspirating vitamin syrup in her weakened state and another monitoring for bradycardia during NG insertion.

### *Refeeding syndrome*

Six of the subjects fulfil this criterion for refeeding syndrome. Please see table 2.

<b>Subject number</b>	<b>Onset of Refeeding syndrome (days post admission).</b>	<b>First serum concentration of biochemistry below the reference range.  (Nadir of reference range (mmol/L); calcium 2.15, phosphorus 0.81, potassium 3.5, magnesium 0.68)</b>
1	1	Phosphate (0.68), potassium (2.9), magnesium (0.63)
2	1	Calcium (2.05), phosphorus (0.77)
3	2	Phosphate (0.76), potassium (2.9)
4	2	Calcium (2.05), phosphorus (0.58)
5	4	Calcium (2.12)
6	5	Calcium (2.14)

**Table 2:** Onset and biochemistry of refeeding syndrome.

Subjects who experienced refeeding syndrome had a longer period of NG feeding, mean  $48.6 \pm 2.3.9$  days, compared to those who did not have refeeding syndrome (mean  $33.8 \pm 16.1$  days), but was not statistically significant ( $p=0.346$ ). The mean BMI in the refeeding syndrome group was  $13.45 \pm 1.86$  kg/m<sup>2</sup>, compared to  $14.94 \pm 1.4$  kg/m<sup>2</sup> in the non-refeeding syndrome group ( $p=0.22$ ).

### *Length of Stay*

The length of stay in hospital ranged from 17 to 82 days with a mean of 38 days. There was a strongly positive relationship between length of stay (LOS) and overall weight gain ( $r=0.838$ ,  $p=0.002$ ). LOS was an important predictor of overall weight gain (95% CI, -4.635, 3.312) ( $p=0.002$ ).

### *Treatment avoiding behaviour*

Seven of the subjects were witnessed undertaking treatment avoiding behaviour during their inpatient stay. There was no difference in mean weight gain between those who attempted to avoid the treatment regime and those who did not ( $p=0.64$ ), although the mean weight gain was trending higher in those who attempted to avoid treatment ( $6.61 \pm 4.3$  kgs) than in those who did not ( $4.85 \pm 3.8$  kgs) but did not achieve statistical significance. Five demonstrated repetitive leg movements while in bed despite repeated requests to stop, one over-exercised by extremely vigorous finger movements on her phone and laptop, another flicking pages of a magazine, one repeatedly requested to be moved to the window and have air-conditioning cooler (to shiver), two attempted to cache food, and all seven attempted not to finish meals.

### Post discharge

Follow up data was available for seven of the subjects. The most recent available BMI documented in the medical notes at follow up is shown (table 2). The mean time to this follow-up appointment was  $327\pm 461$  days (range 28 to 1216 days). Two subjects have voluntarily disengaged from the treatment course before completion of the follow up programme and have lower BMI ( $-0.8$  and  $-0.4$  kgs/m<sup>2</sup>) at the last reported follow up than BMI at discharge (32 and 1216 days post discharge). The 5 patients who either completed or are still attending the post discharge CBT-E programme have a significantly higher BMI compared to the discharge BMI ( $p=0.039$ ). The mean rise in BMI among this group was  $1.52\pm 1.41$  kgs/m<sup>2</sup>. There have been no deaths to date, and no readmissions in this cohort.

Subject	BMI on discharge (kg/m <sup>2</sup> )	Most recent follow up BMI (kg/m <sup>2</sup> )	Time from discharge to most recently recorded BMI (days)
1	18.4	20.8	73
2	15.8	15.4	28
3	15.06	15.6	1045
4	17.25	21.1	134
5	16.62	17.1	47
6	16.28	16.7	146
7	16.94	17.3	225

**Table 2:** BMI on discharge and most recent BMI post discharge from hospital for subjects who attended for follow up.

### Discussion

This study demonstrated the effectiveness of a well-trained and well co-ordinated team for the safe management of these patients presenting to a general hospital. All but one member of the team has general medical clinical responsibilities and a workload reflecting the real world of busy general hospital care.

Patients with eating disorders often present initially with artificially added weight (e.g. phone, coins or other weights in pockets, heavy clothing, or bowel/water loading) so initial weight recordings are often inaccurate and rise when repeated in a more controlled setting by experienced personnel. This was seen in this study with a mean weight reduction on second and third recording over the 24-36 hours post admission of 1.25 kgs. This highlights the importance of training staff to remove extra clothing, cached weights, and perform weighing after voiding.

Equally important is the early recognition and reporting of any other treatment avoiding behaviour, and manipulation of staff. Most of our subjects were seen to perform treatment avoiding behaviour, including micro exercising, failing to adhere to bed rest rules, food caching and non-completion of meal. A high degree of awareness and constant alertness are cornerstones of this role.

The hospital admission can be protracted, and costs high including one-one observation by a health care assistant. The time input is also large with protracted negotiations about feeding, treatment avoidance and detention. However, in this study the length of the inpatient stay correlated positively with the amount weight gain at discharge. It is likely that this protracted stay allowed a longer period of supervised nutrition, limitation of exercise and a longer interface time as an inpatient with the mental health team who will be the cornerstone of post discharge recovery.

Admission biochemistry was largely normal which is consistent with other studies and care must be taken not to assume safety of discharge based on these electrolytes <sup>9</sup> and careful monitoring of serum biochemistry is important because of rates of high refeeding syndrome.

One subject had a serum glucose was 3.1 mmol/L (range 3.9-9.6 mmol/L) associated with sepsis. The development of hypoglycaemia during admission is sometimes an early sign of sepsis and all patients with hypoglycaemia should be assessed by a doctor, screened for sepsis, and monitored closely for the next 48 hours, and treated accordingly.

In summary the learning points from this study include the importance of hypoglycaemia as a potential marker of sepsis, the recognition that normal admission serum biochemistry should not be seen as absence of pathology, risk or appropriateness of discharge, the high frequency of refeeding syndrome in this cohort, the high frequency of treatment avoiding behaviour, and the first recorded weight can be falsely elevated and repeated weighing over three days is advisable to obtain the lowest value and admission transaminitis can worsen with feeding. Moreover, this study demonstrates that safe and effective management of this challenging cohort according to the MEED guidelines can be achieved in a general hospital with training of staff, cooperation in a multidisciplinary environment and long term positive results can be sustained if patients comply with close follow up post discharge by trained staff using CBT-E.

**Declaration Conflicts of Interest:**

The authors have no conflicts of interest to declare.

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