Seminar

Eating disorders

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Eating disorders are an important cause of physical and psychosocial morbidity in adolescent girls and young adult women. They are much less frequent in men. Eating disorders are divided into three diagnostic categories: anorexia nervosa, bulimia nervosa, and the atypical eating disorders. However, the disorders have many features in common and patients frequently move between them, so for the purposes of this Seminar we have adopted a transdiagnostic perspective. The cause of eating disorders is complex and badly understood. There is a genetic predisposition, and certain specific environmental risk factors have been implicated. Research into treatment has focused on bulimia nervosa, and evidence-based management of this disorder is possible. A specific form of cognitive behaviour therapy is the most effective treatment, although few patients seem to receive it in practice. Treatment of anorexia nervosa and atypical eating disorders has received remarkably little research attention.

Eating disorders are of great interest to the public, of perplexity to researchers, and a challenge to clinicians. They feature prominently in the media, often attracting sensational coverage. Their cause is elusive, with social, psychological, and biological processes all seeming to play a major part, and they are difficult to treat, with some patients actively resisting attempts to help them. Nevertheless, there is progress to report both in terms of their understanding and treatment.

Classification and diagnosis

The classification of the eating disorders and their principal diagnostic criteria are shown in panel 1.[1–6] Note that in addition to anorexia nervosa and bulimia nervosa, there is a third diagnostic category, atypical eating disorders,[3] the equivalent American term being "eating disorders not otherwise specified".[1] A further eating disorder has also been proposed, termed binge eating disorder.[1] Since this condition is somewhat different in nature to the other three diagnostic groups we will discuss it separately later.

General clinical features

Anorexia nervosa and bulimia nervosa are united by a distinctive core psychopathology, which is essentially the same in female and male individuals; patients overevaluate their shape and weight. Whereas most of us assess ourselves on the basis of our perceived performance in various domains—eg, relationships, work, parenting, sporting prowess—patients with anorexia nervosa or bulimia nervosa judge their self-worth largely, or even exclusively, in terms of their shape and weight and their ability to control them. Most of the other features of these disorders seem to be secondary to this psychopathology and to its consequences—for example, self-starvation.[7] Thus, in anorexia nervosa there is a sustained and determined pursuit of weight loss and, to the extent that this pursuit is successful, this behaviour is not seen as a problem. Indeed, these patients tend to view their low weight as an accomplishment rather than an affliction[8] and, as a consequence, they have limited motivation to change. In bulimia nervosa, equivalent attempts to control shape and weight are undermined by frequent episodes of uncontrolled overeating (binge eating) with the result that patients often describe themselves as failed anorexics. The core psychopathology has other manifestations; for example, many patients mislabel certain adverse physical and emotional states as feeling fat, and some repeatedly scrutinise aspects of their shape, which could contribute to them overestimating their size.

Anorexia nervosa

In anorexia nervosa, the pursuit of weight loss is successful in that a very low weight is achieved. This loss of weight is primarily the result of a severe and selective restriction of food intake, with foods viewed as fattening being excluded. In most instances there is no true anorexia as such. In some patients, the restriction over food intake is also motivated by other psychological processes, including asceticism, competitiveness, and a wish to punish themselves.[7] Many patients engage in a driven type of over exercising, which can contribute to their low weight. Self-induced vomiting and other extreme forms of weight-control behaviour, such as the misuse of laxatives or diuretics, are practised by a few individuals. Some patients have times when they lose control over eating, although the amounts eaten are often not large. Symptoms of depression and anxiety disorders, irritability, lability of mood, impaired concentration, loss of sexual appetite, and obsessional features are frequent accompaniments. Typically these features get worse as weight is lost and improve with weight regain. Interest in the outside world also declines as patients become underweight, with the result that most become socially withdrawn and isolated. This feature too is reversible.

Search strategy

We searched the Medline and PsycINFO databases for articles on eating disorders published since 1980. The key words used were eating disorders, anorexia nervosa, bulimia nervosa, bulimia, and binge eating. Only articles written in English were reviewed. Additionally, we reviewed professional books (written in English) on eating disorders published during this period. The references listed at the end of this article were chosen on the basis of their importance, accessibility, and usefulness as sources of further information

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Panel 1: **Classification and diagnosis of eating disorders**

Definition of an eating disorder

- There is a definite disturbance of eating habits or weight-control behaviour
- Either this disturbance, or associated core eating disorder features, results in a clinically significant impairment of physical health or psychosocial functioning (core eating disorder features comprise the disturbance of eating and any associated overevaluation of shape or weight)
- The behavioural disturbance should not be secondary to any general medical disorder or to any other psychiatric condition

Classification of eating disorders

- Anorexia nervosa
- Bulimia nervosa
- Atypical eating disorders (or eating disorder not otherwise specified)[1,3]

Certain additional childhood-onset eating disorders are recognised,[4] though these are outside the scope of this Seminar

Principal diagnostic criteria

- Anorexia nervosa
  - Overevaluation of shape and weight—ie, judging self-worth largely, or exclusively, in terms of shape and weight
  - Active maintenance of an unduly low bodyweight—eg, body-mass index $\leqslant 17{\cdot}5$ kg/m^2
  - Amenorrhoea in postmenarcheal females who are not taking an oral contraceptive. The value of the amenorrhoea criterion can be questioned since most female patients who meet the other two diagnostic criteria are amenorrhoeic, and those who menstruate seem to resemble closely those who do not[5,6]
- Bulimia nervosa
  - Overevaluation of shape and weight—ie, judging self-worth largely, or exclusively, in terms of shape and weight
  - Recurrent binge eating—ie, recurrent episodes of uncontrolled overeating
  - Extreme weight-control behaviour—eg, strict dietary restriction, frequent self-induced vomiting or laxative misuse
  - Diagnostic criteria for anorexia nervosa are not met
- Atypical eating disorders
  - Eating disorders of clinical severity that do not conform to the diagnostic criteria for anorexia nervosa or bulimia nervosa

Bulimia nervosa

The main feature that distinguishes bulimia nervosa from anorexia nervosa is that attempts to restrict food intake are punctuated by repeated binges (episodes of eating during which there is an aversive sense of loss of control and an unusually large amount of food is eaten). The amount consumed in these binges varies, but is typically between 4·2 MJ (1000 kcals) and 8·4 MJ (2000 kcals).[9,10] In most instances, binge eating is followed by compensatory self-induced vomiting or laxative misuse, but there is a subgroup who do not purge. The combination of undereating and binge eating results in bodyweight being generally unremarkable, providing the other obvious difference from anorexia nervosa. Most patients with bulimia nervosa are distressed by their loss of control over eating and ashamed of it, which makes them easier to engage in treatment than those with anorexia nervosa, although there is typically a delay of many years before they seek help. Symptoms of depression and anxiety disorders are often prominent and, as in the case of anorexia nervosa, there is a subgroup who engage in substance misuse or self-injury, or both.[11–13] This subgroup is probably over-represented in specialist treatment centres.[14]

Atypical eating disorders

Most atypical eating disorders closely resemble anorexia nervosa and bulimia nervosa,[15,16] and many are as severe and long lasting. Some are virtually identical to the two prototypical disorders, but do not meet their precise diagnostic criteria.[6] For example, the patient's weight might be just above the diagnostic threshold for anorexia nervosa or she might still be menstruating. In others, the picture is mixed. For instance, there could be extreme dietary restraint, pronounced over exercising, occasional binge eating, and a low-to-normal weight. Many such patients have had anorexia nervosa or bulimia nervosa in the past. Overevaluation of shape and weight is present in most, although in some the focus is primarily on maintaining strict control over eating.

Distribution

Panel 2[17–21] gives a summary of what is known about the distribution of eating disorders. The general belief is that eating disorders have become more frequent over recent decades. In the instance of bulimia nervosa, this notion could well be true,[22–25] but alternative explanations for the apparent increase in anorexia nervosa[26,27] are plausible, including greater help-seeking and better detection than in the past, and changes in diagnostic practice.[18,28] The

Panel 2: **Distribution of eating disorders**[17–21]

	Anorexia nervosa	**Bulimia nervosa**
Worldwide distribution	Predominantly Western societies	Predominantly Western societies
Ethnic origin	Mainly white people	Mainly white people
Sex	Most female (about 90%)	Most female (uncertain proportion)
Age	Adolescents (some young adults)	Young adults (some adolescents)
Social class	Possible excess in higher social classes	Even distribution
Prevalence	0·7% (in teenage girls)	1–2% (in 16–35-year old females)
Incidence (per 100 000 per year)	19 in females, 2 in males	29 in females, 1 in males
Secular change	Possible increase	Likely increase

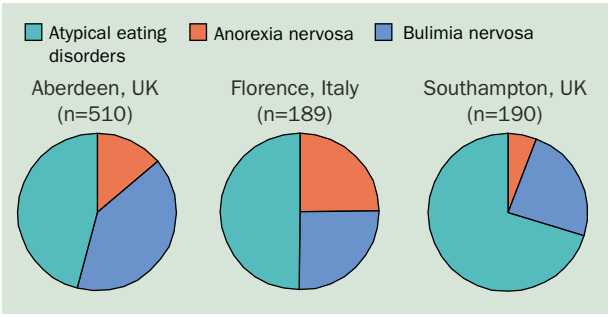

Figure 1: **Diagnostic composition of three community-based case series**[15,16,31]

fact that many instances do not come to medical attention complicates research; for example, most individuals with bulimia nervosa are not in treatment,[29,30] and the subgroup who are is biassed in certain respects.[30]

There has been little research done on the distribution of the atypical eating disorders, although they are frequently encountered in clinical practice. Figure 1, for example, shows that atypical eating disorders were the most common diagnostic category in three, well classified case series.[15,16,31] To judge from clinical experience, atypical eating disorders primarily affect adolescents and young adult women.

Development and subsequent course

Anorexia nervosa typically starts in midteenage years with the onset of dietary restriction, which proceeds to get out of control. In some instances the disorder is short-lived and self-limiting, or only requires a brief intervention. These instances are most typical of young individuals with a brief history. In others, the disorder becomes entrenched and necessitates more intensive treatment. In 10–20% of individuals, the disorder proves intractable and unremitting.[32,33] This heterogeneity in course and outcome is often neglected in accounts of the disorder. The proportions with these outcomes vary in accord with the age of the sample group and the treatment setting. Some residual features are common, particularly overconcern about shape, weight, and eating. A frequent occurrence is the development of binge eating[34] and, in about half the cases, full bulimia nervosa.[35] Most prominent among the favourable prognostic factors are an early age of onset and a short history, whereas unfavourable prognostic factors include a long history, severe weight loss, and binge eating and vomiting.[33]

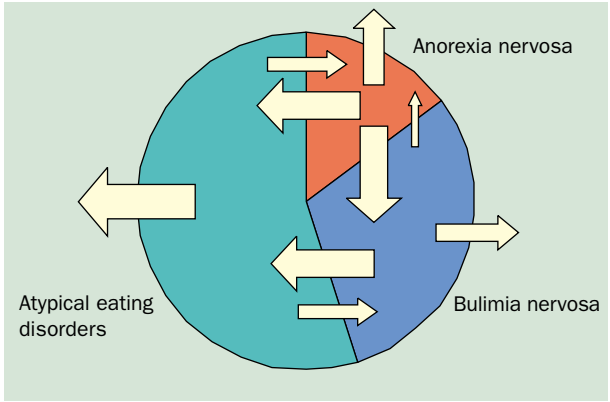

Figure 2: **Schematic representation of temporal movement between the eating disorders**

The size of the arrow indicates likelihood of movement in shown direction. Arrows that point outside of the circle indicate recovery.

Anorexia nervosa is the one eating disorder to be associated with a raised mortality rate, the standardised mortality ratio over the first 10 years from presentation being about 10.[19] Most deaths are either a direct result of medical complications or due to suicide.[36]

Bulimia nervosa has a slightly later age of onset than anorexia nervosa.[37] It usually starts in much the same way as anorexia nervosa—indeed, in about a quarter of cases, the diagnostic criteria for anorexia nervosa are met for a time.[38] Eventually, however, episodes of binge eating begin to interrupt the dietary restriction and, as a result, bodyweight rises to normal or near normal levels. The disorder tends to be self-perpetuating.[39] Thus the average length of history at presentation is about 5 years,[37] and even 5–10 years later on, between a third and a half of individuals still have an eating disorder of clinical severity, although in many it is atypical in form.[39–42] No consistent predictors of outcome have been identified, although there is evidence that childhood obesity,[43–45] low selfesteem, and personality disturbance are associated with a worse prognosis.[46]

Little is known about the course of the atypical eating disorders, although findings of a small, 3-year prospective study[47] indicate that the eating disorder persisted in most cases and that in almost half it evolved into anorexia nervosa or bulimia nervosa.

Thus it seems that patients with eating disorders tend to migrate between the diagnostic categories of anorexia nervosa, bulimia nervosa, and the atypical eating disorders. The main pathways are shown in figure 2. This temporal movement, together with the fact that anorexia nervosa, bulimia nervosa, and the atypical eating disorders share the same distinctive psychopathology, suggest that common mechanisms are involved in their persistence.[48] However, the fact that eating disorders do not evolve into other conditions lends support to the distinctiveness of the diagnostic category as a whole.

Pathogenesis

Research into the pathogenesis of the eating disorders has focused almost exclusively on anorexia nervosa and bulimia nervosa. There is undoubtedly a genetic predisposition and a range of environmental risk factors, and there is some information with respect to the identity and relative importance of these contributions. However, virtually nothing is known about the individual causal processes involved, or about how they interact and vary across the development and maintenance of the disorders. Hence, rather than prematurely attempting to present a unifying causal model, we indicate the main empirical data available, and discuss briefly certain interpretational issues.

Genetics

Eating disorders and certain associated traits run in families.[49] There seems to be cross-transmission between anorexia nervosa, bulimia nervosa, and the atypical eating disorders, suggesting a shared familial liability.[50] The prevalence of substance misuse is increased, especially in the relatives of bulimic probands,[51,52] but there seems to be no cross-transmission. There is also a raised prevalence of depression,[51,53] the pattern of familial transmission being unclear.[49] Additionally, there is evidence of familial coaggregation of anorexia nervosa and obsessional and perfectionist traits.[51]

In the absence of adoption studies, twin designs have been used to establish the genetic contribution to the familiality of eating disorders. Clinic samples show concordance for anorexia nervosa of around 55% in

	Origin of sample	Heritability (%, 95% CI)	Shared environment (%, 95% CI)	Individual-specific environment (%, 95% CI)
Anorexia nervosa				
Wade et al, 2000[56]	Virginia	58 (33–84)	–	42 (16–68)
Kortegaard et al, 2001[57]	Denmark	48 (27–65)	–	52 (NA)
Klump et al, 2001[58]	Minnesota	76 (35–95)	–	24 (5–65)
Bulimia nervosa*				
Kendler et al, 1991[23]	Virginia	54 (0–77)	1 (0–65)	46 (23–77)
Bulik et al, 1998[55]	Virginia	51 (0–86)	0 (0–68)	49 (14–100)
Wade et al, 1999[59]	Australia	32 (0–68)	0 (0–52)	68 (32–100)
Kendler et al, 1995[60]	Virginia	28 (7–62)	37 (10–59)	35 (19–49)
Bulik et al, 1998[55]	Virginia	31 (0–54)	0 (0–35)	67 (46–94)
Bulik et al, 1998[55]	Virginia	83 (49–100)	0 (0–30)	17 (0–36)
Wade et al, 1999[59]	Australia	59 (36–68)	0 (0–11)	41 (33–48)
Kortegaard et al, 2001[57]	Denmark	61 (44–75)	–	24 (NA)

NA=not available. *Except for Kortegaard et al, the bulimia nervosa results are adapted from table 2 of the Bulik et al, review. Some of the point estimates differ from those provided in the original reports because the review used a different statistical model. The diagnostic criteria (see panel 1) have been relaxed in all these studies, often substantially. The Bulik et al study used two different definitions. The twins in the Virginia and Australia studies were interviewed on several occasions (waves). Two of the studies[55–59] used this information to improve diagnostic reliability. These important issues are discussed elsewhere.[61,62]

Table 1: **Eating disorders: estimates of heritability and environmental contributions in population-based twin studies**

monozygotic twins and 5% in dizygotic twins, with the corresponding figures for bulimia nervosa being 35% and 30%, respectively.[54] These findings suggest a significant heritability of anorexia nervosa but not of bulimia nervosa. Because clinic-based samples are potentially biassed, population-based samples have also been studied. Particular interest was generated by a report that indicated that more than 80% of the variance in liability to bulimia nervosa was genetic,[55] this estimate being much higher than was expected from previous findings. Indeed, this finding would make bulimia nervosa one of the most heritable of all complex phenotypes. However, as table 1[56–62] shows, there is still uncertainty as to the size of the genetic contribution to bulimia nervosa, and to anorexia nervosa, with there being differing point estimates and wide confidence intervals. The same applies to the contributions of individual-specific and shared (common) environmental factors. Several issues affect the interpretation of these data.[61,62] For example, there has been insufficient power to detect shared environmental effects, and established diagnostic criteria have been broadened considerably to increase the number of "affected" twins available for analysis.

Despite these caveats, there is a clear and possibly substantial genetic contribution to both anorexia nervosa and bulimia nervosa. Molecular genetic studies are being undertaken to identify the underlying loci and genes. Genetic association studies have focused on polymorphisms in serotonin (5-HT)-related genes, because this neurotransmitter system is important in regulation of eating and mood. Particular attention was drawn to the 5-HT2AR (*HTR2A*) gene after an association was reported between allelic variation in the promoter region (−1438 A→G) and anorexia nervosa.[63] However, three of six studies, and a multicentre family-based study, have not been able to confirm this observation.[64] A range of other polymorphisms have been investigated, but no associations with eating disorders have yet been clearly replicated, or confirmed in a family study or by meta-analysis.[65] In the first genome-wide linkage survey yet reported, only weak evidence for linkage in anorexia nervosa was noted, the highest non-parametric linkage score (1·80) being for a marker on chromosome 4.[66] In families of probands with the restricting subtype of anorexia nervosa—ie, those with no binge eating or purging—there was modest evidence of linkage to chromosome 1p. A further analysis, which covaried for related behavioural traits, came up with a different locus on chromosome 1, as well as loci on chromosomes 2 and 13.[67] All these findings must be judged preliminary.

Other research into risk factors

Many other risk factors have been implicated,[68] and their respective contributions have been assessed in an integrated series of community-based, case-control studies (panel 3).[68–71] The various factors differ in nature and specificity. Some are adverse premorbid experiences of the type associated with many psychiatric disorders—eg, childhood sexual abuse. Others seem to predispose especially to bulimia nervosa—eg, childhood and parental obesity, early menarche, parental alcoholism—some of which could operate by sensitising the person to her or his shape, thereby encouraging dieting. This effect is most likely to be seen in women in view of the social pressure on them to be slim. Yet other risk factors are character traits, the two most prominent being low selfesteem and perfectionism, the latter being a particularly common antecedent of anorexia nervosa.[70]

Panel 3: **Main risk factors for anorexia nervosa and bulimia nervosa[68–71]**

General factors

Female
Adolescence and early adulthood
Living in a Western society

Individual-specific factors

Family history
- Eating disorder of any type
- Depression
- Substance misuse, especially alcoholism (bulimia nervosa)
- Obesity (bulimia nervosa)

Premorbid experiences
- Adverse parenting (especially low contact, high expectations, parental discord)
- Sexual abuse
- Family dieting
- Critical comments about eating, shape, or weight from family and others
- Occupational and recreational pressure to be slim

Premorbid characteristics
- Low selfesteem
- Perfectionism (anorexia nervosa and to a lesser extent bulimia nervosa)
- Anxiety and anxiety disorders
- Obesity (bulimia nervosa)
- Early menarche (bulimia nervosa)

Panel 4: **Current knowledge about binge eating disorder**[82–90]

Definition	Recurrent episodes of binge eating in the absence of extreme weight-control behaviour[1]
Clinical features	Frequent binge eating, much as in bulimia nervosa, but against the background of a general tendency to overeat.[85,86] Strong association with obesity.[82] By definition, self-induced vomiting and laxative misuse are not present or only occasional. Depressive features and dissatisfaction with shape common, although these features tend to be less severe than in bulimia nervosa
Distribution	Patients typically present in their 40s and as many as a quarter are male.[87] Prevalence in the community has not been satisfactorily established. Present in 5–10% of those seeking treatment for obesity
Pathogenesis	Barely studied. Lower exposure to "eating disorder risk factors" than in anorexia nervosa and bulimia nervosa.[71] Nature of relation with obesity unclear
Course	Little known. Patients typically give long histories of being prone to binge eat, particularly at times of stress, but many also report extended periods free from binge eating. Spontaneous remission rate seems high[39,81]
Medical complications	None established, other than those secondary to any comorbid obesity
Response to treatment	In the short-term seems more treatment-responsive than anorexia nervosa and bulimia nervosa. Notable placebo response rate.[82,83] Frequency of binge eating declines in response to various pharmacological and psychological treatments, including cognitive behaviour therapy,[88] interpersonal psychotherapy,[88] behavioural weight loss programmes,[83] and self-help,[89,90] but with little accompanying weight change. No studies of long-term course or outcome

Neurobiological findings

There has been extensive research into the neurobiology of eating disorders.[72] This work has focused on neuropeptide and monoamine (especially 5-HT) systems thought to be central to the physiology of eating and weight regulation. Of the various central and peripheral abnormalities reported, many are likely to be secondary to the aberrant eating and associated weight loss. However, some aspects of 5-HT function remain abnormal after recovery,[72–74] leading to speculation that there is a trait monoamine abnormality that might predispose to the development of eating disorders or to associated characteristics such as perfectionism. Furthermore, normal dieting in healthy women alters central 5-HT function, providing a potential mechanism by which eating disorders might be precipitated in women vulnerable for other reasons.[75,76]

Psychological processes

Specific psychological theories have been proposed to account for the development and maintenance of eating disorders. Most influential in terms of treatment have been cognitive behavioural theories.[48,77–80] In brief, these theories propose that the restriction of food intake that characterises the onset of many eating disorders has two main origins, both of which may operate. The first is a need to feel in control of life, which gets displaced onto controlling eating.[80] The second is overevaluation of shape and weight in those who have been sensitised to their appearance. In both instances, the resulting dietary restriction is highly reinforcing. Subsequently, other processes begin to operate and serve to maintain the eating disorder. They include social withdrawal, the fact that extreme and rigid dietary restraint promotes binge eating in certain individuals, and the negative effect of binge eating on concerns about shape and the sense of being in control. There is increasing evidence that correction of these processes is necessary for recovery, especially in those with bulimia nervosa.[48]

Binge eating disorder

By comparison with anorexia nervosa and bulimia nervosa, little is known about binge eating disorder. Although it shares with bulimia nervosa the symptom of binge eating, its overlap with the other eating disorders is limited. For example, the condition seems to primarily affect an older age group, its sex ratio is less uneven, the binge eating occurs against the background of a general tendency to overeat rather than dietary restraint (which probably accounts for its strong association with obesity), and the fact that findings from natural history studies[39,81] and drug trials[82,83] both suggest that there is a high spontaneous remission rate at least in the short-term. Panel 4[82–90] summarises current knowledge about the disorder.

Medical complications and their management

The physical abnormalities seen in anorexia nervosa seem to be largely secondary to these patients' disturbed eating habits and their compromised nutritional state. Hence most are reversed by restoration of healthy eating habits and sound nutrition, with the possible exception of reduced bone density. The main physical features are listed in panel 5.[91,92] The physical abnormalities seen in bulimia nervosa are usually minor unless vomiting, or laxative or diuretic misuse are frequent, in which case there is risk of electrolyte disturbance.[93–95] Patients who vomit frequently are also at risk of dental damage.[96] Equivalent physical abnormalities are noted in individuals with those atypical eating disorders in which bodyweight is very low or there is a high frequency of purging. There are no established medical complications of binge eating disorder per se (other than those secondary to comorbid obesity).

The panoply of physical abnormalities seen in the eating disorders can cloud thinking about diagnosis and management. The diagnosis of an eating disorder is made on positive grounds, using the history and mental state examination to detect the characteristic behavioural and attitudinal features; not by simply ruling out possible physical causes. No laboratory tests are required to make the diagnosis and, unless there are positive reasons to suspect the presence of physical disease, no tests are required to exclude other medical disorders. In general, the management of any physical abnormalities should focus on the correction of the eating disorder. Starvation-induced hypothyroidism should not, for example, be treated with thyroxine. Nevertheless, life-threatening complications must be addressed and the patient's nutritional state needs to be optimised.

Two clinical problems deserve particular mention. The first, osteopenia and osteoporosis, is especially common in longstanding and severe cases of anorexia nervosa[97] and is

Panel 5: **Main physical features of anorexia nervosa**[91–93]

Physical symptoms

- Heightened sensitivity to cold
- Gastrointestinal symptoms—eg, constipation, fullness after eating, bloatedness
- Dizziness and syncope
- Amenorrhoea (in females not taking an oral contraceptive), low sexual appetite, infertility
- Poor sleep with early morning wakening

Physical signs

- Emaciation; stunted growth and failure of breast development (if prepubertal onset)
- Dry skin; fine downy hair (lanugo) on the back, forearms, and side of the face; in patients with hypercarotenaemia, orange discolouration of the skin of the palms and soles
- Swelling of parotid and submandibular glands (especially in bulimic patients)
- Erosion of inner surface of front teeth (perimylolysis) in those who vomit frequently
- Cold hands and feet; hypothermia
- Bradycardia; orthostatic hypotension; cardiac arrhythmias (especially in underweight patients and those with electrolyte abnormalities)
- Dependent oedema (complicating assessment of bodyweight)
- Weak proximal muscles (elicited as difficulty rising from a squatting position)

Abnormalities on physical investigation

- *Endocrine*
  Low concentrations of leutenising hormone, follicle stimulating hormone, and oestradiol
  Low T_3, T_4 in low normal range, normal concentrations of thyroid stimulating hormone (low T_3 syndrome)
  Mild increase in plasma cortisol
  Raised growth hormone concentration
  Severe hypoglycaemia (rare)
  Low leptin (but possibly higher than would be expected for bodyweight)
- *Cardiovascular*
  ECG abnormalities (especially in those with electrolyte disturbance): conduction defects, especially prolongation of the Q-T interval, of major concern
- *Gastrointestinal*
  Delayed gastric emptying
  Decreased colonic motility (secondary to chronic laxative misuse)
  Acute gastric dilatation (rare, secondary to binge eating or excessive re-feeding)
- *Haematological*
  Moderate normocytic normochromic anaemia
  Mild leucopenia with relative lymphocytosis
  Thrombocytopenia
- *Other metabolic abnormalities*
  Hypercholesterolaemia
  Raised serum carotene
  Hypophosphataemia (exaggerated during refeeding)
  Dehydration
  Electrolyte disturbance (varied in form; present in those who vomit frequently or misuse large quantities of laxatives or diuretics): vomiting results in metabolic alkalosis and hypokalaemia; laxative misuse results in metabolic acidosis, hyponatraemia, hypokalaemia
- *Other abnormalities*
  Osteopenia and osteoporosis (with heightened fracture risk)
  Enlarged cerebral ventricles and external cerebrospinal fluid spaces (pseudoatrophy)

associated with a substantially increased risk of fractures.[98] The pathophysiology is not well understood and there is uncertainty over management.[99,100] Restoration of a healthy weight and an adequate diet, and with them the resumption of spontaneous menstruation, are of central importance. The benefits of calcium supplementation and oestrogen replacement are unclear.[101,102] Preliminary evidence in adult patients suggests that the strategy of combining anabolic (recombinant human insulin-like growth factor I) and antiresorptive (oral contraceptive) therapy could be of help.[102]

The second problem concerns pregnancy and childrearing. Generally, eating disorders improve during pregnancy, but birthweight can be abnormal and there is a higher rate of caesarean section in individuals with eating disorders than in those without.[103,104] In a small proportion of cases, childrearing is impaired, with secondary effects on the child's feeding and growth.[105] Whether or not there are more general effects on child development is not known.

Management of eating disorders

Over the past 20 years the treatment of bulimia nervosa has attracted considerable research attention, and evidence-based management is now possible. There have been few randomised controlled studies into the treatment of anorexia nervosa or the atypical eating disorders, with the result that in their instance treatment recommendations have to be tentative. In the absence of satisfactory

	Anorexia nervosa		Bulimia nervosa		Atypical eating disorders		Binge eating disorder	
	Evidence	Effect	Evidence	Effect	Evidence	Effect	Evidence	Effect
Drug treatment								
Antidepressants (acute treatment)	Modest	0	Considerable	**	None	–	Modest	**
Antidepressants (relapse prevention)	Modest	*	Modest	*	None	–	None	–
Antipsychotics	Modest	0	None	–	None	–	None	–
Appetite suppressants	None	–	Modest	0	None	–	Modest	**
Psychological treatment								
Cognitive analytic therapy (CAT)	Modest	*	None	–	None	–	None	–
Cognitive behaviour therapy (CBT)	Modest	*	Strong	***	None	–	Moderate	***
"Dialectical behaviour therapy"-based treatment	None	–	Modest	**	None	–	Modest	**
Exposure with response prevention (ERP)	None	–	Moderate	**	None	–	None	–
Family-based therapy for adolescents	Moderate	***	None	–	None	–	None	–
Interpersonal psychotherapy (IPT)	None	–	Moderate	**	None	–	Modest	***
Nutritional counselling	Modest	0	Modest	*	None	–	None	–
Psychodynamic psychotherapy	Modest	*	Modest	*	None	–	None	–
Psychoeducational self-help	None	–	Moderate	*	None	–	Moderate	**
Schema-based cognitive therapy	None	–	None	–	None	–	None	–
12-step approaches	None	–	None	–	None-	–	None	–

Weight of evidence: none=no studies done, modest=fewer than four trials (none of superior quality), moderate=at least four trials or two trials of superior quality, considerable=rating between moderate and strong, strong=at least ten trials and at least five trials of superior quality. Magnitude of effect:–=treatment not studied, 0=no beneficial effect, *=slight beneficial effect, **=some beneficial effect, ***=moderate beneficial effect, ****=pronounced beneficial effect—ie, substantial and persistent effect.

Table 2: **Empirical standing of treatments advocated for patients with eating disorders: weight of supporting evidence from randomised controlled trials (published and in press) and magnitude of treatment effects observed**

systematic reviews of the full range of the research that has been done, table 2 is intended to convey the empirical standing of the main treatments advocated and implemented. Note that many of these treatments have little or no evidence to support them. The treatment of male patients follows the same principles as that of female patients.

Bulimia nervosa

There have been more than 50 randomised controlled trials done to assess treatments for bulimia nervosa, and their main findings are reasonably consistent.[106–108] Although almost all the trials have been efficacy rather than effectiveness studies, there are good reasons to think that their findings are relevant to management in most psychiatric settings.[109,110]

The research has generated three robust findings. First, the most effective treatment is a specific type of cognitive behaviour therapy that focuses on modifying the specific behaviours and ways of thinking that maintain these patients' eating disorder.[111,112] It typically involves about 20 individual treatment sessions over 5 months and results in substantial improvement with (on intent-to-treat analyses) a third to a half of the patients making a complete and lasting recovery.[106] The remainder range in outcome from greatly improved to not improved at all. The second finding is that antidepressant drugs have an antibulimic effect. They result in a rapid decline in the frequency of binge eating and purging, and an improvement in mood, but the effect is not as great as that obtained with cognitive behaviour therapy and, more importantly, the limited evidence available suggests it is often not sustained. The third research finding is a negative one: no consistent predictors of outcome have been identified.

Three less robust findings have also emerged from the trials. First, combining cognitive behaviour therapy with antidepressant drugs results in few consistent benefits over cognitive behaviour therapy alone.[113,114] Second, findings from two trials suggest that a short-term focal psychotherapy termed interpersonal psychotherapy[115,116] could be as effective as cognitive behaviour therapy, but it takes considerably longer to work.[117,118] Third, simple largely behavioural treatments (including forms of self-help) that include elements of cognitive behaviour therapy could help a subset of patients,[119-123] although they are unlikely to be sufficient for the majority.

In summary, cognitive behaviour therapy is the clear treatment of choice for bulimia nervosa. It is not a panacea, but it has the potential to benefit many patients. Having said that, clinical experience and research evidence[124,125] suggest that few patients receive such therapy. Arguably, the main role for antidepressant drugs is as a readily-delivered initial intervention (possibly provided in primary care), the second step being full cognitive behaviour therapy (delivered by a trained therapist). Evidence-based guidelines cannot be formulated for the treatment of those patients who do not respond to cognitive behaviour therapy.[48,126]

Anorexia nervosa

In view of the paucity of research on the treatment of anorexia nervosa, the following comments simply summarise mainstream opinion. In principle, there are four aspects to management. The first is to help patients see that they need help and to maintain their motivation thereafter. This aim is crucial given their reluctance to change. The second is weight restoration. This goal is needed to reverse the malnutrition and of itself usually leads to substantial improvement in the patient's overall state. Weight restoration can be achieved on an outpatient, daypatient, or inpatient basis, their relative merits being the subject of debate.[127–130] Indications for admission to hospital include risk of suicide, severe interpersonal problems at home, and failure of less intensive methods. Physical indications include a very low weight, rapid weight loss, and the presence of medical complications, such as pronounced oedema, severe electrolyte disturbance, hypoglycaemia, or great intercurrent infection. Under such circumstances, admission should be to a general medical ward or a psychiatric unit with good access to general medical help. In either instance, staff experienced in the management of the disorder are a great advantage. Admission should always be viewed as a preliminary to subsequent outpatient treatment.

The third aspect of management is addressing patients' overevaluation of shape and weight, their eating habits, and their general psychosocial functioning. There is no single way to achieve this aim. One approach that has some research support is a family-based treatment,[131] which seems to be of most help to younger patients[132] and is thus mainly used with adolescents. There are various forms of family therapy and which is best is unclear.[133] Cognitive behaviour therapy is a logical alternative for older patients,

not least in view of its effectiveness in bulimia nervosa. However, its use in anorexia nervosa has not been well described and there is little evidence to support this method of care. Both forms of treatment require training to implement them, and both are best offered on an outpatient basis.

The fourth aspect of management, use of compulsory treatment, is only relevant to a few cases. Reconciling respect for patients' wishes and their right to receive good treatment can be difficult, and compulsory treatment, though legally permissible, should never be undertaken lightly.[134,135]

Drug treatment does not have an established place in the management of anorexia nervosa. No drug has been shown to be of clinical value in promoting weight regain,[136,137] although preliminary findings suggest that fluoxetine might reduce the risk of relapse in those patients whose weight has recently been restored.[138] This observation needs to be substantiated.

Atypical eating disorders

Since the treatment of the atypical eating disorders has received almost no research attention, the only advice that can be given is for clinicians to follow the guidelines for treatment of bulimia nervosa in instances in which there is binge eating, and those for the treatment of anorexia nervosa in instances in which weight is low.

Clinical and research priorities

Several research themes and priorities emerge from this Seminar. First, the existing scheme for classifying eating disorders is unsatisfactory and anomalous, in that about half the cases seen in clinical practice are relegated to an atypical or not otherwise specified group (figure 1). This system is a historical accident that needs to be rectified, since far more unites the three categories of eating disorder than separates them.[48] A classificatory scheme that reflects clinical reality would greatly facilitate research and clinical practice. Second, to clarify the pathogenesis of eating disorders requires larger and more sophisticated twin studies than those used to date, as well as continuing genome-wide linkage and association studies. The search for genes might also benefit from studies of related phenotypes, such as obesity,[139] thinness,[140] and weight lability. Most importantly, the research must be targeted on the interaction of genetic and environmental processes, and this should be from a developmental perspective. Third, there is a pressing need for more treatment research, both in terms of developing more effective treatments and focusing on the full range of eating disorders. This research, and perhaps clinical practice, would be improved by ignoring professional and administrative boundaries that exist between adolescent and adult eating disorder services, given the age distribution of these disorders. Last, the gulf between research evidence and service provision needs to be investigated and bridged; too few patients receive evidence-based treatment and too many receive suboptimal or inappropriate therapy.

Conflict of interest statement

None declared.

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