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**Title:**

15 Minute Consultation: The Child with Obesity

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1 **ABSTRACT**

2 Obesity is common among children and young people, with potential for significant clinical  
3 consequences. The physical and psychological co-morbidities associated with childhood  
4 obesity persist into adult life, but many children do not have access to tailored obesity  
5 services. We present a framework for the identification, assessment, and management of  
6 childhood obesity by the non-specialist. We also offer strategies to initiate discussions about  
7 weight and to communicate effectively with patients living with obesity.

8

9 **INTRODUCTION**

10 Childhood obesity is one of the most serious public health challenges of the 21st century, with  
11 rates increasing tenfold over the last forty years. In England, 23% of children starting school  
12 and 34% of children aged 10 to 11 years are classified as overweight or obese. In the UK,  
13 obesity is twice as prevalent in the most deprived populations compared with the least  
14 deprived, while in low-income countries this association is reversed.(1) The definitions of  
15 obesity are listed in Table 1. The development of obesity is complex: societal and economic  
16 factors combined with global trends for increased sedentary behaviours and consumption of  
17 energy-dense food all play a role.

18

19 Childhood obesity leads to adult obesity with increased risk of poor health outcomes and  
20 premature death. Type 2 diabetes and hypertension are increasingly seen in children, and the  
21 psychosocial impact on children's quality of life includes low self-esteem, depression, and  
22 bullying.(1) Weight bias can lead to lower expectations from teachers, decreased school  
23 attendance, and fewer friends.(1) Perceived benefits of obesity can be a barrier to  
24 intervention and include protection against bullying for some, being seen as a sign of health,  
25 or being valued in some communities.

26

27 This paper aims to support the identification of obesity that requires onward referral: obesity  
28 with suspicion of an underlying cause or with significant co-morbidities. However, as the  
29 majority of obesity is nutritional in origin, this paper also focuses on the assessment and  
30 management of patients whose obesity is not caused by an underlying medical problem.

31

## 32 **Presentation of Childhood Obesity**

33 In the UK, children with obesity may be identified through the National Child Measurement  
34 Programme which records height, weight, and BMI for every child in Reception (age four to  
35 five) and Year 6 (age 10 to 11). Clinicians should also identify obesity opportunistically by  
36 recording and reviewing BMI each time a child is in contact with health services.

37

## 38 **COMMUNICATION**

39 A significant proportion of healthcare consultations are likely to be with children with  
40 overweight or obesity. Neither parents nor healthcare professionals reliably recognise  
41 overweight status in children,(2) limiting the opportunities for acknowledgement and support  
42 towards lifestyle change. Discussing weight status is an area that healthcare professionals  
43 find difficult, citing lack of time or knowledge and concern about preserving patient  
44 relationships. Public Health England's framework Let's Talk About Weight uses motivational  
45 interviewing principles to support the person making the behaviour change to identify their  
46 own solutions,(3) and the online Moving Medicine resource ([movingmedicine.ac.uk](http://movingmedicine.ac.uk)) uses a  
47 similar approach with short conversations tailored to children and young people with obesity.

48

49 Experiences of weight-related stigma can be a barrier to seeking medical attention for  
50 obesity-related concerns, leading to a cycle of disengagement from medical services and  
51 worsening health outcomes. Awareness of language and communication can significantly  
52 change the way that a person with obesity experiences the consultation and increase their  
53 likelihood of engaging with behaviour change.(4) It is particularly important to create a non-  
54 judgemental environment, show empathy, and avoid generalisations or assumptions. Further  
55 recommendations are described in Box 1.

56

## 57 **CLINICAL ASSESSMENT**

58 The clinical assessment of the child with obesity focuses on three areas: identifying patients  
59 who require investigation for an underlying cause of obesity, screening for co-morbidities, and  
60 seeking modifiable lifestyle risk factors.

61

## 62 **Identifying patients with a possible underlying diagnosis**

63 Red flags for obesity with an underlying cause include rapid weight gain in infancy,  
64 hyperphagia, and short stature (Table 2). Possible indicators of hyperphagia include waking  
65 at night to eat, demanding food relentlessly, stealing food, eating frozen, dirty or uncooked  
66 food, and disruption of normal daily activities by food-seeking behaviour. Abnormal  
67 development or dysmorphic features may point towards an underlying syndrome.

68

69 Obesity clusters in families, although a family history of severe early onset obesity can point  
70 towards a genetic cause. Short stature should raise suspicion of an endocrinopathy, while  
71 children whose obesity is not caused by an underlying syndrome often have a tendency  
72 towards slightly taller stature than their normal-weight peers until attainment of final adult  
73 height. Small for gestational age infants can show rapid catch-up growth in infancy and  
74 subsequent childhood/adulthood obesity. Puberty in obese children may be earlier than  
75 average but precocious puberty is not expected.

76

77 Genetic testing (available through the University of Cambridge Metabolic Research  
78 Laboratories; [www.goos.org.uk](http://www.goos.org.uk)) is recommended in patients with extreme obesity before five  
79 years of age, extreme hyperphagia, a family history of extreme obesity, and where bariatric  
80 surgery is being considered.(6, 7) Other investigations may be indicated where there is a  
81 suspicion of a specific underlying cause (Table 2).

82

## 83 **Screening for co-morbidities**

84 Assessment for co-morbidities should be considered in children with BMI  $\geq 98^{\text{th}}$  centile or z  
85 score  $>2$  (Table 3).(5) A family history of type 2 diabetes, cardiovascular disease, or  
86 hyperlipidaemia increases the metabolic risks associated with childhood obesity. Acanthosis  
87 nigricans, an indicator of insulin resistance, is most easily seen at the base of the neck, axilla  
88 or groin.

89

## 90 **Seeking modifiable lifestyle risk factors**

91 In the history, asking about dietary habits, exercise, screen-time, and sleep can help identify  
92 which lifestyle change goals are most suitable for the individual child and family (see Box 2).  
93 A dietary history includes but is not limited to drink preference, snack preference, after-school  
94 eating and eating that takes place during screen-time (“grazing”). A dietary history over the  
95 previous 24 hour period can be useful. It is likewise important to recognise barriers to lifestyle  
96 change that may exist, including financial pressures, limited local availability of fresh food,  
97 and parents/carers who work unsocial hours or who are not able to cook.

98

## 99 **MANAGEMENT**

100 Obesity services in the UK are commissioned in four tiers (Figure 1), with Tier 1  
101 encompassing universal services provided by general practitioners, health visitors and school  
102 nurses. Tier 2 services are commissioned and run by local councils, offering multicomponent  
103 interventions to promote healthy eating habits and physical activity, reduce sedentary time,  
104 and offer behaviour change strategies such as stimulus control and goal setting.(7) Tier 3  
105 services are specialist multi-disciplinary paediatric obesity health services able to offer dietetic  
106 advice, pharmacological management, and, in some centres, psychological support. Supra-  
107 specialised Tier 4 services manage patients who are candidates for bariatric surgery.

108

109 Access to services across all tiers varies according to geographical location. Children living in  
110 areas without access to Tier 2 or 3 services may rely on general paediatric or endocrinology  
111 input for management of obesity. Other non-specialists able to support the family include  
112 parenting groups, youth support workers, and family support workers.

113

## 114 **Weight Maintenance vs Weight Loss**

115 In most children who have not yet achieved their final height, weight maintenance rather than  
116 weight loss is advised. However, pre-pubertal children with severe obesity should be  
117 supported to lose weight. Likewise, young people with obesity who have completed growth  
118 should aim to lose weight, usually between 0.5 and 1kg per month.(8)

119

## 120 **Diet and Exercise**

121 Lifestyle advice should focus on both dietary alterations and physical activity (Box 2). Goals  
122 should be realistic and can be revisited on consecutive appointments rather than attempting a  
123 complete lifestyle overhaul at once.

124

125 General principles of the dietary management of obesity in children are the avoidance of  
126 extremely restrictive or “fad” diets and the promotion of sustainable healthy eating patterns.  
127 Although specialist units may offer individualised recommendations (including very low calorie  
128 diets or low carbohydrate/low glycaemic index diets), most general units should provide  
129 dietary advice in line with national guidance (e.g. the UK Eatwell Guide) alongside a  
130 discussion of age-appropriate portion sizes.(9)

131

132 Although a calorie-based approach to weight management is not advocated by the National  
133 Institute for Clinical Excellence (NICE),(5) some families may request advice about  
134 recommended daily calorie consumption for their child. The 2011 Dietary Reference Values  
135 for Energy report details estimated energy requirements by age, sex, and activity levels.(10)

136

137 The benefits of physical activity exceed simple energy expenditure and include improvements  
138 in both physical and mental health. Children between one and four years are advised to  
139 spend 180 minutes of the day physically active.(11) At least 60 minutes per day of moderate-  
140 vigorous physical activity (exercising to the point of feeling warmer and breathing faster) is  
141 recommended for school-age children.(11) Advice about physical activity needs to be tailored  
142 to the individual, with consideration of possible mobility limitations or musculoskeletal issues.

143

144 In addition to formal physical exercise, families can explore ways to build more physical  
145 activity into their everyday lives such as walking to school, engaging in active play, or using  
146 stairs rather than lifts and escalators. Screen and sedentary time should also be limited to a  
147 maximum of two hours per day or 14 hours a week.(8)

148

149 **Medication**

150 NICE suggests that drug treatment can be considered in children over twelve years with  
151 significant physical or psychological comorbidities under specialist supervision.(5) Drug  
152 treatment under 12 years of age is only considered in the presence of severe comorbidities.  
153 Medications that may contribute to weight loss are listed in Table 4.

154

### 155 **Surgery**

156 Bariatric surgery in young people is effective, leading to clinically significant weight loss and  
157 reduction of type 2 diabetes and other co-morbidities.(12) With concerns about surgical  
158 morbidity and effect on growth and puberty, it is only considered in exceptional  
159 circumstances. Candidates must also have a BMI over 40 (or over 35 with significant co-  
160 morbidities) despite all other available management and have reached or nearly reached  
161 physiological maturity.(5, 6)

162

### 163 **Referral to other services**

164 Reduction of BMI is the most effective means of improving obesity-related co-morbidities.  
165 Children with features suggestive of obesity with an underlying cause (Table 2) or evidence of  
166 significant co-morbidities (including sleep apnoea, non-alcoholic fatty liver disease with  
167 significantly or persistently raised ALT,(13) type 2 diabetes) should be referred to the  
168 appropriate specialist service. If significant psychological distress such as anxiety or  
169 depression is identified at any stage, onward referral for psychological support is indicated.  
170 Referral to eating disorders services should be arranged if binge-eating has been identified.

171

### 172 **Safeguarding**

173 A framework for practice published in 2010 suggests that neither obesity nor failure to lose  
174 weight are safeguarding concerns in themselves.(14) However, consistent failure to engage  
175 with services (particularly where there is co-morbidity) or wider concerns about neglect should  
176 prompt safeguarding discussions.

177

### 178 **CONCLUSION**



179 Recognition and management of obesity in children is essential. Consequences of childhood  
 180 obesity persist into adulthood and impact physical health, social functioning, and  
 181 psychological wellbeing. Communication must be carefully managed, using non-judgemental  
 182 language and recognising that families and children may feel apprehensive or defensive  
 183 when discussing weight.

184 In the absence of signs suggesting an underlying cause of obesity, investigations for most  
 185 patients focus on the detection and management of clinical consequences of obesity.

186 Lifestyle change is key, with engagement of the whole family and/or household to support  
 187 modification of diet and increased exercise in the long-term. Working together with children,  
 188 young people, and their families, paediatricians can play an important role in supporting  
 189 changes to promote lifelong health for patients with obesity.

190 Table 1. Definitions of obesity in children

	WHO(15)	UK NICE(5)
Overweight	<p><b>Under five years old:</b> Weight/length-for-height Z score &gt; 2.0</p> <p><b>Aged 5-19 years:</b> BMI Z score &gt; 1.0</p>	BMI ≥91 <sup>st</sup> centile
Obese	<p><b>Under five years old:</b> Weight/length for height Z score &gt;3.0</p> <p><b>Aged 5-19 years:</b> BMI Z score &gt; 2.0</p>	BMI ≥98 <sup>th</sup> centile
Severely obese	<p>No universally agreed definition but may be described as:</p> <ul style="list-style-type: none"> <li>- severe obesity: BMI &gt;99.6<sup>th</sup> centile(8) or BMI ≥ 120% of 95<sup>th</sup> centile(16)</li> <li>- extreme obesity: BMI z score &gt;3.5(13)</li> </ul>	

191 BMI centiles and Z scores

192 In UK paediatric practice, BMI is usually described in terms of its centile. BMI can also be  
 193 described as the number of standard deviations above or below the mean, referred to as the  
 194 z score. BMI z scores are used by the World Health Organisation and in research.

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Box 1. Talking about obesity and overweight with children and young people

- Young people, and the adults with them, may be concerned to hear they have obesity or are overweight. Listen to these concerns first, before giving any advice.
- If you do provide advice, collaborate with young people and/or the adults with them. Do not make assumptions about their behaviours, and invite their input and thoughts.
- Statements like “other young people have said x” or “some young people say y” can help you show the person that they are not alone.
- Some statements may imply blame for either the young person, or the adult with them. Think carefully about focusing on small positive changes, rather than negatively commenting on current behaviours.

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Table 2. Underlying causes of obesity

Cause	Suggestive features
<b>Endocrinopathy</b>	Children with an endocrinopathy demonstrate poor linear growth and short stature (relative to mid-parental height and target centile range) in combination with overweight/obesity.
Hypothyroidism	Hypothyroidism can contribute to weight gain, but note that a mildly raised TSH (<10 mIU/L) is common in obesity. In the absence of positive thyroid peroxidase antibodies and with a normal FT4, isolated mild raised TSH is not suggestive of hypothyroidism and treatment is not recommended.(17)
Cushing's syndrome	Arrested growth is a key feature. Associated features such as a short history of obesity, rapid weight gain, lack of family history and virilisation may also be present.
<b>Genetic</b>	Children with genetic causes of obesity typically have early onset of severe obesity, with rapid weight gain in infancy. Syndromic and monogenic causes should be considered.
Syndromic obesity	Includes Prader-Willi syndrome, Bardet-Biedl syndrome. Additional syndromic features such as hypotonia, poor feeding in infancy and learning difficulties may be present.
Monogenic obesity	Includes melanocortin 4 receptor deficiency and leptin deficiency. Associated features such as severe hyperphagia, developmental delay, sensorineural deafness, abnormalities of the eyes, hypoglycaemia or intestinal dysfunction may suggest a monogenic cause.
Polygenic obesity	Many single nucleotide polymorphisms have a very small effect on an individual's predisposition to overweight/obesity. Each variant present adds to an individual's cumulative risk of obesity.

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Table 3. Screening for co-morbid conditions

Co-morbid condition	Investigation
Hypertension	Diagnose hypertension if serial measurements with an appropriately sized cuff (ideally including manual measurements) are $\geq 95^{\text{th}}$ centile for age, sex, and height OR if the blood pressure is $\geq 130/80$ in children aged 13 and over.

Adverse lipid profile	If abnormal fasting LDL/HDL and cholesterol, can prompt personalised discussions about the health consequences of obesity and support dietetic input. In the absence of familial hypercholesterolaemia, pharmacological treatment of hyperlipidaemia is unusual in young people but should be considered.
Type 2 diabetes and insulin resistance	HbA1c values of $\geq 48$ mmol/mol indicate diabetes. Fasting insulin and glucose can be used to gauge insulin resistance by the HOMA score.  <i>Fasting plasma glucose (mmol/L) <math>\times</math> fasting plasma insulin (mU/L) / 22.5</i>  Patients with a HOMA score $\geq 4.5$ , (13) signs or symptoms of insulin resistance, an HbA1c of 42-47 mmol/mol, or considered high risk should undergo a full oral glucose tolerance test.
Non-alcoholic fatty liver disease (NAFLD)	Children with severe NAFLD are likely to have a raised alanine transaminase (ALT). Mild NAFLD may present with normal liver function tests and only be detectable on imaging including elastography.
Sleep apnoea	Consider sleep apnoea in children with a history of nocturnal gasping, snoring, or frequent waking alongside daytime somnolence, headache, and difficulty concentrating. Poor quality sleep also negatively impacts daytime lifestyle.
Polycystic ovary syndrome (PCOS)	PCOS should be diagnosed with caution: mild hirsutism and menstrual irregularities are common in adolescence. Consider PCOS where there is clinical and biochemical evidence of hyperandrogenism alongside menstrual irregularities.
Psychological distress	Ask about friendship groups, bullying, mood, and self harm.

*This is not an exhaustive list and additional specific tests may be required.*

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Box 2. Brief suggestions for weight management goal-setting

**Dietary changes**

- Limit snacking, grazing and food between main meals
- Increase vegetable and fruit intake (at least five portions a day)
- Eliminate or reduce soft drinks and fruit juices
- Pay attention to age-appropriate portion sizes – try smaller plates
- Reduce frequency of take-aways and ready meals
- Avoid keeping energy-dense food at home (e.g. biscuits, sweets, chocolate, crisps)
- Discourage second helpings
- Have regular family mealtimes and avoid combining meals with screen time
- Recognise cues for snacking (e.g. boredom, stress)
- Slow the pace of eating to allow time for satiety signals to develop
- Advise parents/carers to avoid using food as a reward

**Exercise/activity**

- Use active transport to get to and from school (walk, cycle, scoot)
- Plan physical activity as a family e.g. weekend cycles or walks
- Decrease sedentary and screen time
- Join sports clubs or training sessions

**Other**

- Encourage good sleep hygiene

*Children/families can choose 2-3 of these goals to focus on at a time. Management is most likely to be successful if the whole family works towards the same goals.*

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Table 4. Pharmacological management of obesity in children and young people

Medication	Clinical effectiveness	Important side effects
<b>Orlistat</b> Licenced in Europe and USA ≥12 years of age for specialist use	Average weight loss in paediatric studies approximately 5kg(18)	Lower gastro-intestinal symptoms: diarrhoea, urgency, abdominal pain, oily/fatty stool Side effects are milder with low fat diets
<b>Liraglutide</b> Licenced in Europe and USA for treatment of type 2 diabetes in children ≥10 years old Licensed in USA for weight management aged ≥12 years old	Approximately 5% of body weight lost (approximately 4.5kg weight loss in paediatric trials) (19)	Nausea and diarrhoea Risk of diabetic ketoacidosis in patients with type 2 diabetes treated with insulin and liraglutide
<b>Metformin</b> Licenced in Europe and USA for treatment of type 2 diabetes in children ≥10 years old Not specifically licenced for weight management	Average weight loss in clinical trials in children is 3-4kg(20)	Mild gastro-intestinal side effects (nausea, abdominal pain), which usually improve spontaneously after several weeks Side effects reduced by initiation at a low dose followed by progressive dose increase

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