

Prescribing Framework for Guanfacine Hydrochloride (Intuniv) for Attention Deficit Hyperactivity Disorder

Patient's Name:..... NHS Number:

Patient's Address:.....(Use addressograph sticker)

GP's Name:.....

Communication

We agree to treat this patient within this Prescribing Framework

Specialist Prescriber's Name..... Prof Reg. No.

Specialist Prescriber's Signature..... Date:.....

Where prescriber is not a consultant:

Consultant's Name: GMC No

Consultant's Signature Date:.....

GP's Signature:..... Date:.....

GP's Name (if different from listed above).....

The front page of this form should be completed by the specialist and the form sent to the patient's general practitioner.

The patient's GP should sign and send back to specialist, to confirm agreement to enter into shared care arrangement. If the General Practitioner is **unwilling** to accept prescribing responsibility for the above patient the specialist should be informed within two weeks of receipt of this framework and specialist's letter.

Full copy of framework can also be found at : <https://www.hey.nhs.uk/herpc/amber/>

Prescribing framework for **Guanfacine for Attention Deficit Hyperactivity Disorder**

Approved: Jan 2018

Review: Jan 2021

1. Background

Attention-Deficit Hyperactivity Disorder (ADHD) is diagnosed if the three clinical features - inattention, over-activity and impulsiveness - have been present from an early age, persist in more than one situation (e.g. at home and in school) and impair function. The diagnosis must be made following a comprehensive assessment by an appropriate child psychiatrist and/or a paediatrician with special interest and training in this field. Drug therapy is only one part of the package of care for children with ADHD which typically includes social, psychological, behavioural and educational interventions.

In later adolescence and adult life, the range of possible impairment extends to educational and occupational underachievement, dangerous driving, difficulties in carrying out daily activities such as shopping and organising household tasks, in making and keeping friends, in intimate relationships (for example, excessive disagreement) and with childcare.

Treatment aims in ADHD are to reduce hyperactive behaviour, detect and treat any co-existing disorders, promote academic and social function and learning, improve emotional adjustment and self-esteem, and to relieve family distress.

Treatment of ADHD often needs to be continued into adolescence, and may need to be continued into adulthood. Initiating treatment in adulthood is unlicensed. Adults who present with symptoms of ADHD for the first time in primary care or general adult psychiatric services who do not have a childhood diagnosis of ADHD, should be referred for assessment by a mental health specialist trained in the diagnosis and treatment of ADHD.

Guanfacine is a selective α_{2A} -adrenergic receptor agonist in that it has 15-20 times higher affinity for this receptor subtype than for the α_{2B} or α_{2C} subtypes. Guanfacine is a non-stimulant. The mode of action of guanfacine in ADHD is not fully established. Preclinical research suggests guanfacine modulates signalling in the prefrontal cortex and basal ganglia through direct modification of synaptic noradrenalin transmission at the α_2 -adrenergic receptors.

These guidelines aim to provide a framework for the prescribing of Guanfacine by GPs and to set out the associated responsibilities of GPs and hospital specialists who enter into the shared care arrangements

The guidelines should be read in conjunction with

- The guidance: Responsibility for prescribing between Primary & Secondary/Tertiary Care.
- NICE Clinical Guideline 72 *Attention Deficit Hyperactivity Disorder*
- NICE advice ESNM70

CG72 suggests that methylphenidate is considered in the following situations

- ADHD without significant comorbidity
- ADHD with comorbid conduct disorder
- when tics, Tourette's syndrome, anxiety disorder, stimulant misuse or risk of stimulant diversion are present

CG72 suggests that atomoxetine is considered in the following situations

- when tics, Tourette's syndrome, anxiety disorder, stimulant misuse or risk of stimulant diversion are present
- if methylphenidate has been tried and has been ineffective at the maximum tolerated dose
- if the individual is intolerant to low or moderate doses of methylphenidate

CG72 suggests that dexamfetamine is considered if there has been a poor response to drug treatment with methylphenidate and atomoxetine.

Lisdexamfetamine is a prodrug of Dexamfetamine and can be considered as an alternative to Dexamfetamine.

NICE ESNM70 looks at the evidence for Guanfacine being a further option for the treatment of ADHD in children and adolescents 6-17 years old for whom stimulants are not suitable, not tolerated or have been shown to be ineffective

Rates of treatment-emergent adverse events were higher in children and young people treated with Guanfacine compared with Atomoxetine or placebo

Choice of drug should be guided by comorbidities, adverse effects, specific issues that may affect compliance, the potential for drug diversion or misuse, and the preferences of the child or young person or their parent or carer.

2. Indication

Guanfacine is indicated for the treatment of attention deficit hyperactivity disorder (ADHD) in children and adolescents 6-17 years old for whom stimulants are not suitable, not tolerated or have been shown to be ineffective.

It must be used as a part of a comprehensive ADHD treatment programme, typically including psychological, educational and social measures

It is not licensed for use in combination with stimulants or for adults with ADHD.

3. Dose

For all patients, the recommended starting dose is 1 mg of Guanfacine, taken orally once a day.

The dose may be adjusted in increments of not more than 1mg per week. Dose should be individualised according to the patient's response and tolerability.

Depending on the patient's response and tolerability the recommended maintenance dose range is 0.05-0.12 mg/kg/day.

The recommended dose titration for children and adolescents is provided below in tables 1 and 2

Table1:

Dose Titration Schedule for Children Aged 6-12 years				
Weight Group	Week 1	Week 2	Week 3	Week 4
25 kg and up Max Dose= 4 mg	1 mg	2 mg	3 mg	4 mg

Table 2:

Dose Titration Schedule for Adolescents (Aged 13-17 Years)							
Weight Group ^a	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7
34-41.4 kg Max Dose= 4 mg	1 mg	2 mg	3 mg	4 mg			
41.5-49.4 kg Max Dose= 5 mg	1 mg	2 mg	3 mg	4 mg	5 mg		
49.5-58.4 kg Max Dose= 6 mg	1 mg	2 mg	3 mg	4 mg	5 mg	6 mg	
58.5 kg and above Max Dose= 7 mg	1 mg	2 mg	3 mg	4 mg	5 mg	6 mg	7 mg ^b

^a Adolescent subjects must weigh at least 34kg.

^b Adolescents weighing 58.5 and above may be titrated to a 7mg/day dose after the subject has completed a minimum of 1 week of therapy on a 6mg/day dose and the physician has performed a thorough review of the subject's tolerability and efficacy

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4. Method of administration

Guanfacine should be taken once a day either in the morning or evening.

It can be taken with or without food, but should not be taken with fatty foods (e.g. high fat breakfast).

Tablets should be swallowed whole with a drink of water or other liquid (but not grapefruit juice).

Tablets should not be broken, crushed or chewed.

5. Duration of treatment

Advice will be given to the GP by the secondary care Specialist on duration of treatment and dose changes for each individual patient.

6. Contraindications

Hypersensitivity to the active substance or to any of the excipients

7. Cautions

- Caution is advised when treating patients with Guanfacine who have a history of hypotension, heart block, bradycardia, or cardiovascular disease, or who have a history of syncope or a condition that may predispose them to syncope, such as hypotension, orthostatic hypotension, bradycardia, or dehydration. Caution is also advised when treating patients with Guanfacine who are being treated concomitantly with antihypertensives or other medicinal products that can reduce blood pressure or heart rate or increase the risk of syncope. Patients should be advised to drink plenty of fluid.
- Guanfacine should be prescribed with caution in patients with a known history of QT prolongation, risk factors for torsade de pointes (e.g. heart block, bradycardia, hypokalemia) or patients who are taking medicinal products known to prolong the QT interval. These patients should receive further cardiac evaluation based on clinical judgement
- Guanfacine may cause somnolence and sedation predominantly at the start of treatment and could typically last for 2-3 weeks and longer in some cases. It is therefore recommended that patients will be closely monitored weekly during dose titration and stabilisation, and every 3 months during the first year, taking into consideration clinical judgement. Before Guanfacine is used with any other centrally active depressants (such as alcohol, sedatives, phenothiazines, barbiturates, or benzodiazepines) the potential for additive sedative effects should be considered. Patients should not drink alcohol whilst taking Guanfacine. Patients are advised against operating heavy equipment, driving or cycling until they know how they respond to treatment with Guanfacine.
- Patients with emergent suicidal ideation or behaviour during treatment for ADHD should be evaluated immediately by their physician. Treatment of an underlying psychiatric condition may be necessary and consideration should be given to a possible change in the ADHD treatment programme.
- Children and adolescents treated with Guanfacine may show an increase in their BMI. Height and weight should be monitored
- Intuniv contains lactose. Patients with rare hereditary problems of galactose intolerance, the Lapp lactase deficiency or glucose-galactose malabsorption should not take this medicinal product
- Blood pressure and pulse may increase following discontinuation of Guanfacine. Monitoring and tapering of the dose during withdrawal is recommended

8. Adverse effects

Adverse Drug Reactions Reported with Guanfacine (Intuniv)	
System/Organ Class	Incidence Category
Immune system disorders	
Hypersensitivity	Uncommon
Metabolism and nutrition disorders	
Decreased appetite	Common
Psychiatric disorders	
Depression	Common
Anxiety	Common
Affect lability	Common
Insomnia	Common
Middle insomnia	Common
Nightmare	Common
Agitation	Uncommon
Hallucination	Uncommon
Nervous system disorders	
Somnolence	Very common
Headache	Very common
Sedation	Common
Dizziness	Common
Lethargy	Common
Convulsion	Uncommon
Syncope/loss of consciousness	Uncommon
Dizziness postural	Uncommon
Hypersomnia	Rare
Cardiac disorders	
Bradycardia	Common
Atrioventricular block first degree	Uncommon
<i>Tachycardia</i>	<i>Uncommon</i>
Sinus arrhythmia	Uncommon
Vascular disorders	
Hypotension	Common
Orthostatic hypotension	Common
Pallor	Uncommon
Hypertension	Rare
Respiratory, thoracic, and mediastinal disorders	
Asthma	Uncommon
Gastrointestinal disorders	
Abdominal pain	Very common
Vomiting	Common
Diarrhoea	Common

Nausea	Common
Constipation	Common
Abdominal/stomach discomfort	Common
Dry mouth	Common
Dyspepsia	Uncommon
Skin and subcutaneous tissue disorders	
<i>Rash</i>	<i>Common</i>
<i>Pruritus</i>	<i>Uncommon</i>
Renal and urinary disorders	
Enuresis	Common
Pollakiuria	Uncommon
General disorders	
Fatigue	Very common
Irritability	Common
Asthenia	Uncommon
Chest pain	Uncommon
Malaise	Rare
Investigations	
Blood pressure decreased	Common
Weight increased	Common
Blood pressure increased	Uncommon
Heart rate decreased	Uncommon
Alanine aminotransferase increased	Uncommon

The following definitions apply to the frequency terminology used:

Very common ($\geq 1/10$)

Common ($\geq 1/100$ to $< 1/10$)

Uncommon ($\geq 1/1,000$ to $< 1/100$)

Rare ($\geq 1/10,000$ to $< 1/1,000$)

Very rare ($< 1/10,000$)

Not known (cannot be estimated from the available data).

9. Interactions

- QT Prolonging medicinal products - Guanfacine causes a decrease in heart rate. Given the effect on heart rate, the concomitant use with QT prolonging medicinal products is generally not recommended
- CYP3A4 and CYP3A5 inhibitors - Co-administration of Guanfacine with moderate and strong CYP3A4/5 inhibitors elevates plasma Guanfacine concentrations and increases the risk of adverse reactions such as hypotension, bradycardia, and sedation. A 50% reduction of the Guanfacine dose is recommended
- CYP3A4 inducers - When patients are taking Guanfacine concomitantly with a CYP3A4 inducer, an increase in the dose of Guanfacine within the recommended dose range is proposed
- Valproic acid - Co-administration of Guanfacine and Valproic acid can result in increased concentrations of Valproic acid. The mechanism of this interaction is unknown. Adjustments in the dose of Valproic acid and Guanfacine may be indicated when co-administered.
- Antihypertensives - Caution should be used when Guanfacine is administered concomitantly with an antihypertensive, due to the potential for additive pharmacodynamic effects such as hypotension and syncope.
- CNS depressant medicinal products - Caution should be used when Guanfacine is administered concomitantly with CNS depressant medicinal products (e.g. alcohol, sedatives, hypnotics, benzodiazepines, barbiturates, and antipsychotics) due to the potential for additive pharmacodynamic effects such as sedation and somnolence.
- Food interactions - Guanfacine should not be administered with high fat meals as this can have a significant effect on the absorption of guanfacine

Details of contraindications, cautions, drug interactions and adverse effects listed above are not exhaustive. For further information always check with BNF www.bnf.org.uk or SPC (www.medicines.org.uk).

10. Monitoring:

Pre-treatment screening:

Prior to prescribing, it is necessary to conduct a baseline evaluation to identify patients at increased risk of somnolence and sedation, hypotension and bradycardia, QT-prolongation arrhythmia and weight increase /risk of obesity. This evaluation should address a patient's cardiovascular status including blood pressure and heart rate, documenting comprehensive history of concomitant medications, past and present co-morbid medical and psychiatric disorders or symptoms, family history of sudden cardiac/unexplained death and accurate recording of pre-treatment height and weight on a growth chart

Monitoring during titration:

During dose titration, weekly monitoring for signs and symptoms of somnolence and sedation, hypotension and bradycardia should be performed.

Ongoing monitoring:

During the first year of treatment, the patient should be assessed at least every 3 months for the signs and symptoms of:

- somnolence and sedation
- hypotension
- bradycardia
- weight increase /risk of obesity

It is recommended clinical judgement be exercised during this period. 6 monthly monitoring should follow thereafter, with more frequent monitoring following any dose adjustments

Patients requiring long-term therapy should be carefully monitored. The patient's response to the drug should be assessed by the prescriber at each clinical meeting. For children: parents and teachers should be advised to report on levels of activity, concentration, and other factors. These reports should be compared before and after treatment, and be used to facilitate the decision to increase the dose or to stop treatment.

A young person with ADHD receiving treatment and care from Child and Adolescent Mental Health Services (CAMHS) or paediatric services should be reassessed at school-leaving age to establish the need for continuing treatment into adulthood. If continued treatment is necessary, arrangements should be made for a smooth transition to adult services with details of the anticipated treatment and services that the young person will require. Precise timing of arrangements may vary but should usually be completed by the time the young person is 18 years

During the transition to adult services, a formal meeting involving CAMHS and/or paediatrics and adult psychiatric services should be considered, and full information provided to the young person about adult services. For young people aged 16 years and older, the care programme approach (CPA) should be used as an aid to transfer between services. The young person, and when appropriate the parent or carer, should be involved in the planning.

After transition to adult services, adult healthcare professionals should carry out a comprehensive assessment of the person with ADHD that includes personal, educational, occupational and social functioning, and assessment of any coexisting conditions, especially drug misuse, personality disorders, emotional problems and learning difficulties.

11. Information to patient

- Reporting of side-effects and adverse events to GP or Specialist
- Patients should be advised that somnolence and sedation can occur, particularly early in treatment or with dose increases
- Ensure they have a clear understanding of the treatment
- Patients/caregivers should be instructed not to discontinue Guanfacine without consulting their doctor.
- In the event of a missed dose, Guanfacine dosing can resume the next day. If two or more consecutive doses are missed, the patient / carer should be advised to consult their doctor as re-titration is recommended based on the patient's tolerability to guanfacine

12. Responsibilities of clinicians involved

Stage of Treatment	Hospital Specialist	General Practitioner
Initiation	<ul style="list-style-type: none"> • Assessment and diagnosis of ADHD • Initiation and titration of Guanfacine therapy • Conduct a baseline evaluation to identify patients at increased risk of somnolence and sedation, hypotension and bradycardia, QT-prolongation arrhythmia and weight increase /risk of obesity. Do ECG as a baseline for those patients identified as high risk by the initial prescriber as per the advice on the SPC • During dose titration, weekly monitoring for signs and symptoms of somnolence and sedation, hypotension and bradycardia should be performed. • Provision of written guidance and questionnaire's for parents and teachers, regarding drug treatment, at specialists discretion • Reporting adverse events to CHM • Ensure baseline full blood count has been performed if indicated • Monitor height weight appetite pulse and blood pressure as indicated 	<ul style="list-style-type: none"> • Liaise and seek advice from the specialist team, when appropriate • Take over prescribing of medication 4 weeks after the patient has been stabilised on treatment and provide on-going clinical care
Maintenance	<ul style="list-style-type: none"> • Monitor height weight appetite pulse and blood pressure as indicated. • Monitor for signs and symptoms of somnolence and sedation, hypotension and bradycardia as indicated • Re-evaluate the usefulness of Guanfacine every 3 months for the first year and then at least yearly based on clinical judgement, and consider trial periods off medication to assess the patient's functioning without pharmacotherapy, preferably during times of school holidays. • Review treatment as requested by the GP. • Review the need for continuation with treatment and give advice on continuing dose • Reporting adverse events to CHM • Advising the GP when and how Guanfacine should be discontinued for patients receiving the drug long-term. • Provide necessary supervision and support during discontinuation phase 	<ul style="list-style-type: none"> • Prescribing Guanfacine once the patient is stabilised • Liaison with the Paediatrician or Psychiatrists regarding any complications of treatment. • Reporting of adverse events to Specialist and CHM • Monitor for signs and symptoms of somnolence, sedation, hypotension and bradycardia, height, weight, appetite, pulse, blood pressure at least every 3 months during the first year, and then 6 monthly • Reporting to and seeking advice from the Specialists on any aspect of patient care which is of concern to the GP and may affect treatment • Co-operating with the Specialist during the discontinuation phase

Appendix 1:

Blood Pressure Levels for Boys by Age and Height Percentile

Age (Year)	BP Percentile ↓	Systolic BP (mmHg)							Diastolic BP (mmHg)						
		← Percentile of Height →							← Percentile of Height →						
		5th	10th	25th	50th	75th	90th	95th	5th	10th	25th	50th	75th	90th	95th
1	50th	80	81	83	85	87	88	89	34	35	36	37	38	39	39
	90th	94	95	97	99	100	102	103	49	50	51	52	53	53	54
	95th	98	99	101	103	104	106	106	54	54	55	56	57	58	58
	99th	105	106	108	110	112	113	114	61	62	63	64	65	66	66
2	50th	84	85	87	88	90	92	92	39	40	41	42	43	44	44
	90th	97	99	100	102	104	105	106	54	55	56	57	58	58	59
	95th	101	102	104	106	108	109	110	59	59	60	61	62	63	63
	99th	109	110	111	113	115	117	117	66	67	68	69	70	71	71
3	50th	86	87	89	91	93	94	95	44	44	45	46	47	48	48
	90th	100	101	103	105	107	108	109	59	59	60	61	62	63	63
	95th	104	105	107	109	110	112	113	63	63	64	65	66	67	67
	99th	111	112	114	116	118	119	120	71	71	72	73	74	75	75
4	50th	88	89	91	93	95	96	97	47	48	49	50	51	51	52
	90th	102	103	105	107	109	110	111	62	63	64	65	66	66	67
	95th	106	107	109	111	112	114	115	66	67	68	69	70	71	71
	99th	113	114	116	118	120	121	122	74	75	76	77	78	78	79
5	50th	90	91	93	95	96	98	98	50	51	52	53	54	55	55
	90th	104	105	106	108	110	111	112	65	66	67	68	69	69	70
	95th	108	109	110	112	114	115	116	69	70	71	72	73	74	74
	99th	115	116	118	120	121	123	123	77	78	79	80	81	81	82
6	50th	91	92	94	96	98	99	100	53	53	54	55	56	57	57
	90th	105	106	108	110	111	113	113	68	68	69	70	71	72	72
	95th	109	110	112	114	115	117	117	72	72	73	74	75	76	76
	99th	116	117	119	121	123	124	125	80	80	81	82	83	84	84
7	50th	92	94	95	97	99	100	101	55	55	56	57	58	59	59
	90th	106	107	109	111	113	114	115	70	70	71	72	73	74	74
	95th	110	111	113	115	117	118	119	74	74	75	76	77	78	78
	99th	117	118	120	122	124	125	126	82	82	83	84	85	86	86
8	50th	94	95	97	99	100	102	102	56	57	58	59	60	60	61
	90th	107	109	110	112	114	115	116	71	72	72	73	74	75	76
	95th	111	112	114	116	118	119	120	75	76	77	78	79	79	80
	99th	119	120	122	123	125	127	127	83	84	85	86	87	87	88
9	50th	95	96	98	100	102	103	104	57	58	59	60	61	61	62
	90th	109	110	112	114	115	117	118	72	73	74	75	76	76	77
	95th	113	114	116	118	119	121	121	76	77	78	79	80	81	81
	99th	120	121	123	125	127	128	129	84	85	86	87	88	88	89
10	50th	97	98	100	102	103	105	106	58	59	60	61	61	62	63
	90th	111	112	114	115	117	119	119	73	73	74	75	76	77	78
	95th	115	116	117	119	121	122	123	77	78	79	80	81	81	82
	99th	122	123	125	127	128	130	130	85	86	86	88	88	89	90

Blood Pressure Levels for Boys by Age and Height Percentile (Continued)

Age (Year)	BP Percentile ↓	Systolic BP (mmHg)							Diastolic BP (mmHg)						
		← Percentile of Height →							← Percentile of Height →						
		5th	10th	25th	50th	75th	90th	95th	5th	10th	25th	50th	75th	90th	95th
11	50th	99	100	102	104	105	107	107	59	59	60	61	62	63	63
	90th	113	114	115	117	119	120	121	74	74	75	76	77	78	78
	95th	117	118	119	121	123	124	125	78	78	79	80	81	82	82
	99th	124	125	127	129	130	132	132	86	86	87	88	89	90	90
12	50th	101	102	104	106	108	109	110	59	60	61	62	63	63	64
	90th	115	116	118	120	121	123	123	74	75	75	76	77	78	79
	95th	119	120	122	123	125	127	127	78	79	80	81	82	82	83
	99th	126	127	129	131	133	134	135	86	87	88	89	90	90	91
13	50th	104	105	106	108	110	111	112	60	60	61	62	63	64	64
	90th	117	118	120	122	124	125	126	75	75	76	77	78	79	79
	95th	121	122	124	126	128	129	130	79	79	80	81	82	83	83
	99th	128	130	131	133	135	136	137	87	87	88	89	90	91	91
14	50th	106	107	109	111	113	114	115	60	61	62	63	64	65	65
	90th	120	121	123	125	126	128	128	75	76	77	78	79	79	80
	95th	124	125	127	128	130	132	132	80	80	81	82	83	84	84
	99th	131	132	134	136	138	139	140	87	88	89	90	91	92	92
15	50th	109	110	112	113	115	117	117	61	62	63	64	65	66	66
	90th	122	124	125	127	129	130	131	76	77	78	79	80	80	81
	95th	126	127	129	131	133	134	135	81	81	82	83	84	85	85
	99th	134	135	136	138	140	142	142	88	89	90	91	92	93	93
16	50th	111	112	114	116	118	119	120	63	63	64	65	66	67	67
	90th	125	126	128	130	131	133	134	78	78	79	80	81	82	82
	95th	129	130	132	134	135	137	137	82	83	83	84	85	86	87
	99th	136	137	139	141	143	144	145	90	90	91	92	93	94	94
17	50th	114	115	116	118	120	121	122	65	66	66	67	68	69	70
	90th	127	128	130	132	134	135	136	80	80	81	82	83	84	84
	95th	131	132	134	136	138	139	140	84	85	86	87	87	88	89
	99th	139	140	141	143	145	146	147	92	93	93	94	95	96	97

BP, blood pressure

* The 90th percentile is 1.28 SD, 95th percentile is 1.645 SD, and the 99th percentile is 2.326 SD over the mean.

For research purposes, the standard deviations in Appendix Table B-1 allow one to compute BP Z-scores and percentiles for boys with height percentiles given in Table 3 (i.e., the 5th, 10th, 25th, 50th, 75th, 90th, and 95th percentiles). These height percentiles must be converted to height Z-scores given by (5% = -1.645; 10% = -1.28; 25% = -0.68; 50% = 0; 75% = 0.68; 90% = 1.28; 95% = 1.645) and then computed according to the methodology in steps 2-4 described in Appendix B. For children with height percentiles other than these, follow steps 1-4 as described in Appendix B.

Blood Pressure Levels for Girls by Age and Height Percentile

Age (Year)	BP Percentile ↓	Systolic BP (mmHg)							Diastolic BP (mmHg)						
		← Percentile of Height →							← Percentile of Height →						
		5th	10th	25th	50th	75th	90th	95th	5th	10th	25th	50th	75th	90th	95th
1	50th	83	84	85	86	88	89	90	38	39	39	40	41	41	42
	90th	97	97	98	100	101	102	103	52	53	53	54	55	55	56
	95th	100	101	102	104	105	106	107	56	57	57	58	59	59	60
	99th	108	108	109	111	112	113	114	64	64	65	65	66	67	67
2	50th	85	85	87	88	89	91	91	43	44	44	45	46	46	47
	90th	98	99	100	101	103	104	105	57	58	58	59	60	61	61
	95th	102	103	104	105	107	108	109	61	62	62	63	64	65	65
	99th	109	110	111	112	114	115	116	69	69	70	70	71	72	72
3	50th	86	87	88	89	91	92	93	47	48	48	49	50	50	51
	90th	100	100	102	103	104	106	106	61	62	62	63	64	64	65
	95th	104	104	105	107	108	109	110	65	66	66	67	68	68	69
	99th	111	111	113	114	115	116	117	73	73	74	74	75	76	76
4	50th	88	88	90	91	92	94	94	50	50	51	52	52	53	54
	90th	101	102	103	104	106	107	108	64	64	65	66	67	67	68
	95th	105	106	107	108	110	111	112	68	68	69	70	71	71	72
	99th	112	113	114	115	117	118	119	76	76	76	77	78	79	79
5	50th	89	90	91	93	94	95	96	52	53	53	54	55	55	56
	90th	103	103	105	106	107	109	109	66	67	67	68	69	69	70
	95th	107	107	108	110	111	112	113	70	71	71	72	73	73	74
	99th	114	114	116	117	118	120	120	78	78	79	79	80	81	81
6	50th	91	92	93	94	96	97	98	54	54	55	56	56	57	58
	90th	104	105	106	108	109	110	111	68	68	69	70	70	71	72
	95th	108	109	110	111	113	114	115	72	72	73	74	74	75	76
	99th	115	116	117	119	120	121	122	80	80	80	81	82	83	83
7	50th	93	93	95	96	97	99	99	55	56	56	57	58	58	59
	90th	106	107	108	109	111	112	113	69	70	70	71	72	72	73
	95th	110	111	112	113	115	116	116	73	74	74	75	76	76	77
	99th	117	118	119	120	122	123	124	81	81	82	82	83	84	84
8	50th	95	95	96	98	99	100	101	57	57	57	58	59	60	60
	90th	108	109	110	111	113	114	114	71	71	71	72	73	74	74
	95th	112	112	114	115	116	118	118	75	75	75	76	77	78	78
	99th	119	120	121	122	123	125	125	82	82	83	83	84	85	86
9	50th	96	97	98	100	101	102	103	58	58	58	59	60	61	61
	90th	110	110	112	113	114	116	116	72	72	72	73	74	75	75
	95th	114	114	115	117	118	119	120	76	76	76	77	78	79	79
	99th	121	121	123	124	125	127	127	83	83	84	84	85	86	87
10	50th	98	99	100	102	103	104	105	59	59	59	60	61	62	62
	90th	112	112	114	115	116	118	118	73	73	73	74	75	76	76
	95th	116	116	117	119	120	121	122	77	77	77	78	79	80	80
	99th	123	123	125	126	127	129	129	84	84	85	86	86	87	88

Blood Pressure Levels for Girls by Age and Height Percentile (Continued)

Age (Year)	BP Percentile ↓	Systolic BP (mmHg)							Diastolic BP (mmHg)						
		← Percentile of Height →							← Percentile of Height →						
		5th	10th	25th	50th	75th	90th	95th	5th	10th	25th	50th	75th	90th	95th
11	50th	100	101	102	103	105	106	107	60	60	60	61	62	63	63
	90th	114	114	116	117	118	119	120	74	74	74	75	76	77	77
	95th	118	118	119	121	122	123	124	78	78	78	79	80	81	81
	99th	125	125	126	128	129	130	131	85	85	86	87	87	88	89
12	50th	102	103	104	105	107	108	109	61	61	61	62	63	64	64
	90th	116	116	117	119	120	121	122	75	75	75	76	77	78	78
	95th	119	120	121	123	124	125	126	79	79	79	80	81	82	82
	99th	127	127	128	130	131	132	133	86	86	87	88	88	89	90
13	50th	104	105	106	107	109	110	110	62	62	62	63	64	65	65
	90th	117	118	119	121	122	123	124	76	76	76	77	78	79	79
	95th	121	122	123	124	126	127	128	80	80	80	81	82	83	83
	99th	128	129	130	132	133	134	135	87	87	88	89	89	90	91
14	50th	106	106	107	109	110	111	112	63	63	63	64	65	66	66
	90th	119	120	121	122	124	125	125	77	77	77	78	79	80	80
	95th	123	123	125	126	127	129	129	81	81	81	82	83	84	84
	99th	130	131	132	133	135	136	136	88	88	89	90	90	91	92
15	50th	107	108	109	110	111	113	113	64	64	64	65	66	67	67
	90th	120	121	122	123	125	126	127	78	78	78	79	80	81	81
	95th	124	125	126	127	129	130	131	82	82	82	83	84	85	85
	99th	131	132	133	134	136	137	138	89	89	90	91	91	92	93
16	50th	108	108	110	111	112	114	114	64	64	65	66	66	67	68
	90th	121	122	123	124	126	127	128	78	78	79	80	81	81	82
	95th	125	126	127	128	130	131	132	82	82	83	84	85	85	86
	99th	132	133	134	135	137	138	139	90	90	90	91	92	93	93
17	50th	108	109	110	111	113	114	115	64	65	65	66	67	67	68
	90th	122	122	123	125	126	127	128	78	79	79	80	81	81	82
	95th	125	126	127	129	130	131	132	82	83	83	84	85	85	86
	99th	133	133	134	136	137	138	139	90	90	91	91	92	93	93

BP, blood pressure

* The 90th percentile is 1.28 SD, 95th percentile is 1.645 SD, and the 99th percentile is 2.326 SD over the mean.

For research purposes, the standard deviations in Appendix Table B-1 allow one to compute BP Z-scores and percentiles for girls with height percentiles given in Table 4 (i.e., the 5th, 10th, 25th, 50th, 75th, 90th, and 95th percentiles). These height percentiles must be converted to height Z-scores given by (5% = -1.645; 10% = -1.28; 25% = -0.68; 50% = 0; 75% = 0.68; 90% = 1.28%; 95% = 1.645) and then computed according to the methodology in steps 2-4 described in Appendix B. For children with height percentiles other than these, follow steps 1-4 as described in Appendix B.

Appendix 2

Heart Rate Centile Calculator Online Resource

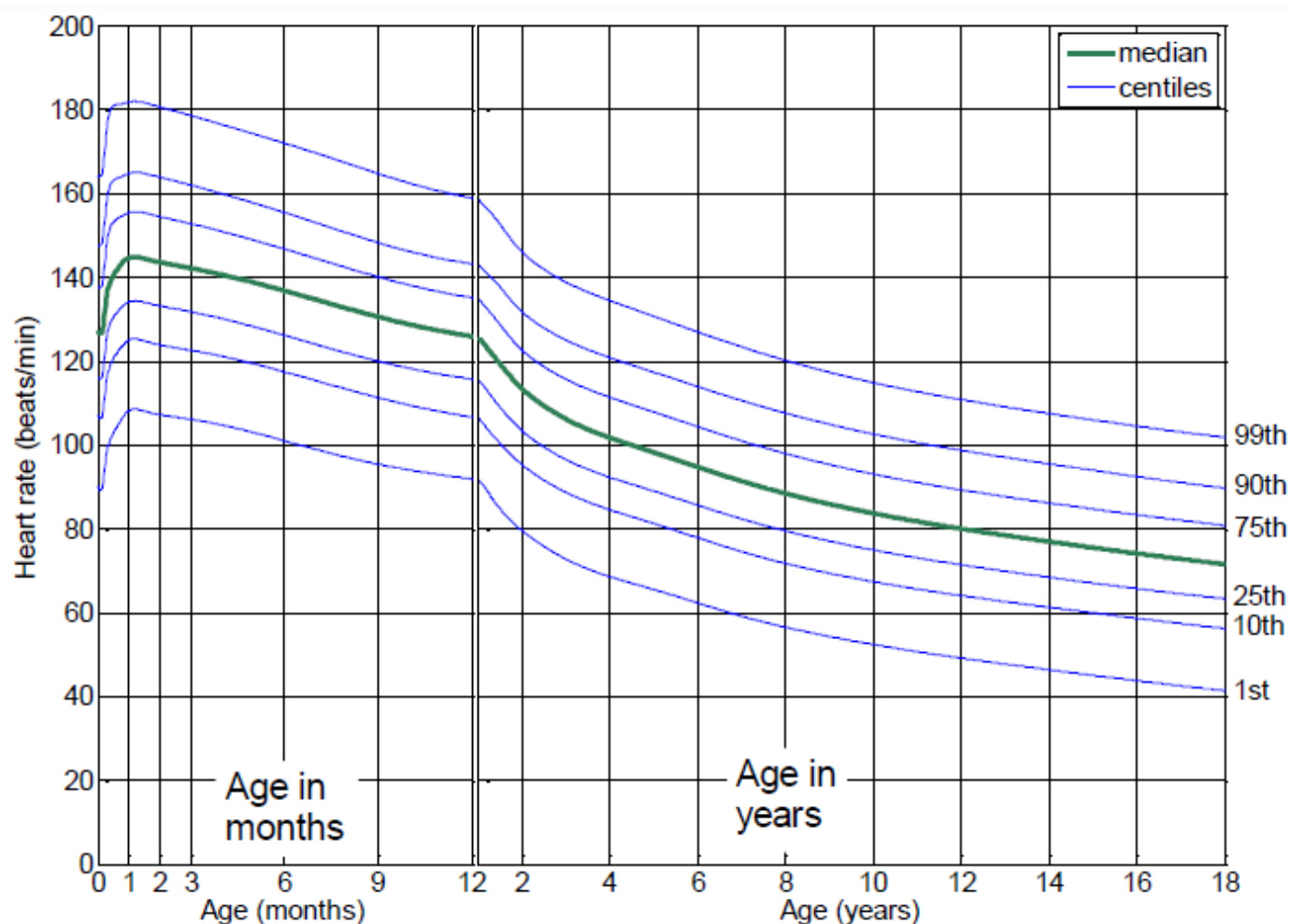
<http://madox.org/webapp/184>

Blood Pressure Centile Calculator Online Resource

<https://www.bcm.edu/bodycomplab/Flashapps/BPVAgeChartpage.html>

Appendix 3

Heart Rate Centile Charts From Birth to 18 years:



Appendix 4

Data Recording	
Measurement 1	
Recording Date	
Weight	
Length/Height	
Location	
Health worker name	
Measurement 2	
Recording Date	
Weight	
Length/Height	
Location	
Health worker name	
Measurement 3	
Recording Date	
Weight	
Length/Height	
Location	
Health worker name	
Measurement 4	
Recording Date	
Weight	
Length/Height	
Location	
Health worker name	
Measurement 5	
Recording Date	
Weight	
Length/Height	
Location	
Health worker name	
Measurement 6	
Recording Date	
Weight	
Length/Height	
Location	
Health worker name	
Measurement 7	
Recording Date	
Weight	
Length/Height	
Location	
Health worker name	
Measurement 8	
Recording Date	
Weight	
Length/Height	
Location	
Health worker name	
Measurement 9	
Recording Date	
Weight	
Length/Height	
Location	
Health worker name	
Measurement 10	
Recording Date	
Weight	
Length/Height	
Location	
Health worker name	

BOYS UK Growth chart 2-18 years

RCPCH    

Anyone who measures a child, plots or interprets charts should be suitably trained or supervised. For further information and training materials see fact sheet and presentation on www.growthcharts.rcpch.ac.uk

This chart is mainly intended to assess the growth of school age boys. It combines data from the UK 1990 growth reference for children at birth and from 4-18 years⁽¹⁾, with the WHO growth standard for children aged 2 years to 4 years⁽²⁾. The growth of children under 2 years of age should be plotted on the more detailed UK-WHO 0-4 years growth charts.

As well as simply using this chart for plotting growth data, it also includes a number of new features which you may wish to use to help interpret the growth data.

- birth centile plotting scale
- BMI look-up and plotting grid
- scales to estimate adult height and mid-parental centile
- guide to assessing puberty

Measurement procedure

Accurate measurement is essential and shoes must be removed for all measurements

Height: Measure height recorded to the last millimetre. A correctly installed stadiometer or approved portable measuring device is the only equipment that can be reliably used (see illustration). If a child cannot stand, measure lying down, using an approved length measuring device and plot as for height.

Position head and feet as illustrated with child standing as straight as possible.

Weight: Remove heavy clothing and shoes and weigh using class II clinical electronic scales in metric setting.

Plotting

Plot each measurement by placing a small dot where a vertical line through the child's age crosses a horizontal line through the measured value.

The lettering on the charts ('weight', 'length' etc.) sits on the 50th centile to provide orientation.

Birth centile plotting scale

The chart starts at age 2 years, but there is a plotting scale on the left of the chart where for term infants, birth weight (and if measured, length) can be plotted to allow comparison of the birth centile with later growth.

Please place sticker (if available) otherwise write in space provided.

Name: _____
NHS/CHI No: _____
Hospital No: _____
Date of Birth: ____/____/____

When is further assessment required? If any of the following:

- Where weight or height or BMI is below the 0.4th centile, unless already fully investigated at an earlier age.
- If the height centile is more than 3 centile spaces below the mid-parental centile.
- A drop in height centile position of more than 2 centile spaces, as long as measurement error has been excluded.
- Smaller centile falls or discrepancies between child's and mid-parental centile, if seen in combination, or if associated with possible underlying disease.
- If there are any other concerns about the child's growth.

Adult Height Predictor

This allows you to predict the child's adult height based on their current height, but with a regression adjustment to allow for the tendency of very tall and short children to be less extreme in height as adults. Four boys out of five will have an adult height within ± 6 cm of the predicted adult height.

Instructions for use

Plot the most recent height centile on the centile line on the Adult Height Predictor (on the flap to the right of the height centile chart) and read off the predicted adult height for this centile.

Mid-Parental Centile

The 'mid-parental centile' is the average adult height centile to be expected for all children of these parents. It incorporates a regression adjustment to allow for the tendency of very tall and short parents to have children with less extreme heights. Comparing this to the child's current height centile can help assess whether the child's growth is proceeding as expected. The larger the discrepancy between the two, the more likely it is that the child has some sort of growth disorder. Most children's height centiles (nine out of ten) are within ± 2 centile spaces of the mid-parental centile, and only 1 percent will be more than three centile spaces below.

Instructions for use

The Mid-parental Centile Comparator is on the flap to the right of the height centile chart. If possible measure both parents' heights, or else use reported heights. Plot their heights on the Mother's and Father's height scales. Join the two points with a line between them. The mid-parental centile is where this line crosses the centile line in the middle. Compare the mid-parental centile to the child's current height centile, plotted on the adult height predictor centile scale.

Mid-parental target height

This can be obtained by plotting the mid-parental centile on the main chart at age 18 and reading off the corresponding height. Four boys out of five will have an adult height within ± 7 cm of this target height. However the predicted adult height (above) is usually closer than mid-parental target height to the child's final height.

Pubertal Assessment

The puberty 'phase' may be ascertained through simple questions about the appearance of secondary sexual characteristics as well as by clinical examination.

By history from parents, carers or young person

Pre-puberty (Tanner stage 1)	In Puberty (Tanner stages 2-3)	Completing Puberty (Tanner stages 4-5)
If both of the following: High voice No signs of pubertal development	If any of the following: Slight deepening of the voice Early pubic or axillary hair growth Enlargement of testes or penis	If any of the following: Voice fully broken Moustache and early facial hair growth Adult size of penis with pubic and axillary hair

Is the timing of puberty normal?

The three vertical black lines (puberty lines) on the right hand page (9-18 years) of the chart indicate the normal age limits for the phases of puberty described above.

- Boys with measurements plotted on the left page will usually be in the 'Pre-puberty' phase. Puberty before 9 years in boys is likely to be precocious and further assessment is necessary.
- Between 9-14 years most boys will be either 'Pre-puberty' or 'in puberty'. If there are no signs of puberty by 14 years, then puberty is delayed and further assessment is indicated.
- From 14-17 years most boys will be either 'in puberty' or 'Completing puberty'.
- After 17 years boys will usually be 'Completing puberty'. If this is not the case, maturation is delayed and further assessment may be needed.

Body Mass Index (BMI) centile look-up

If weight is above the 75th centile or if weight and height centiles differ, the BMI centile should be calculated, as the BMI centile is the best indicator of thinness and fatness. The BMI look-up allows you to read off the BMI centile, accurate to a quarter of a centile space. There is a BMI centile grid at the top of the growth chart where the centiles for children with high or low values can be plotted.

Instructions for use

1. Note the weight and height centiles from the growth chart.
2. Plot the weight centile against the height centile on the BMI look-up.
3. If between centiles, read across in this position.
4. Read off the corresponding BMI centile from the blue slanting lines.
5. Plot the centile in the BMI grid at the top of the growth chart at the appropriate age.

What does a high or low BMI mean?

A BMI above the 91st centile suggests overweight. A child above the 98th centile is very overweight (clinically obese). BMI below the 2nd centile is unusual and may reflect undernutrition, but may simply reflect a small build.

References

1. Freeman JV, Cole TJ, Chen S, Jones PRM, White EM, Preece MA. Cross sectional stature and weight reference curves for the UK, 1990. Arch Dis Child 1995; 72:17-24.
2. www.who.int/childgrowth/en

For further relevant references see fact sheet downloadable from www.growthcharts.rcpch.ac.uk

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Growth patterns before and during puberty

Successive height measurements can show wide variation, because it is difficult to measure height accurately. If there are concerns it is useful to measure on a few occasions over time. Assessing growth during puberty is complex because the age when puberty starts varies.

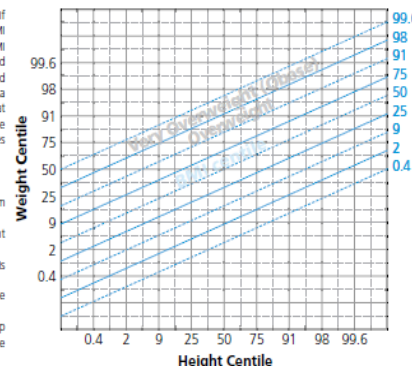
What does a height in the shaded area below the 0.4th centile mean?

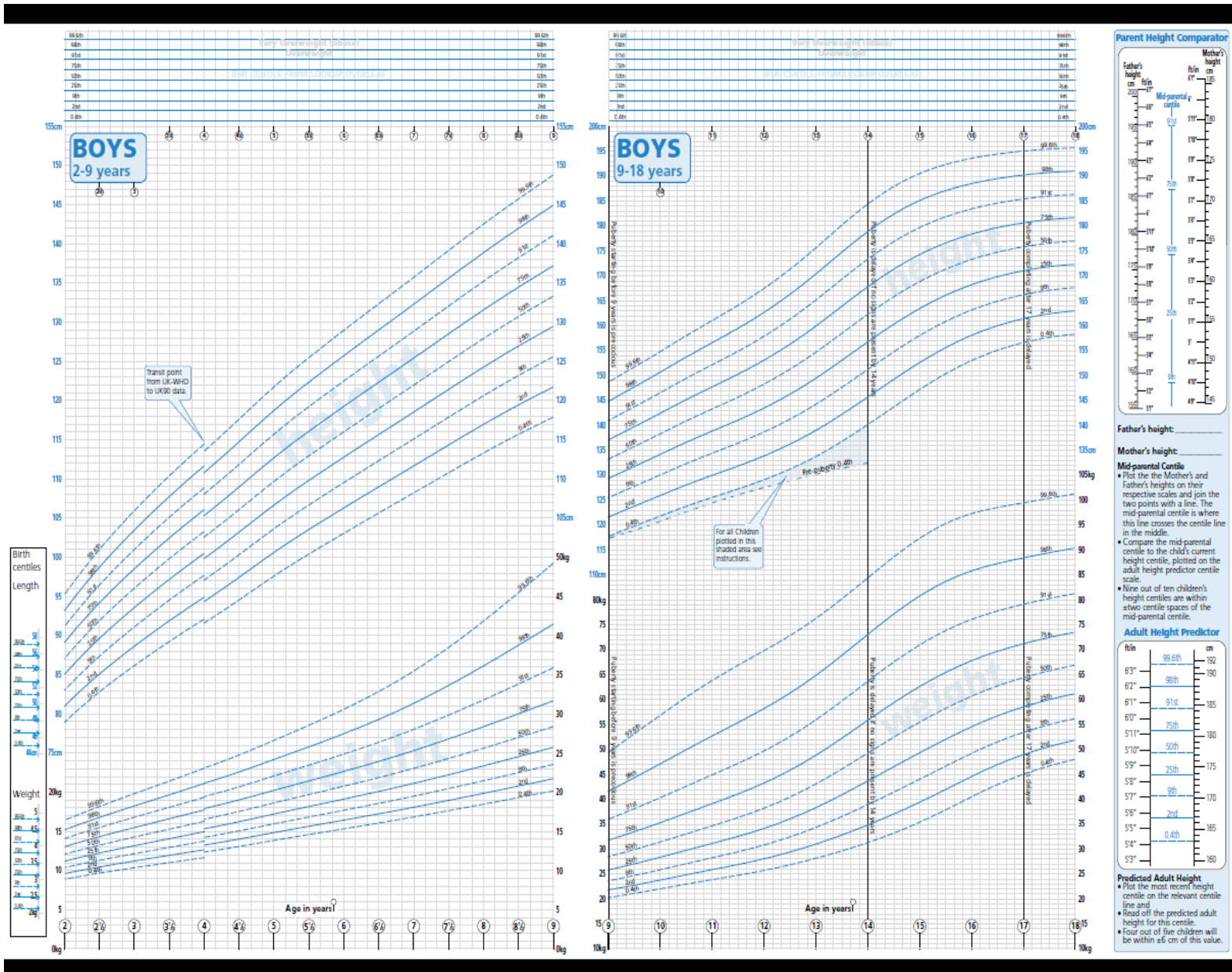
This chart provides some extra guidance about the lower limit (0.4th centile) for height in boys 9-14 years. If a plot falls within the shaded area on the height chart between 9 and 14 years, pubertal assessment will be required and mid-parental centile should be assessed.

If they are in puberty or Completing puberty, they are below the 0.4th centile and should be referred. In most instances a Pre-pubertal boy plotted in this area is growing normally, but comparison with the mid-parental centile and growth trajectory will assist the assessment of whether further investigation is needed.

Centile terminology

If the point is within 1/4 of a space of the line they are on the centile: e.g. 91st.
If not they should be described as being between the two centiles: e.g. 75th-91st.
A centile space is the distance between two of the centile lines, or equivalent distance if midway between centiles.





Prescribing framework for **Guanfacine for Attention Deficit Hyperactivity Disorder**

Approved: Jan 2018

Review: Jan 2021

Appendix 5:

Data Recording	
Measurement 1	
Recording Date	
Weight	
Length/height	
Location	
Health worker name	
Measurement 2	
Recording Date	
Weight	
Length/height	
Location	
Health worker name	
Measurement 3	
Recording Date	
Weight	
Length/height	
Location	
Health worker name	
Measurement 4	
Recording Date	
Weight	
Length/height	
Location	
Health worker name	
Measurement 5	
Recording Date	
Weight	
Length/height	
Location	
Health worker name	
Measurement 6	
Recording Date	
Weight	
Length/height	
Location	
Health worker name	
Measurement 7	
Recording Date	
Weight	
Length/height	
Location	
Health worker name	
Measurement 8	
Recording Date	
Weight	
Length/height	
Location	
Health worker name	
Measurement 9	
Recording Date	
Weight	
Length/height	
Location	
Health worker name	
Measurement 10	
Recording Date	
Weight	
Length/height	
Location	
Health worker name	

GIRLS UK Growth chart 2-18 years



Anyone who measures a child, plots or interprets charts should be suitably trained or supervised. For further information and training materials see fact sheet and presentation on www.growthcharts.rcpch.ac.uk

This chart is mainly intended to assess the growth of school age girls. It combines data from the UK 1990 growth reference for children at birth and from 4–16 years⁽¹⁾, with the WHO growth standard for children aged 2 years to 4 years⁽²⁾. The growth of children under 2 years of age should be plotted on the more detailed UK-WHO 0–4 years growth charts.

As well as simply using this chart for plotting growth data, it also includes a number of new features which you may wish to use to help interpret the growth data.

- birth centile plotting scale
- BMI look-up and plotting grid
- scales to estimate adult height and mid-parental centile
- guide to assessing puberty

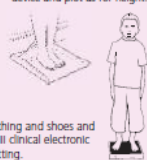
Measurement procedure

Accurate measurement is essential and shoes must be removed for all measurements



Height: Measure height recorded to the last millimetre. A correctly installed stadiometer or approved portable measuring device is the only equipment that can be reliably used (see illustration). If a child cannot stand, measure lying down, using an approved length measuring device and plot as for height.

Position head and feet as illustrated with child standing as straight as possible.



Weight: Remove heavy clothing and shoes and weigh using class II clinical electronic scales in metric setting.

Plotting

Plot each measurement by placing a small dot where a vertical line through the child's age crosses a horizontal line through the measured value.

The lettering on the charts ('weight', 'length' etc.) sits on the 50th centile to provide orientation.

Birth centile plotting scale

The chart starts at age 2 years, but there is a plotting scale on the left of the chart where for term infants, birth weight (and if measured, length) can be plotted to allow comparison of the birth centile with later growth.

Please place sticker (if available) otherwise write in space provided.

Name:

NHS/CHI No:

Hospital No:

Date of Birth:

When is further assessment required? If any of the following:

- Where weight or height or BMI is below the 0.4th centile, unless already fully investigated at an earlier age.
- If the height centile is more than 3 centile spaces below the mid-parental centile.
- A drop in height centile position of more than 2 centile spaces, as long as measurement error has been excluded.
- Smaller centile falls or discrepancies between child's and mid-parental centile, if seen in combination, or if associated with possible underlying disease.
- If there are any other concerns about the child's growth.

Adult Height Predictor

This allows you to predict the child's adult height based on their current height, but with a regression adjustment to allow for the tendency of very tall and short children to be less extreme in height as adults. Four girls out of five will have an adult height within ± 6 cm of the predicted adult height.

Instructions for use

Plot the most recent height centile on the centile line on the Adult Height Predictor (on the flap to the right of the height centile chart) and read off the predicted adult height for this centile.

Mid-Parental Centile

The 'mid-parental centile' is the average adult height centile to be expected for all children of these parents. It incorporates a regression adjustment to allow for the tendency of very tall and short parents to have children with less extreme heights. Comparing this to the child's current height centile can help assess whether the child's growth is proceeding as expected. The larger the discrepancy between the two, the more likely it is that the child has some sort of growth disorder. Most children's height centiles (nine out of ten) are within ± 2 centile spaces of the mid-parental centile, and only 1 percent will be more than three centile spaces below.

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The Mid-parental Centile Comparator is on the flap to the right of the height centile chart. If possible measure both parents' heights, or else use reported heights. Plot their heights on the Mother's and Father's height scales. Join the two points with a line between them. The mid-parental centile is where this line crosses the centile line in the middle. Compare the mid-parental centile to the child's current height centile, plotted on the adult height predictor centile scale.

Mid-parental target height

This can be obtained by plotting the mid-parental centile on the main chart at age 18 and reading off the corresponding height. Four girls out of five will have an adult height within ± 7 cm of this target height. However the predicted adult height (above) is usually closer than mid-parental target height to the child's final height.

Pubertal Assessment

The puberty 'phase' may be ascertained through simple questions about the appearance of secondary sexual characteristics as well as by clinical examination.

By history from parents, carers or young person

Pre-puberty (Tanner stage 1)	In Puberty (Tanner stages 2-3)	Completing Puberty (Tanner stages 4-5)
No signs of pubertal development	Any breast enlargement pubic or axillary hair	Started periods with signs of pubertal development

Is the timing of puberty normal?

The three vertical black lines (puberty lines) on the right hand page (8-18 years) of the chart indicate the normal age limits for the phases of puberty described above.

- Girls with measurements plotted on the left page will usually be in the 'Pre-puberty' phase. Puberty before 8 years in girls is likely to be precocious and further assessment is necessary.
- Between 8-13 years most girls will be either 'Pre-puberty' or 'In puberty'. If there are no signs of puberty by 13 years, then puberty is delayed and further assessment is indicated.
- From 13-16 years most girls will be either 'In puberty' or 'Completing puberty'.
- After 16 years girls will usually be 'Completing puberty'. If this is not the case, maturation is delayed and further assessment may be needed.

Growth patterns before and during puberty

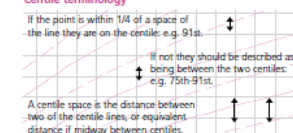
Successive height measurements can show wide variation, because it is difficult to measure height accurately, if there are concerns it is useful to measure on a few occasions over time. Assessing growth during puberty is complex because the age when puberty starts varies.

What does a height in the shaded area below the 0.4th centile mean?

This chart provides some extra guidance about the lower limit (0.4th centile) for height in girls 8-13 years. If a plot falls within the shaded area on the height chart between 8 and 13 years, pubertal assessment will be required and mid-parental centile should be assessed.

If they are **In puberty** or **Completing** puberty, they are below the 0.4th centile and should be referred. In most instances a **Pre-pubertal** girl plotted in this area is growing normally, but comparison with the mid-parental centile and growth trajectory will assist the assessment of whether further investigation is needed.

Centile terminology



Body Mass Index (BMI) centile look-up

If weight is above the 75th centile or if weight and height centiles differ, the BMI centile should be calculated, as the BMI centile is the best indicator of thinness and fatness. The BMI look-up allows you to read off the BMI centile, accurate to a quarter of a centile space. There is a BMI centile grid at the top of the growth chart where the centiles for children with high or low values can be plotted.

Instructions for use

1. Note the weight and height centiles from the growth chart.
2. Plot the weight centile against the height centile on the BMI look-up.
3. If between centiles, read across in this position.
4. Read off the corresponding BMI centile from the pink slanting lines.
5. Plot the centile in the BMI grid at the top of the growth chart at the appropriate age.

What does a high or low BMI mean?

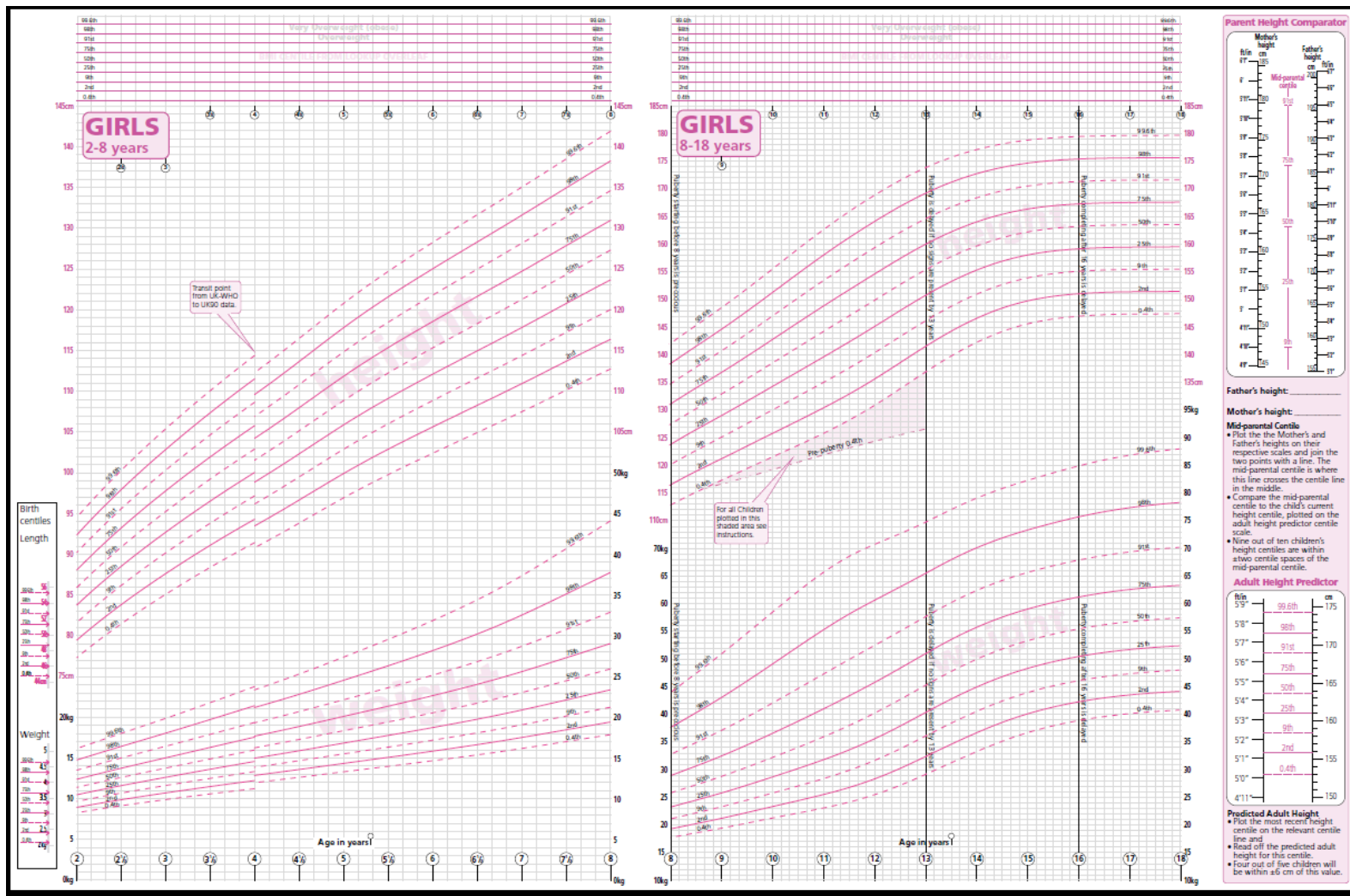
A BMI above the 91st centile suggests overweight. A child above the 98th centile is very overweight (clinically obese). BMI below the 2nd centile is unusual and may reflect undernutrition, but may simply reflect a small build.

References

1. Freeman JV, Cole TJ, Chinn S, Jones PRM, White EM, Preece MA. Cross sectional stature and weight reference curves for the UK, 1990. Arch Dis Child 1995; 73:17-24.
2. www.who.int/childgrowth/en

For further relevant references see fact sheet downloadable from www.growthcharts.rcpch.ac.uk

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Contact Details:**HFT**

During Office hours: Medicines Management Pharmacist Humber NHS Foundation Trust Head Quarters
Willerby Hill (01482 301724) or contact specialist as per clinic letter

Out of hours: In emergency contact Victoria House and ask for on-call CAMHS consultant 01482 223191

Community Paediatrics (CHCP)**During office hours:**

Contact specialist (as per clinic letter) or secretaries on 01482 221261

Out of Hours:

Contact the HEY On call Registrar for Paediatrics via HRI switchboard. (01482 875875)

APPROVAL PROCESS

Written by:	Melissa Turner, Specialist Clinical Pharmacist, HFT
Consultation process:	CAMHS (HFT), DTC (HFT), Community Paediatricians (CHCP)
Approved by:	<i>HERPC Jan 2018</i>
Ratified by:	<i>HERPC Jan 2018</i>
Review date:	<i>Jan 2021</i>

Prescribing framework for **Guanfacine for Attention Deficit Hyperactivity Disorder**

Approved: Jan 2018

Review: Jan 2021