HERPC
Hull & East Riding Prescribing Committee

Prescribing Framework for Methylphenidate For Attention Deficit Hyperactive 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: http://www.hey.nhs.uk/amber.htm

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 with methylphenidate 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.

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

Methylphenidate is a Schedule 2 Controlled Drug (CD). Prescription requirements for prescribing CDs should therefore be observed.

The guidelines should be read in conjunction with

- The general guidance on prescribing matters given in EL (91) 127 “Responsibility for prescribing between hospitals and GPs”.
- NICE Clinical Guideline 87 (NG 87) *Attention deficit hyperactivity disorder: Diagnosis and management (Published March 2018)*
- NICE Guideline *5 Medicines optimisation: the safe and effective use of medicines to enable the best possible outcomes 2015*

2. Medication Choice

	Medication choice – children aged 5 years and over and young people	Medication choice – adults
Atomoxetine	**FOURTH LINE** • For patients intolerant of methylphenidate or lisdexamfetamine **OR** • After inadequate response to **separate** 6-week trials of lisdexamfetamine* **AND** methylphenidate*	**FOURTH LINE** • For patients intolerant of methylphenidate or lisdexamfetamine **OR** • After inadequate response to **separate** 6-week trials of lisdexamfetamine* **AND** methylphenidate*
Dexamfetamine	**THIRD LINE** • For patients responding to but intolerant of lisdexamfetamine	**THIRD LINE** • For patients responding to but intolerant of lisdexamfetamine
Guanfacine	**FOURTH LINE** • For patients intolerant of methylphenidate or lisdexamfetamine **OR** • After inadequate response to separate 6-week trials of lisdexamfetamine* **AND** methylphenidate*	**ONLY ON ADVICE OF TERTIARY SERVICES**
Lisdexamfetamine	**SECOND LINE** • After inadequate response to 6-week trial of methylphenidate*	**FIRST LINE** **OR** **SECOND LINE** • After inadequate response to trial of methylphenidate*
Methylphenidate	**FIRST LINE**	**FIRST LINE** **OR** **SECOND LINE** • After inadequate response to trial of lisdexamfetamine*
* AT ADEQUATE DOSE		

3. Indication

Methylphenidate is indicated as part of a comprehensive treatment programme for attention-deficit/hyperactivity disorder (ADHD) in children aged 6 years of age and over when remedial measures alone prove insufficient. Treatment must be initiated and supervised by a doctor specialised in the treatment of ADHD. Diagnosis should be made according to current DSM criteria or the guidelines in ICD-10

This shared care protocol applies to children 6 years and above, and adults. The drug is not licensed for children less than six years of age.

Other than the brand Medikinet XL which has recently obtained a license for treatment of ADHD in adults, initiating treatment in adulthood is unlicensed. However, Methylphenidate is included in the BNF as treatment for adults (off-licence)

Please note that at the time of writing, Medikinet XL is the only brand of Methylphenidate which is licensed for initiation of treatment in adults with ADHD

4. Dose/formulation

- **Immediate-release preparations:**

CHILDREN and YOUNG PEOPLE 6–18 years: 5mg once or twice daily and increase at weekly intervals by 5–10mg daily; usual max. 60mg daily in divided doses but may be increased to 2.1mg/kg daily (max. 90mg daily) by the specialist. If improvement is not observed after appropriate dosage adjustment the drug will be discontinued. In some patients, rebound hyperactivity may occur as the effect of the drug wears off in the evening. Dividing the doses to include an additional dose at bedtime may eliminate this difficulty. However, bedtime doses may cause sleep disturbance.

ADULT: over 18 years [unlicensed use], 5mg two to three times daily increased if necessary at weekly intervals according to response. Maximum 100mg daily in 2-3 divided doses. If the effect wears off in the evening, with rebound hyperactivity then a dose at bedtime may be appropriate

- **Modified-release preparations:**

Different brands of modified-release preparations may not have the same clinical effect. To avoid confusion between these different formulations of methylphenidate, prescribers should specify the brand to be dispensed.

The differences in the most common brands of modified-release Methylphenidate are as follows:

Brand	Immediate release component	Modified-release component	Duration of Action (hours)
Equasym XL	30%	70%	8
Medikinet XL	50%	50%	8
Concerta XL	22%	78%	12
Matoride XL	22%	78%	12
Xaggitin XL	25%	75%	12
Delmosart XL	25%	75%	12
Xenidate XL	21%	79%	12

Methylphenidate modified release may be used once daily in the morning, swallowed whole and must NOT be chewed, divided or crushed.

Patients can be converted from standard methylphenidate preparations as described in the relevant Summary of Product Characteristics.

Treatment may also be commenced using modified-release preparations – please see product literature for the recommended dosing schedule for the brand required.

Equasym XL and Medikinet XL – contents of capsules can sprinkled on apple sauce or a similar soft food and then swallowed immediately without chewing).

Once the patient has been stabilised a further 4-week supply will be prescribed by the psychiatrist/paediatrician to allow adequate time for information to be passed to their General Practitioner.

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

- Anorexia nervosa
- Cardiovascular disease, Arrhythmias, Cardiomyopathy, Heart failure
- Cerebrovascular disorders
- Hyperthyroidism
- Phaeochromocytoma
- Psychosis
- Severe depression, suicidal ideation
- Severe hypertension
- Structural cardiac abnormalities
- Uncontrolled bipolar disorder
- Vasculitis

7. Cautions:

- Agitation
- Alcohol dependence, Drug dependence
- Anxiety
- Epilepsy (discontinue if increased seizure frequency
- Family history of Tourette syndrome, Tics
- Susceptibility to angle-closure glaucoma

Concerta XL, delmosart XL and Xaggitin XL should not be used in patients with severe gastrointestinal tract narrowing or dysphagia or significant difficulty with swallowing tablets because the methylphenidate is contained within a non-deformable, non-absorbable shell which is eliminated unchanged from the body in the patient's stool.

8. Adverse effects

The following have been reported:

• Decreased appetite and moderately reduced weight gain and growth retardation have been reported with the long-term use of methylphenidate in children (monitor height and weight) • Occasional abdominal pain, nausea and vomiting (alleviated with concomitant food intake) • Diarrhoea, dyspepsia, dry mouth, constipation • Headaches • Emotional lability • Abnormal dreams, confusion, suicidal ideation • Tachycardia, palpitation, arrhythmias, changes in blood pressure, myocardial infarction, angina; supraventricular tachycardia, bradycardia • Cough, nasopharyngitis	• Tics (*very rarely* Tourette syndrome), movement disorders, insomnia, nervousness, asthenia, depression, irritability, aggression • Headache, drowsiness, dizziness, visual disturbances; fever; arthralgia; • Rash, pruritus, alopecia; sweating, exfoliative dermatitis and erythema multiforme • Dyspnoea • Urinary frequency, haematuria • Muscle cramps, epistaxis; • Hepatic dysfunction • Cerebral arteritis, psychosis, neuroleptic malignant syndrome • Tolerance and dependence • Blood disorders including leucopenia and thrombocytopenia • Angle-closure glaucoma, and convulsions

9. Interactions

Methylphenidate has been reported to interact with the following

- Warfarin - may increase the anticoagulant effect
- Anticonvulsants – may increase levels of phenytoin, Primidone and phenobarbitone
- Tricyclic antidepressants and SSRIs- may increase plasma levels

When starting or stopping treatment with methylphenidate, it may be necessary to adjust the dosage of these medicinal products already being taken and establish drug plasma concentrations (or for Warfarin, coagulation times).

- Risperidone - increased risk of dyskinesias when given with methylphenidate
- MAOIs- risk of hypertensive crisis when methylphenidate given with MAOIs , some manufacturers advise avoid methylphenidate for at least 2 weeks after stopping MAOIs
- Linezolid – Methylphenidate is predicted to increase the risk of elevated blood pressure
- Clonidine- serious adverse events reported with concomitant use of methylphenidate and clonidine (causality not established)
- General anaesthetics- increased risk of hypertension when methylphenidate given with volatile liquid general anaesthetics
- Methylphenidate antagonises hypotensive effect of adrenergic neurone blockers

Alcohol can increase the CNS effects of methylphenidate.

There are no known interactions with antibiotics, simple analgesics and antihistamines.

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 evaluation

Before starting medication for ADHD, people with ADHD should have a full assessment, which should include:

- A review to confirm they continue to meet the criteria for ADHD and need treatment
- A review of mental health and social circumstances, including:
  - Presence of coexisting mental health and neurodevelopmental conditions
  - current educational or employment circumstances
  - risk assessment for substance misuse and drug diversion
  - care needs
- A review of physical health, including:
  - A medical history, taking into account conditions that may be contraindications for specific medicines
  - Current medication
  - Height and weight (measured and recorded against the normal range for age, height and sex)
  - Baseline pulse and blood pressure (measured with an appropriately sized cuff and compared with the normal range for age)
  - A cardiovascular assessment

Refer for a cardiology opinion before starting medication for ADHD if any of the following apply:

- History of congenital heart disease or previous cardiac surgery
- History of sudden death in a first-degree relative under 40 years suggesting a cardiac disease
- Shortness of breath on exertion compared with peers
- Fainting on exertion or in response to fright or noise
- Palpitations that are rapid, regular and start and stop suddenly (fleeting occasional bumps are usually ectopic and do not need investigation)

- Chest pain suggesting cardiac origin
- Signs of heart failure
- A murmur heard on cardiac examination
- Blood pressure that is classified as hypertensive for adults

Refer to a paediatric hypertension specialist before starting medication for ADHD if blood pressure is consistently above the 95th centile for age and height for children and young people

11. Ongoing monitoring

- Measure height every 6 months in children and young people
- Measure weight every 3 months in children 10 years and under
- Measure weight at 3 and 6 months after starting treatment in children over 10 years and young people, and every 6 months thereafter, or more often if concerns arise
- Measure weight every 6 months in adults
- Plot height and weight of children and young people on a growth chart and ensure review by the healthcare professional responsible for treatment
- Monitor heart rate and blood pressure and compare with the normal range for age before and after each dose change and every 6 months.
- Do not offer routine blood tests (including liver function tests) or ECGs to people taking medication for ADHD unless there is a clinical indication.
- If a person taking ADHD medication has sustained resting tachycardia (more than 120 beats per minute), arrhythmia or systolic blood pressure greater than the 95th percentile (or a clinically significant increase) measured on 2 occasions, reduce their dose and refer them to a paediatric hypertension specialist or adult physician
- A healthcare professional with training and expertise in managing ADHD should review ADHD medication at least once a year and discuss with the person with ADHD (and their families and carers as appropriate) whether medication should be continued.

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.

12. Information to patient

- Reporting of side-effects and adverse events to GP or Specialist
- Ensure they have a clear understanding of the treatment
- Healthcare professionals should stress the value of a balanced diet, good nutrition and regular exercise for children, young people and adults with ADHD.
- Advise the family members or carers of children with ADHD that there is no evidence about

the long-term effectiveness or potential harms of a 'few food' diet for children with ADHD, and only limited evidence of short-term benefits

- Encourage people with ADHD to discuss any preferences to stop or change medication and to be involved in any decisions about stopping treatments.

This medicine can impair cognitive function and can affect a patient's ability to drive safely. This class of medicine is in the list of drugs included in regulations under 5a of the Road Traffic Act 1988. When prescribing this medicine, patients should be told:

- The medicine is likely to affect their ability to drive
- Not to drive until they know how they are affected by the medicine
- It is an offence to drive while under the influence of this medicine

However, patients would not be committing an offence (called 'statutory defence') if:

- The medicine has been prescribed to treat a medical problem **and**
- They have taken it according to the instructions given by the prescriber and in the information provided with the medicine **and**
- It was not affecting their ability to drive safely

13. Responsibilities of clinicians involved

Stage	Specialist	General Practitioner
Initiation	• Assessment and diagnosis of ADHD • Initiation of Methylphenidate therapy, including to methylphenidate m/r if required • Undertake pre-treatment evaluation • Provision of written guidance and questionnaires for parents and teachers regarding drug treatment, at the specialists discretion • Reporting adverse events to the CHM • Monitor height, weight, blood pressure and heart rate as indicated	• Liaise and seek advice from the specialist team when appropriate • Take over prescribing of medication 4 weeks after the patient has been stabilized on treatment and provide on-going clinical care
Maintenance	• Monitor height, weight and blood pressure as indicated until the patient is stabilised • Assess continued need for treatment annually including dose and appropriate interruption of medication • Review treatment as requested by the GP • For young people, if methylphenidate is to be continued beyond age 18 years then care should be transferred to adult psychiatric services as appropriate • Reporting of adverse events to CHM • Advising the GP when methylphenidate should be discontinued • Providing necessary supervision and support during the discontinuation phase	• Prescribing methylphenidate once the patient is stabilised • Liaising with the specialist regarding any complications of treatment • Reporting adverse events to the specialist and the CHM • Review treatment every 6 months • Monitor blood pressure and pulse every 6 months • For children under 10 years monitor weight every 3 months • For children over 10 years and adults monitor weight every 6 months • Reporting to and seeking advice from the specialist 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

Contact Details:

HTFT

During Office hours: Medicines Management Pharmacist Humber Teaching 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

During Office hours: Community Paediatrics Service, The Childrens Centre, Walker Street tel 01482 221261 or contact specialist as per clinic letter

APPROVAL PROCESS

Written by:	**Melissa Turner, Specialist Clinical Pharmacist, Mental Health** **Jackie Stark, Principal Pharmacist**
Consultation process:	**HFT Drug Therapeutics Committee, Community Paediatrics,**
Approved by:	***Include MMIG, LMC, HFT DTC***
Ratified by:	***HERPC Sept 2018***
Review date:	***Sept 2021***

Appendix 1:

Blood Pressure Levels for Boys by Age and Height Percentile

Age (Year)	BP Percentile ↓	Systolic BP (mmHg) ← Percentile of Height →							Diastolic BP (mmHg) ← 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) ← Percentile of Height →							Diastolic BP (mmHg) ← 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

Online Resources

1- Heart Rate Centile Calculator

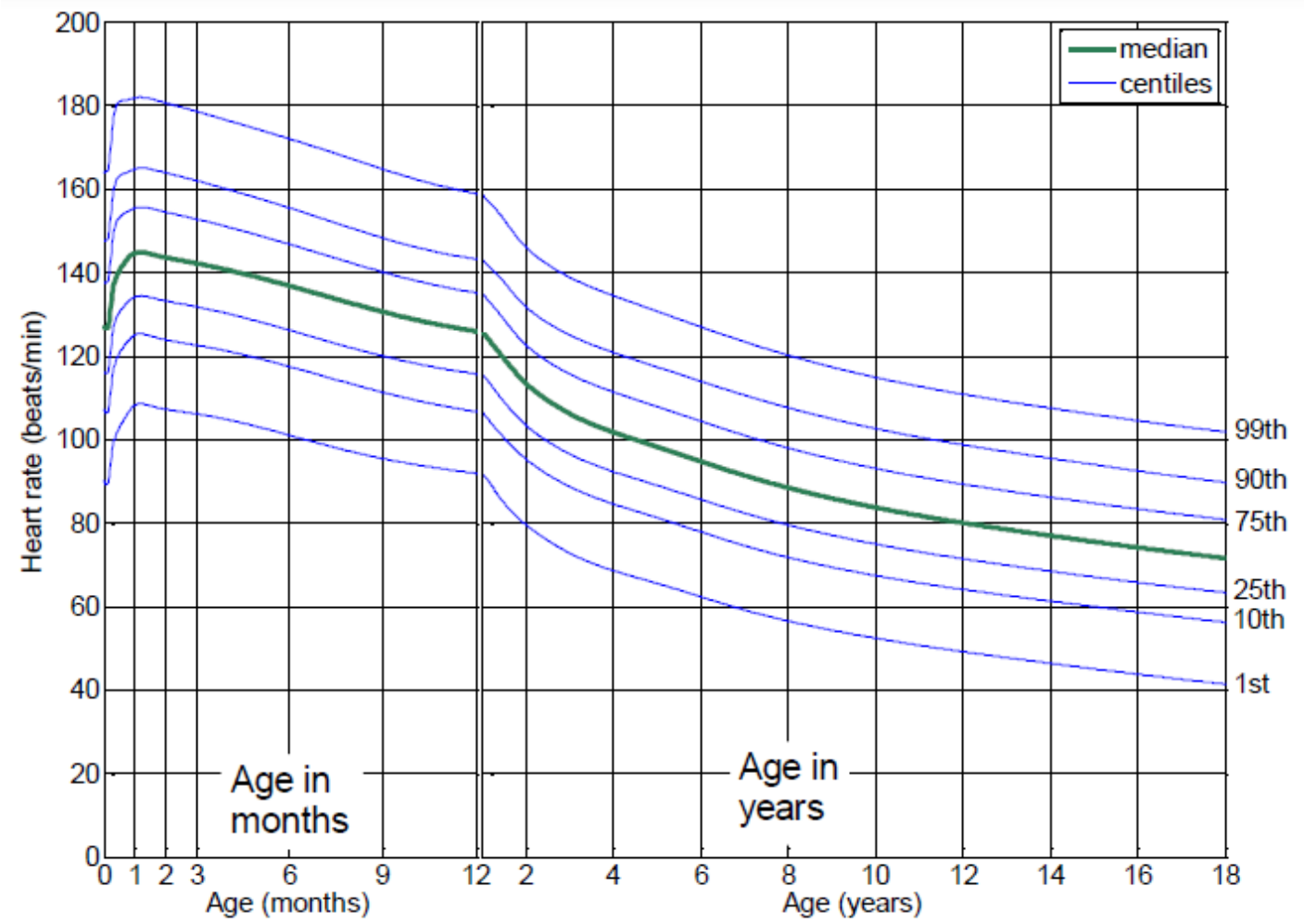
http://madox.org/webapp/184

2- Blood Pressure Centile Calculator

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 Royal College of Paediatrics and Child Health — Department of Health — healthier scotland

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

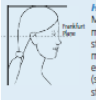
This chart is mainly intended to assess the growth of school age boys. It combines data from the UK 1990 growth reference for children at birth and from 4 -18 years[1], with the WHO growth standard for children aged 2 years to 4 years[2]. The growth of children under 2 years of age should be plotted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

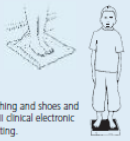
Measurement procedure

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 III 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 ±two 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	If **any** of the following: Slight deepening of the voice	If **any** of the following: Voice fully broken
No signs of pubertal development	Early pubic or armpit hair growth	Moustache and early facial hair growth
	Enlargement of testes or penis	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.

Growth patterns before and during puberty

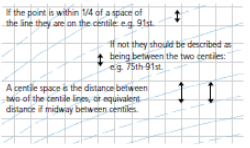
Successive height measurements can show wide variation, because it is difficult to measure height accurately. If there are concerns it is useful to measure on a few occasions over time. Assessing growth during puberty is complex because the age when puberty starts varies.

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.

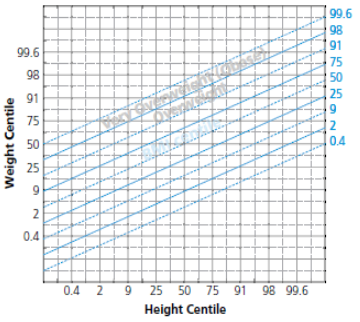
If they are **in** puberty or **Completing** puberty, they are below the 0.4th centile and should be referred. In most instances a **Pre-**pubertal boy plotted in this area is growing normally, but comparison with the mid-parental centile and growth trajectory will assist the assessment of whether further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

Centile terminology



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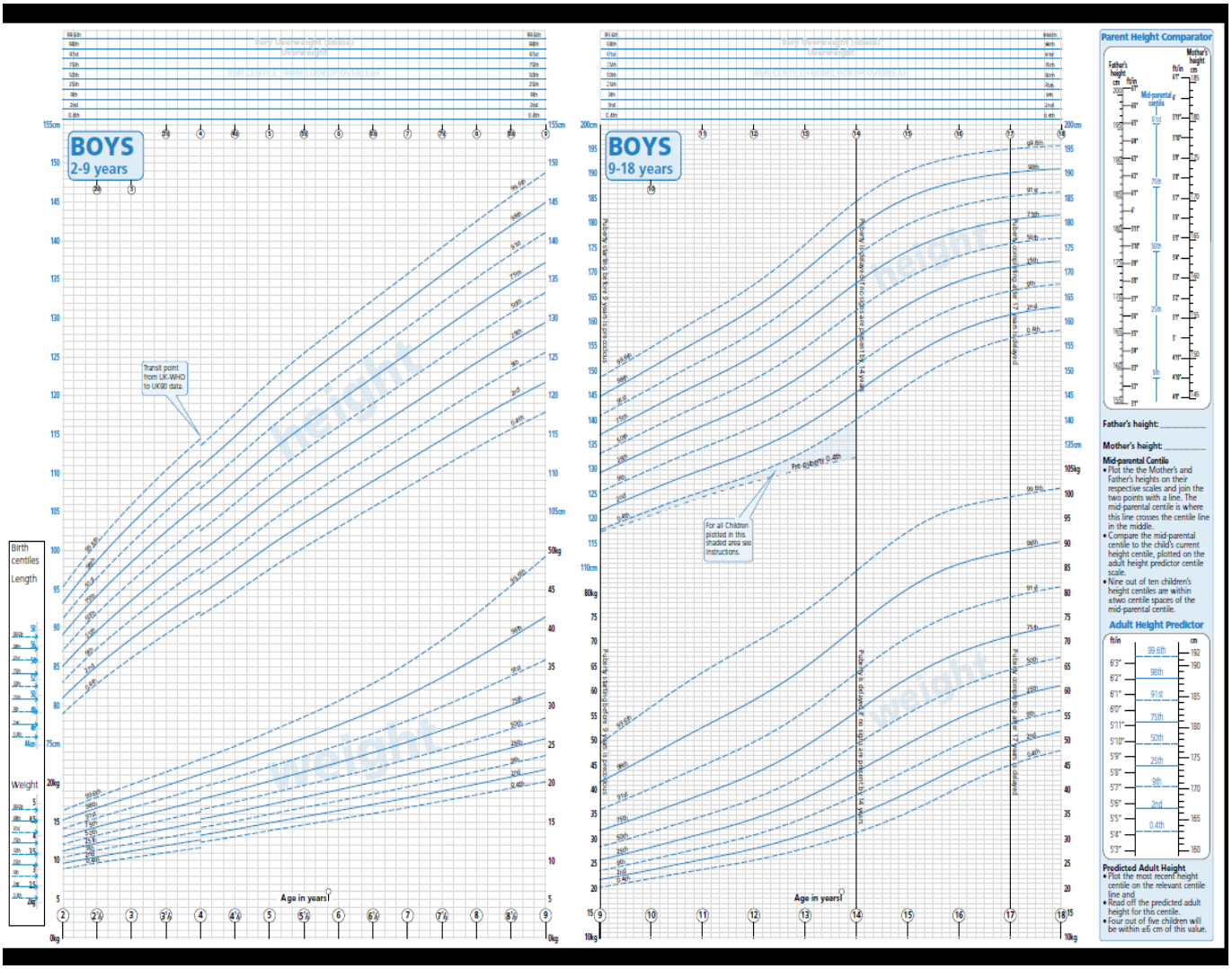
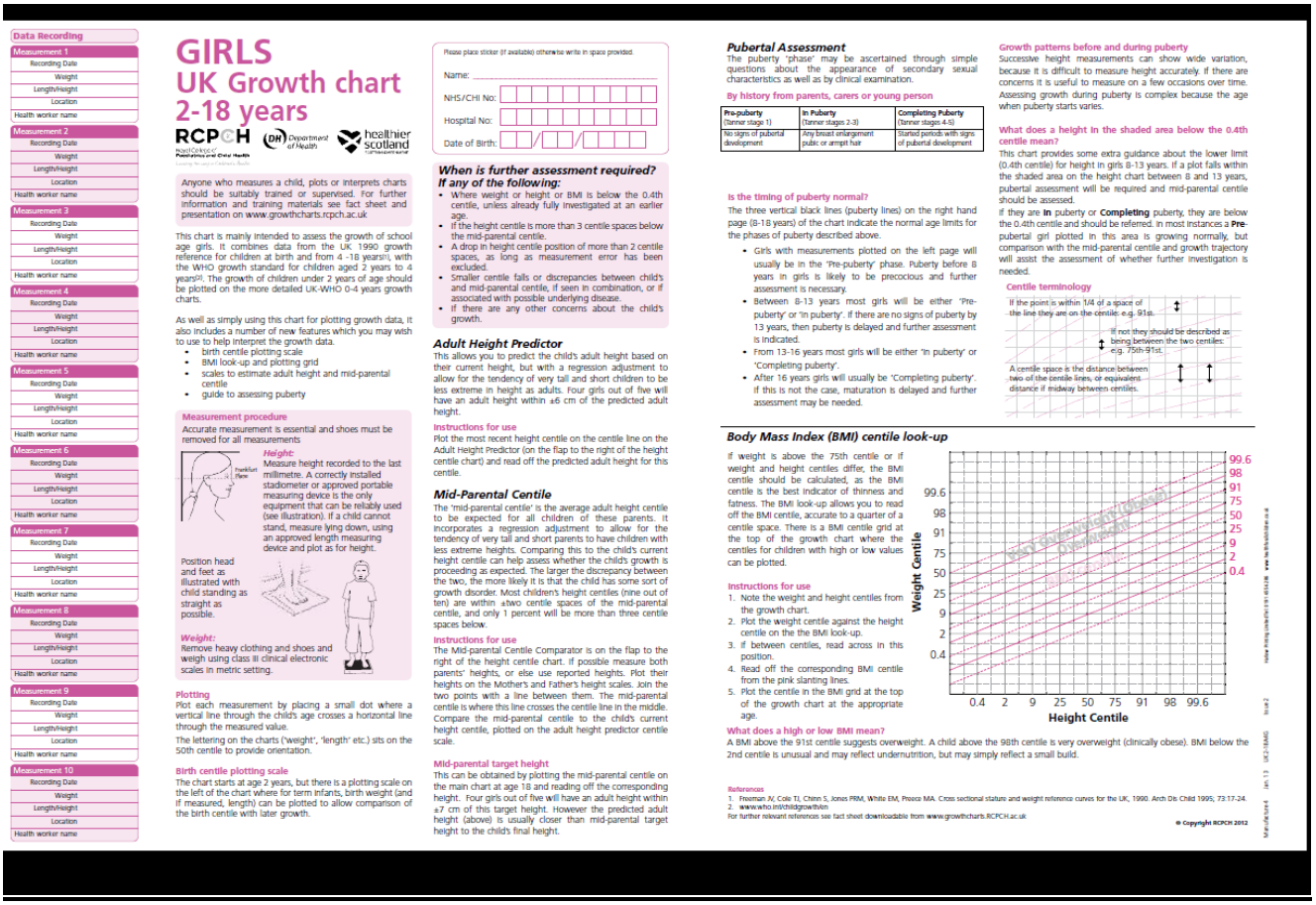
For further relevant references see fact sheet downloadable from www.growthcharts.RCPCH.ac.uk



Prescribing framework for Methylphenidate for Attention Deficit Hyperactive Disorder
Approved by HERPC: Sept 2018 Review date: September 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

RCPCH Royal College of Paediatrics and Child Health · DH Department of Health · healthier scotland

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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 -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 III 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 ±two centile spaces of the mid-parental centile, and only 1 percent will be more than three centile spaces below.

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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 armpit 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.

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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 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
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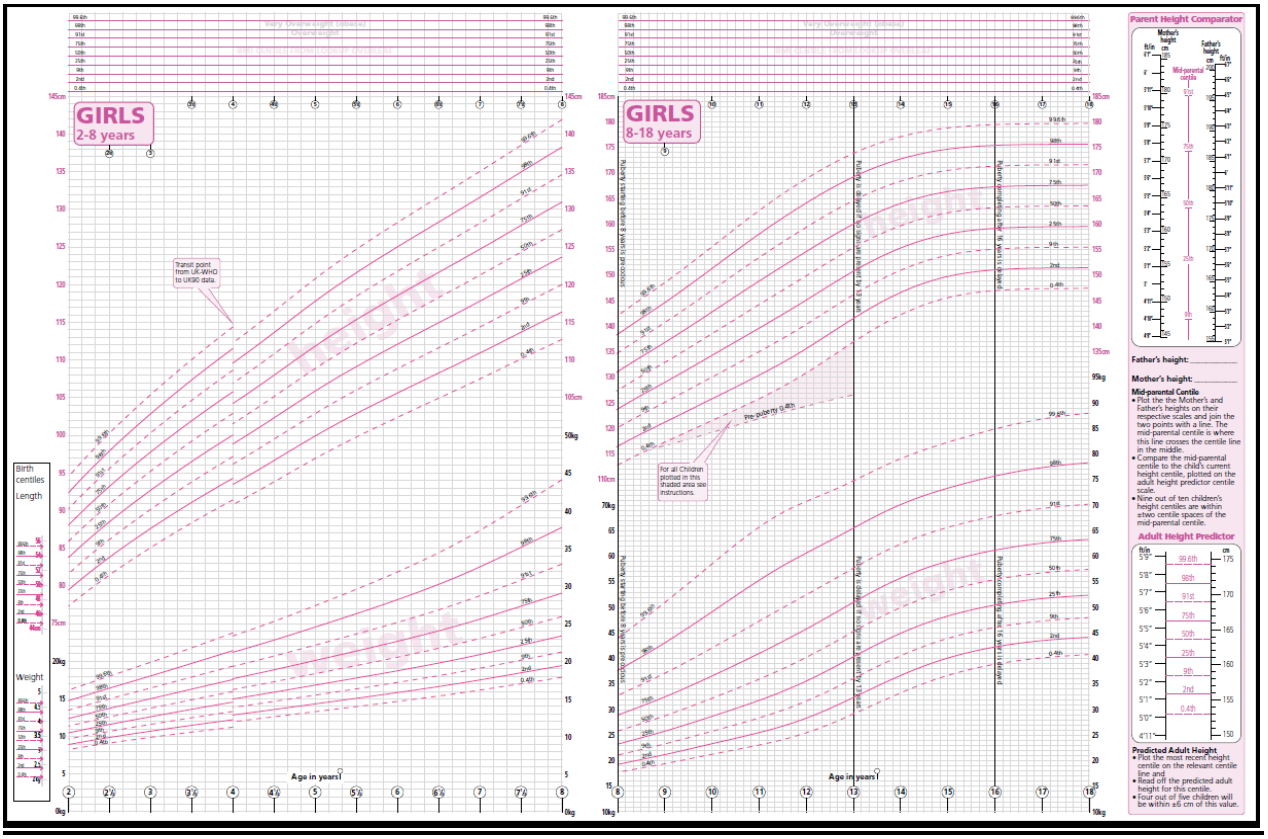

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Approved by HERPC: Sept 2018 Review date: September 2021