### BOYS UK 2-20yr Childhood and puberty close monitoring (CPCM) growth chart

This chart is mainly intended for use in children and young people whose growth requires close monitoring, or whose measurements are outside the usual centile range. It is based on the UK 1990 growth reference from 4-20 years at birth, and the WHO growth standard from 2-4 years (as per the UK-WND 0-4 years charts). For children aged under 2 years whose growth needs detailed assessment, the neonatal and infant close monitoring chart (NIMC) is available. This 2-20 chart has a number of novel features including some puberty phase specific centile lines. For further information about the development of this chart and supporting references see www.growthcharts.rpch.ac.uk.

#### Birth centile plotting scale
The chart starts at age 2 years, but there is a scale to the left of the chart where birth weight, length and head circumference for term infants can be plotted.

#### Children with extremes of height or weight
In addition to the usual nine centile lines, the height charts also show lines -4 and -5 SD below and +4 and +5 SD above the mean. The additional weight lines are -4, -5, and +5 SD respectively. Children whose growth lies on these outer lines are likely to have additional clinical problems, and if not already receiving medical attention should be referred. For exceptionally heavy or light children BMI should be calculated and plotted.

#### Parent height comparator (mid-pediatric centile)
The mid-pediatric centile is the average adult height centile to be expected for all children born of this child's parents. It incorporates a regression adjustment to allow for the tendency of tall and short parents to have children with less extreme heights. Comparing the mid-pediatric centile with 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 disordered growth. Most children's height centiles (nine out of ten) are within 2 centile spaces of the mid-pediatric centile, and only 1 percent will be dissimilar by more than 3 centile spaces.

#### Mid-parental target height
The mid-parental target height is obtained by plotting the mid-pediatric centile on the height chart at age 20 and reading off the corresponding height. Four boys out of five will have an adult height within ±6 cm of this target height. However predicted adult height (above) is usually closer to the child's final height.

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### Adult height predictor
This allows prediction of the child's adult height based on their current height, including 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 this predicted height.

#### Body mass index (BMI) chart

**Where over- or underweight is a concern** BMI can be calculated and plotted on the BMI chart. BMI is calculated by dividing weight (in kg) by the square of height (in metres e.g. 1.32 m; note that cm should be squared) and multiplying the result by 100. To do this, enter the weight; 2. Divide by height; 3. Divide the result by height.

The result should be plotted on the BMI chart provided. To allow the monitoring of severely obese children, the BMI chart displays 'high risk' lines at +3, +3.33, +3.66 and +4.5 SD, and +4 and +5 SD for those severely underweight.

#### Pubertal assessment
For most purposes the pubertal phase approach will be sufficient, based on the history and clinical examination as below. Where more detailed assessment of the progress of puberty is required see the chart flap for Tanner staging.

The three vertical black lines (puberty lines) on the right hand side of the chart (9-20 years) indicate the normal age limits for the phases of puberty described below.

#### What does a measurement in a shaded area mean?

The chart provides extra guidance about the lower limit (0.4th centile) for late-maturing boys in pre-puberty and the upper limit (99.6th centile) for early-maturing boys completing puberty. If height and weight falls within a shaded area on the chart, pubertal assessment will be required. For boys in pre-puberty, height or weight within the lower shaded areas are likely to be normal, but if height is not markedly discrepant from the mid-pediatric centile and BMI is within normal limits. Similarly, boys completing puberty who have measurements in the upper shaded area are usually normal.