Blackpool Teaching Hospitals
NHS Foundation Trust

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| **Title:**<br>**Assessment and investigation for childhood obesity in Secondary Care** | | **Version Number:**<br>1 |
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| **Author / Originator and Job Title:**<br>Dr Wing Tang, Consultant Paediatrician | | **Risk Assessment:**<br>Not Applicable |
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| *Review dates and version numbers may alter if any significant changes are made* | | |

Blackpool Teaching Hospitals NHS Foundation Trust aims to design and implement services, policies and measures that meet the diverse needs of our service, population and workforce, ensuring that they are not placed at a disadvantage over others. The Equality Impact Assessment Tool is designed to help you consider the needs and assess the impact of your policy in the final Appendix.

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## 1 PURPOSE

To provide a guideline for the assessment of obese children and adolescents.

This guideline is adapted from OSCA consensus statement on the assessment of obese children and adolescents for paediatrician'. The (OSCA) Obesity Services for Children and Adolescents Guideline was authored by a network of paediatricians with a special interest in the management of childhood obesity linked to the Royal College of Paediatric and Child Health (RCPCH) and to the Association for the study of Obesity (ASO). The OSCA guideline builds on the NICE recommendation to provide guidance on assessing obesity in secondary care paediatrics.

## 2 TARGET AUDIENCE

This guideline applies to all clinical staff in the Families Division.

## 3 GUIDELINE

Obese children may be brought to the attention of the paediatric services from a number of different sources. (for instance GP, School Nurses, or seen for another medical condition)

Children may be referred to secondary care for the following reasons

1. Children with Body Mass Index (BMI) ≥98th centile who

   i. the child or family are seeking help / treatment, or

   ii. Evidence of the child's health is affected by their obesity

B A likelihood of secondary obesity (e.g. genetics causes)

C A likelihood of co morbidity

D. Any child with extreme obesity.

There are no currently agreed definitions for extreme obesity. Any child with either BMI >3.5 standard deviations (SD) above mean should be regarded as having extreme obesity, as this is equivalent at age 18 years to the adult definition of morbid obesity (BMI ≥40kg/m2).

The table below show BMI > 3.5 SD for each age group. Please note that for a child with a BMI > 3.5, his or hers weight will be significantly above the 99.6$^{th}$ centile.

| Age | BMI > 3.5 SD for boys | BMI >3.5 SD for girls |
|---|---|---|
| 2 yrs | 22.7 | 22.7 |
| 5 yrs | 22 | 23.5 |
| 10 yrs | 32 | 33 |
| 15 yrs | 38 | 38 |
| 18 yrs | 40 | 40 |

### 3.1 Medical History and Examination in Secondary Care

The aims of the consultation are to identify any potential medical cause of obesity and to look at any possible co morbidities.

1. Accurate height, weight and calculation of Body Mass Index (BMI). Plot BMI on appropriate chart.

   BMI - Weight in kg / Height $^{2}$ (in metres)$^{-}$

2. Pattern of Obesity – note whether generalised obesity or whether adiposity is primarily central or upper body.

3. Blood pressure (Please see Appendix C for measurements) – hypertension may warrant further investigation and treatment. Please seek advice from the renal or endocrine team in Royal Manchester Children's Hospital.

4. Pubertal assessment and menstrual history.

5. Acanthosis nigricans – the thickened velvety darkened skin is indicative of significant insulin resistance. It is usually around neck and axillae, but in severe cases may occur in all flexures.

6. Symptoms of Obstructive Sleep Apnoea

   a. Snoring
   b. Difficulty in breathing during sleep.

   If this is present, a formal an overnight saturation study will be appropriate

7. Signs of Endocrinopathy
   - Weight gain, dry skin, goitre, bradycardia may be seen in hypothyroidism. However, hypothyroidism as a primary cause is rare
   - Steroid excess very rare (Signs include striae, hypertension, short stature, hirsutism and telangiectasia).

8. Signs of genetic Obesity Syndromes - particularly early onset obesity, learning difficulties, deafness, epilepsy, retinitis, neuroendocrine abnormalities including hypogonadism and red hair with no family history (See Appendix A below for more details).

9. Concomitant drug use – such as glucocorticoids and atypical antipsychotic meds are associated with obesity and insulin resistance. Other drugs such as pizotifen can increase appetite.

### 3.2 Investigation in secondary care

The aim of these investigations are to identify

2. Aetiology of Obesity, and
3. Obesity Co morbidities

#### 3.2.1 Investigation of the aetiology of obesity

Thyroid function test – few investigations are routinely necessary. If there are no abnormalities found, investigation should be limited to thyroid function test. Note many obese child have a Thyroid Stimulating Hormone (TSH) at the top of or just above the upper limit of the normal range.

#### 3.2.2 Investigation of obesity co morbidities

Fasting bloods for glucose and insulin – to assess insulin resistance, and to identify Type 2 Diabetes.

Lipids including total cholesterol, triglyceride and High Density Lipoprotein (HDL).

Liver function test - Alanine Aminotransferase (ALT) > twice normal range, is the best indicator of probably Non-alcoholic fatty liver disease (NAFLD)

ALT > 120 may need review by a liver unit

Full Blood Count (FBC) and Urea and electrolytes (U+E) – anaemia more common in disordered eating.

**If the assessments and investigation identify any abnormalities, please discuss with the paediatric endocrine team at Royal Manchester Children's Hospital (RMCH). A referral to them may be appropriate for further investigations.**

**Additional investigations that may be considered, by the paediatric endocrine team by RMCH. Some of these can be done locally.**

#### 3.2.2.1 For aetiology:

1. Genetics study - see Appendix A for features suggestive of genetics cause. – May need advice from the paediatric endocrine team and the geneticist.

2. Suspicion of secondary obesity e.g. Cushing (height deceleration, obesity of short duration and a rapid weight gain), severe hypertension ( See Appendix C) acne or hirsuitism (but these are frequently seen in simple obesity).

3. Thyroid antibodies. (Thyroid Peroxidase antibodies) if there are family history or clinical features of hypothryoidisms.

4. Calcium and phosphate if suspicious of pseudohypoparathyroidism. – (hypocalcaemia, hyperphosphatemia, short stature, obesity, developmental delay short stature, obesity, developmental delay, short 4 and 5$^{th}$ metacarpals)

### 3.2.2.2 For co morbidity

1. To identify type 2 Diabetes and insulin resistance

   Oral Glucose Tolerance Test (OGTT) – and insulin levels at 0 and 120 mins to be taken at the same time as glucose levels

   This should be considered if

   i. BMI >98th centile and two of the following -

      - Family history (FH) of type 2 diabetes (first or second degree relative),
      - Ethnicity (South Asian, Middle –Eastern, Hispanic, Black Caribbean or Black African)
      - Clinical signs of insulin resistance (Acanthosis nigricans)

   ii All subject with extreme obesity (> 3.5 SDS )

   iii Any high risk patients – FH of type 2 diabetes, ethnicity, signs of insulin resistance, symptoms of polyuria and polydipsia

2. If there are symptoms of acne, hirsutism and menstrual irregularity, investigation for Polycystic Ovarian Disease should be considered. Take bloods for the following.

   - Adrenal Androgens (androstenedione, Dehydroepiandrosterone sulfate (DHEAS) and testosterone.
   - Follicle-stimulating hormone (FSH) and Luteinizing Hormone (LH)
   - 17-hydroxyprogesterone (17 OHP)
   - Sex hormone binding globulin (SHBG)
   - Prolactin
   - Pelvic Ultrasound Scan (USS) - if appropriate expertise is available

3. Sleep Investigation - Check for snoring, morning headaches and fatigue. If significant concern consider a formal overnight saturation study

### Treatment

The mainstay of treatment of obesity is lifestyle changes. Further treatment options should be discussed with the Paediatric Endocrine team at RMCH. Treatment for co morbidities may be required for these children, and referrals may need to be made to appropriate speciality.

## Summary

This guideline is adapted from the OSCA guideline which provides expert opinion on the assessment of obesity and its co morbidities in secondary care. The recommendations are based on best available evidence, however it must be noted that in many cases where evidence is lacking, the recommendation is based on clinical experience of the expert group.

| 4 ATTACHMENTS | |
|---|---|
| **Appendix Number** | **Title** |
| Appendix A | Main Clinical Obesity Associated Syndromes |
| Appendix B | OSCA Pathway for the Assessment of Obese Children |
| Appendix C | Hypertension and the UK blood pressure centiles |
| Appendix D | Equality Impact Assessment Tool |

| 5 PROCEDURAL DOCUMENT STORAGE (HARD AND ELECTRONIC COPIES) |
|---|
| Electronic Database for Procedural Documents |
| Held by Procedural Document and Leaflet Coordinator |

| 6 LOCATIONS THIS DOCUMENT ISSUED TO | | |
|---|---|---|
| **Copy No** | **Location** | **Date Issued** |
| 1 | Intranet | 19/12/2018 |
| 2 | Wards, Departments and Services | 19/12/2018 |

| 7 OTHER RELEVANT / ASSOCIATED DOCUMENTS | |
|---|---|
| **Unique Identifier** | **Title and web links from the document library** |
| | |

| 8 SUPPORTING REFERENCES / EVIDENCE BASED DOCUMENTS |
|---|
| **References In Full** |
| National Institute for Health and Care Excellence. (Published date: December 2006 Last updated: March 2015). Obesity prevention - CG43. Available: https://www.nice.org.uk/guidance/CG43 . Last accessed 11/12/2017. |
| OSCA (Obesity Services for Children and Adolescents) Network Group. (2009). OSCA Obesity Assessment Protocol - OSCA consensus statement on the assessment of obese children & adolescents for paediatricians. Available: https://www.cornwallhealthyweight.org.uk/OSCA_Guidelines.pdf . Last accessed 11/12/2017. |
| Royal College of Paediatrics and Child Health. Obesity. Available: https://www.rcpch.ac.uk/obesity . Last accessed 11/12/2017.<br>Viner RM, White B, Barrett T, et al. Assessment of childhood obesity in secondary care: OSCA consensus statement. Archives of Disease in Childhood - Education and Practice 2012;97:98-105 |

| 9 CONSULTATION / ACKNOWLEDGEMENTS WITH STAFF, PEERS, PATIENTS AND THE PUBLIC | | |
|---|---|---|
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| Dr Mohanty | Consultant Paediatrician | April 2018 |
| Dr Nanayakkara | Consultant Paediatrician | April 2018 |
| Dr Hopewell | Consultant Paediatrician | April2018 |

| 10 DEFINITIONS / GLOSSARY OF TERMS | |
|---|---|
| 17 OHP | 17-hydroxyprogesterone |
| ALT | Alanine Aminotransferase |
| ASO | Association for the study of Obesity |
| BMI | Body Mass Index |
| DHEAS | Dehydroepiandrosterone sulfate |
| FBC | Full Blood Count |
| FH | Familial hyperaldosteronism |
| FSH | Follicle-stimulating hormone |
| HDL | High Density Lipoprotein |
| LH | Luteinizing Hormone |
| NAFLD | Non-alcoholic fatty liver disease |
| OGTT | Oral Glucose Tolerance Test |
| OSCA | Obesity Services for Children and Adolescents |
| RCPCH | Royal College of Paediatric and Child Health |
| RMCH | Royal Manchester Children's Hospital |
| SD | standard deviations |
| SHBG | Sex hormone binding globulin |
| TSH | Thyroid-stimulating hormone |
| U+E | Urea and electrolytes |
| USS | Ultrasound Scan |

| 11 AUTHOR / DIVISIONAL / DIRECTORATE MANAGER APPROVAL | | | |
|---|---|---|---|
| **Issued By** | Dr Wing Tang, | **Checked By** | Chairperson / Divisional Management meeting / Senior Manager. |
| **Job Title** | Consultant Paediatrician | **Job Title** | |
| **Date** | 08/06/2018 | **Date** | |

## APPENDIX A: MAIN CLINICAL OBESITY ASSOCIATED SYNDROMES

Chromosomal Prader-Willi syndrome

Down's syndrome – typical facial features

Biemond syndrome (AD) - polydactyly, retinitis pigmentosa, renal failure

Aistrom syndrome (AR) – ALSM gene mutation. Obesity apparent 100% by 5 years of age, nystagmus and photophobia

Bardet-Biedl syndrome – visual loss, problem with night vision. Blind spots enlargement, blind by adolescent, polydactly, hypogonadadism and impaired sppech.

Carpenter syndrome – cranial facial abnromality, extra digit

Cohen syndrome – Small head, unusual facial features, and developmental delay

Borjeson-Forssman-Lehmann syndrome (X Linked) – normal birth weight, muscle hypotnonia, ptosis, large ears, hypogonadism, hearing loss.

### Single gene lesions affecting leptin metabolism

Congenital leptin deficiency - normal weight at birth, early onset obesity in the first few months of life, hyperphagia and hypogonadotrophic hypogonadism

Truncated leptin protein

Missense mutation in leptin

Leptin receptor mutation

Prohormone convertase 1 mutation – can present with red hair associated with adrenal insufficiency.

Melanocortin 4 receptor mutation – mutation at 18q21.32

### CLINICAL FEATURES SUGGESTING OBESITY MAY BE SECONDARY TO ANOTHER CONDITION OR SYNDROME

Severe unremitting obesity
Dysmorphic facial features

Disorders of the eyes
colobomata
retinal problems, especially retinitis pigmentosa
narrow pelpebral fissures

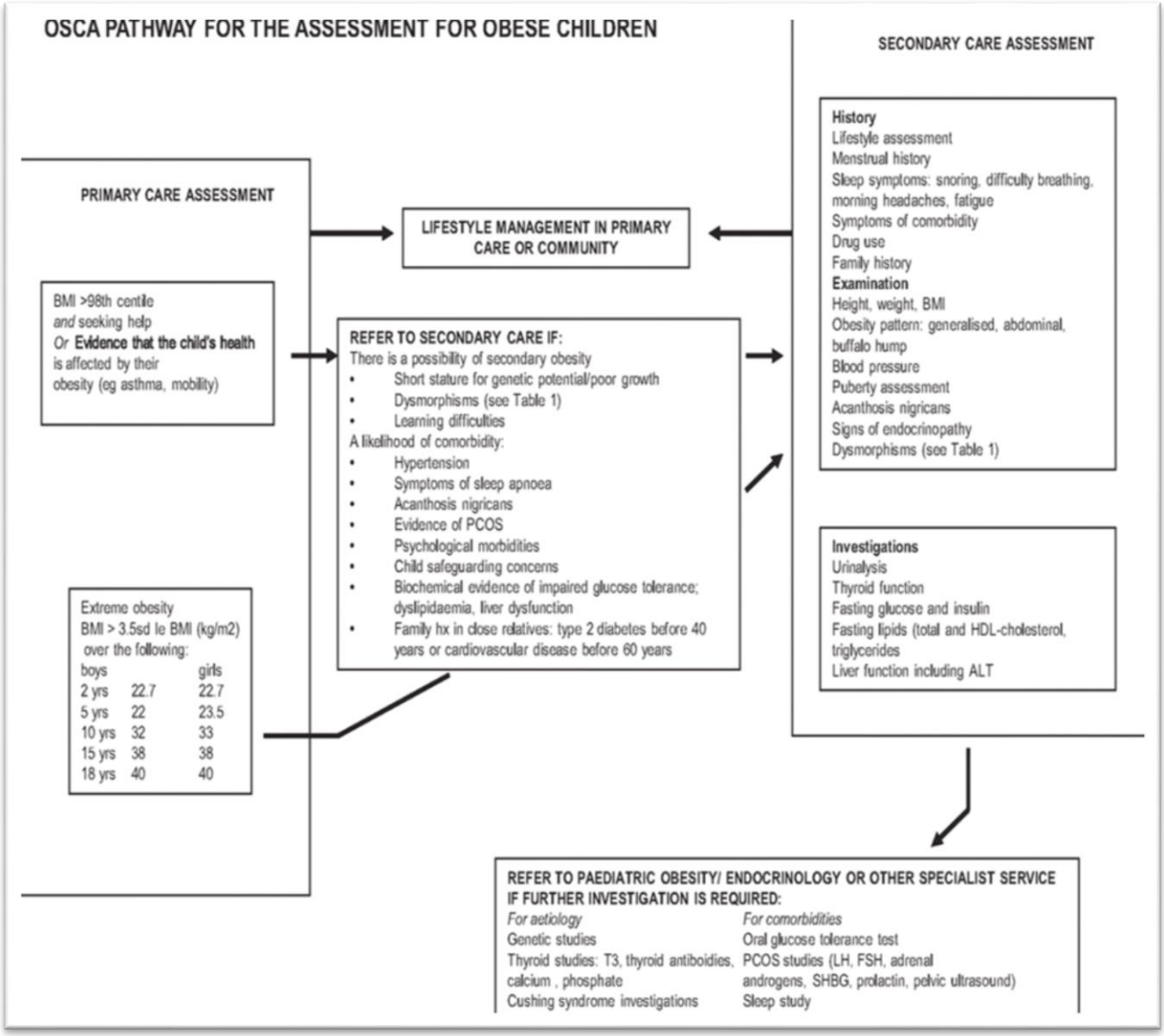
## APPENDIX A: MAIN CLINICAL OBESITY ASSOCIATED SYNDROMES

abnormally position palpebral fissures
severe squint

Skeletal abnormalities
polydactyly
syndactyly
kyphoscoliosis
Sensorineural deafness
Microcephaly and/or abnormally shaped skull

Hypotonia
Hypogonadism
cryptorchidism
micropenis
delayed puberty

## APPENDIX B: OSCA PATHWAY FOR THE ASSESSMENT FOR OBESE CHILDREN



## APPENDIX C: HYPERTENSION AND THE UK BLOOD PRESSURE CENTILES

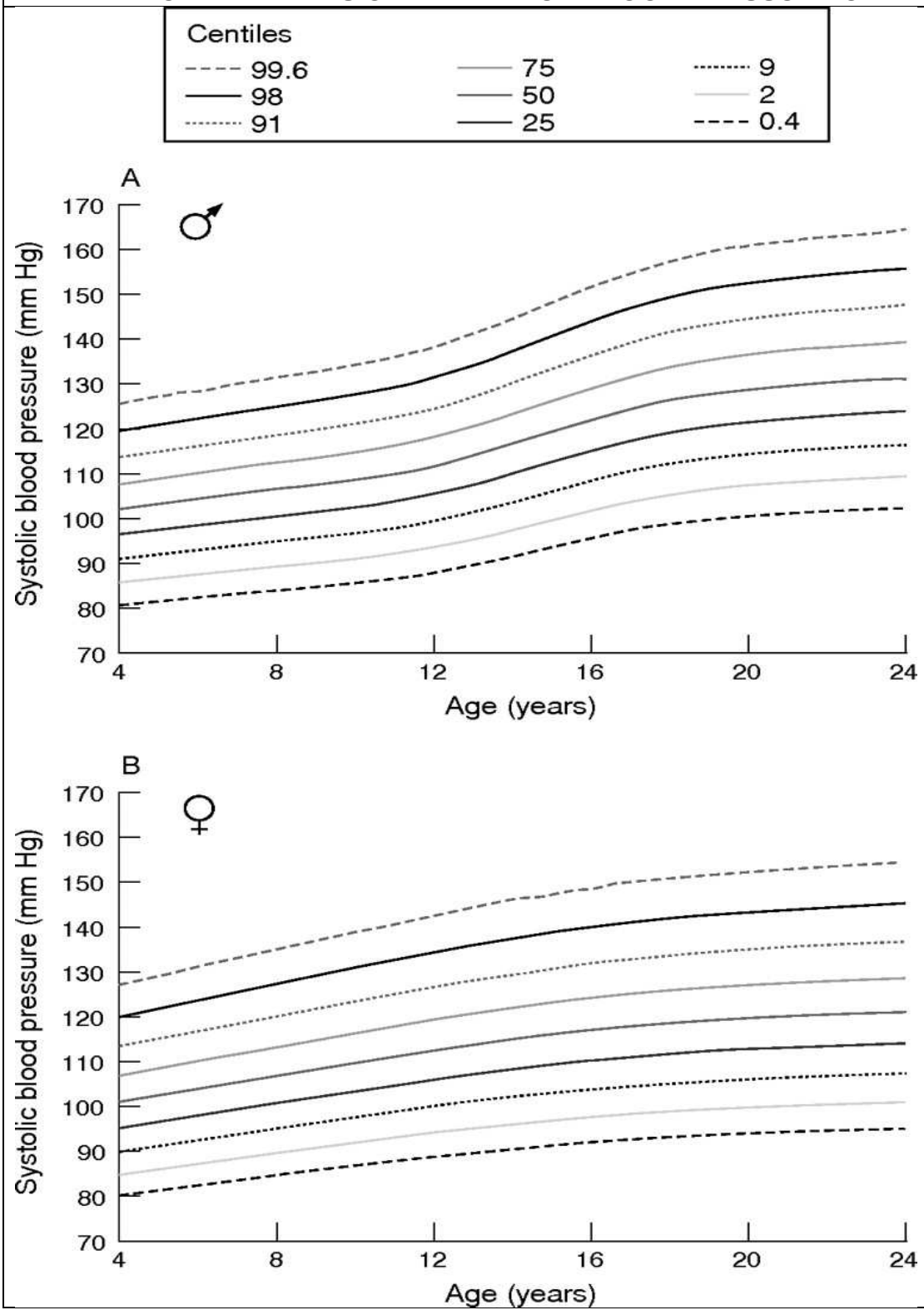
Recent recommendations suggest the following definitions are useful

1. ≥98th centile = hypertension / high blood pressure

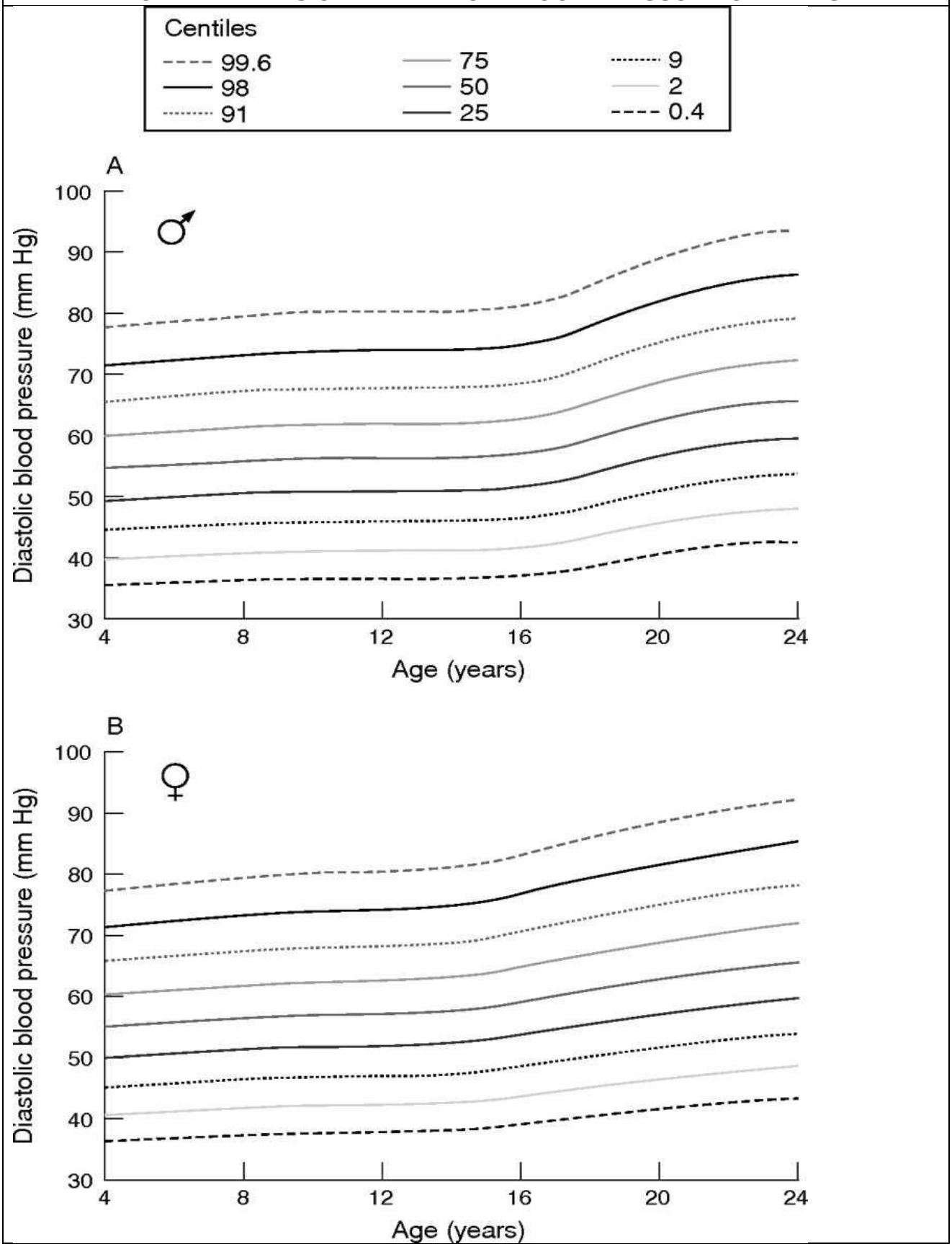
2. 91st to 98th centile = high normal BP for age

Note that the British Hypertension Society adult definition of hypertension (≥140/90 by age 24 years) represents approximately the 91st centile in 24 year old males and above the 98th centile for females.

## APPENDIX C: HYPERTENSION AND THE UK BLOOD PRESSURE CENTILES



## APPENDIX C: HYPERTENSION AND THE UK BLOOD PRESSURE CENTILES



## APPENDIX D: EQUALITY IMPACT ASSESSMENT FORM

| **Department** | Child Health | **Service or Policy** | CHILD/GUID/015 | **Date Completed:** | June 2018 |
|---|---|---|---|---|---|

**GROUPS TO BE CONSIDERED**

Deprived communities, homeless, substance misusers, people who have a disability, learning disability, older people, children and families, young people, Lesbian Gay Bi-sexual or Transgender, minority ethnic communities, Gypsy/Roma/Travellers, women/men, parents, carers, staff, wider community, offenders.

**EQUALITY PROTECTED CHARACTERISTICS TO BE CONSIDERED**

Age, gender, disability, race, sexual orientation, gender identity (or reassignment), religion and belief, carers, Human Rights and social economic / deprivation.

| **QUESTION** | **RESPONSE** | | **IMPACT** | |
|---|---|---|---|---|
| | Issue | Action | Positive | Negative |
| What is the service, leaflet or policy development?<br>What are its aims, who are the target audience? | See 'Purpose' | | | |
| Does the service, leaflet or policy/ development impact on community safety<br>• Crime<br>• Community cohesion | No | | | |
| Is there any evidence that groups who should benefit do not? i.e. equal opportunity monitoring of service users and/or staff. If none/insufficient local or national data available consider what information you need. | No | | | |
| Does the service, leaflet or development/ policy have a negative impact on any geographical or sub group of the population? | No | | | |
| How does the service, leaflet or policy/ development promote equality and diversity? | No | | | |
| Does the service, leaflet or policy/ development explicitly include a commitment to equality and diversity and meeting needs? How does it demonstrate its impact? | No | | | |
| Does the Organisation or service workforce reflect the local population? Do we employ people from disadvantaged groups | No | | | |
| Will the service, leaflet or policy/ development<br>i. Improve economic social conditions in deprived areas<br>ii. Use brown field sites<br>iii. Improve public spaces including creation of green spaces? | No | | | |
| Does the service, leaflet or policy/ development promote equity of lifelong learning? | No | | | |
| Does the service, leaflet or policy/ development encourage healthy lifestyles and reduce risks to health? | No | | | |
| Does the service, leaflet or policy/ development impact on transport? What are the implications of this? | No | | | |
| Does the service, leaflet or policy/development impact on housing, housing needs, homelessness, or a person's ability to remain at home? | No | | | |
| Are there any groups for whom this policy/ service/leaflet would have an impact? Is it an adverse/negative impact? Does it or could it (or is the perception that it could exclude disadvantaged or marginalised groups? | No | | | |
| Does the policy/development promote access to services and facilities for any group in particular? | No | | | |

## APPENDIX D: EQUALITY IMPACT ASSESSMENT FORM

| | | | | |
|---|---|---|---|---|
| Does the service, leaflet or policy/development impact on the environment<br>During development<br>At implementation? | No | | | |
| **ACTION:** | | | | |
| **Please identify if you are now required to carry out a Full Equality Analysis** | | **~~Yes~~** | **No** | **(Please delete as appropriate)** |
| **Name of Author:**<br>**Signature of Author:** | | | **Date Signed:** | |
| | | | | |
| **Name of Lead Person:**<br>**Signature of Lead Person:** | | | **Date Signed:** | |
| | | | | |
| **Name of Manager:**<br>**Signature of Manager** | | | **Date Signed:** | |
| | | | | |