GMMMG Interface Prescribing Subgroup

Shared Care Guideline for Growth Hormone in Paediatrics		Reference Number
Version: 1.2	**Replaces: 1.1**	**Issue date:** *12/09/2017*
Author(s)/Originator(s): (please state author name and department) Professor Leena Patel, CMFT Hannah Porter, Paediatric Clinical Pharmacist, The Royal Manchester Children's Hospital		**To be read in conjunction with the following documents:** Current Summary of Product characteristics (http://www.medicines.org.uk) Refer to BNFC online
Date approved by Interface Prescribing Group: *09/06/2016*	**Date approved by Greater Manchester Medicines Management Group:** *21/07/2016*	
Date approved by Commissioners: *dd/mm/yyyy*	**Review Date:** *21/07/2018*	

Please complete all sections

1. Name of Drug, Brand Name, Form and Strength

Somatropin and omnitrope

Brand	Form	Strength
Genotropin	MiniQuick Syringe	0.2mg, 0.4mg, 0.6mg, 0.8mg. 1mg, 1.2mg, 1.4mg, 1.6mg, 1.8mg, 2mg
	Cartridges	5.3mg, 12mg
Humatrope	Cartridges	6mg, 12mg, 24mg
Norditropin	Cartridges	5mg, 10mg, 15mg
NutropinAq	Cartridge	10mg
Omnitrope	Cartridges	10mg, 15mg
Saizen	Cartridgse	6mg, 12mg, 20mg
Zomacton	Cartridge	10mg

2. Licensed Indications

Please note different brands of somatropin have different licensing agreements. A licensed preparation should always be used where possible.

- Growth Hormone Deficiency (GHD)
- Turner Syndrome (TS)
- Chronic Renal Insufficiency (CRI)
- Prader-Willi Syndrome (PWS)
- born Small for Gestational Age (SGA) with subsequent growth failure at 4 years of age

	or later • Short Stature Homeobox-containing gene (SHOX) deficiency • Growth hormone deficiency post renal transplant in children (unlicensed)

Somatropin brand	GHD	TS	CRI	PWS	SGA	SHOX
Genotropin	✓	✓	✓	✓	✓	
Humatrope	✓	✓	✓		✓	✓
Norditropin	✓	✓	✓		✓	
NutropinAq	✓	✓	✓			
Omnitrope	✓	✓	✓	✓	✓	
Saizen	✓	✓	✓		✓	
Zomacton	✓	✓				

3. Criteria for shared care	Prescribing responsibility will only be transferred when ▪ Treatment is for a specified indication and duration. ▪ Treatment has been initiated and established by the secondary care specialist. ▪ The patient's initial reaction to and progress on the drug is satisfactory. ▪ The GP has agreed in writing in each individual case that shared care is appropriate. ▪ The patient's general physical, mental and social circumstances are such that he/she would benefit from shared care arrangements
4. Patients excluded from shared care	• Unstable disease state • Patient does not consent to shared care • Patient does not meet criteria for shared care
5. Therapeutic use & background	Human growth hormone is produced by the anterior pituitary gland. The synthetic form is called somatropin (recombinant human growth hormone). Human growth hormone is essential for normal growth in children. It increases growth by a direct action on the growth plates and by production of insulin-like growth factors (especially IGF-1), mainly in the liver. Human growth hormone also has important effects on the metabolism of proteins, lipids and carbohydrates, not only during childhood, but also throughout adult life. Growth failure in children can be a result of growth hormone deficiency, but also occurs in children with Turner syndrome, chronic renal insufficiency (CRI), short stature homeobox-containing gene (SHOX) deficiency, and in children born small for gestational age. **Growth hormone deficiency** occurs when the pituitary gland does not produce enough human growth hormone, which is the most common endocrine cause of short stature. Growth hormone deficiency may occur as an isolated hormonal deficiency or in combination with deficiencies in several pituitary hormones arising from hypopituitarism, tumours in the central nervous system, cranial irradiation or other physiological causes. The prevalence of growth hormone deficiency is estimated to be between 1 in 3500 and 1 in 4000 children. In about half of the children with growth hormone deficiency (50%), the cause is unknown (idiopathic growth hormone deficiency). **Turner syndrome** is a chromosomal disorder characterised by the complete or partial lack of one X chromosome in girls. The two most common clinical features are short stature and ovarian failure. Girls with Turner syndrome do not have a deficiency in human growth hormone, although they may have a relative lack of sensitivity to human growth hormone because of haploinsufficiency of the short stature homeobox-containing gene. Not all girls with Turner syndrome need treatment with somatropin. Turner syndrome occurs in between 1 in 1500 and 1 in 2500 live female births. If untreated, girls with Turner syndrome have a final adult height of 136–147 cm. Adult women with Turner syndrome are on average 20 cm shorter than other adult women.

Prader–Willi syndrome is a genetic disorder caused by an abnormality of chromosome 15. Common clinical characteristics include hypogonadism, short stature, hypotonia, dysmorphic features, hypoventilation, changes in body composition, obesity and obesity-related diseases, and behavioural problems. Prader–Willi syndrome occurs in between 1 in 15,000 and 1 in 25,000 live births. Men with Prader–Willi syndrome have a final adult height of about 154 cm; women have a final adult height of 145–159 cm.

Chronic renal insufficiency (CRI), which may include end-stage renal disease, is defined as a persistent elevation of serum creatinine and/or urea. It can be caused by a variety of conditions, including congenital disorders, glomerular disorders and infections. Growth failure associated with CRI usually begins when the glomerular filtration rate falls to 50% of normal. Not all people with CRI in childhood will be shorter than average; figures from the UK Renal Registry indicate that 29% of children who undergo renal transplantation and 41% of children on dialysis are below the 2nd percentile for height within their first year and remain so throughout childhood because of more pronounced deceleration in height velocity. Children with congenital disorders leading to CRI (approximately 60% of children with CRI) are of normal length at birth, but are below the 3rd percentile for height within their first year and remain so throughout childhood.

Various thresholds for height and weight at birth are used to define **'small for gestational age'**, the three most commonly used being:

a height at birth that is 2 standard deviations or more below the population average, or

a weight at birth that is 2 standard deviations or more below the population average, or

a weight at birth below the 10th percentile.

In addition to accurate measurements of a newborn's weight, length and head circumference, the diagnosis of small for gestational age requires accurate assessment of gestational age and valid data from a reference population. The international consensus definition of 'small for gestational age' is a length or weight at birth that is 2 standard deviations below (−2 SD) the population average for birth or weight. The licensed indication for somatropin is for growth disturbance (current height standard deviation score [SDS] −2.5 and parental adjusted height SDS −1) in short children born small for gestational age, with a birth weight and/or length below −2 SD, who failed to show catch-up growth (height velocity SDS less than 0 during the past year) by 4 years of age or later. Children classified as born small for gestational age may have concurrent diagnoses such as familial short stature, Turner syndrome, or growth hormone deficiency. Approximately 10% of children born small for gestational age do not reach the normal height range. Those whose growth has not caught up by 4 years of age are candidates for treatment with growth hormone.

The short stature homeobox-containing gene (SHOX) is located on the distal ends of X and Y chromosomes and plays a role in long bone growth. Normal growth requires two functional copies of the gene. Consequently, growth impairment can occur if one copy of the SHOX gene has been inactivated by mutation or deleted (haploinsufficiency). SHOX deficiency can cause short stature in people with conditions such as Turner syndrome, Leri–Weil syndrome and dyschondrosteosis. Based on a small study (26 people with SHOX haploinsufficiency compared with 45 of their unaffected relatives), children with SHOX haploinsufficiency were 3.8 cm shorter (2.1 standard deviations shorter) than their unaffected relatives and this difference persisted throughout their childhood.

Somatropin (recombinant human growth hormone) is currently the only active treatment option for growth failure in children with growth hormone deficiency, Turner syndrome, CRI, Prader–Willi syndrome, in short children born small for gestational age and in children with SHOX

	deficiency. The place of somatropin in the treatment pathway depends on the child's particular condition, his or her age at diagnosis and the licensed indications of the seven somatropin preparations that are available for use in UK practice. For girls with Turner syndrome, oxandrolone, an anabolic steroid, may be added to growth hormone treatment. In the UK, conservative strategies for the management of growth failure in children with CRI include advice on diet and nutritional supplementation. Reference Human growth hormone (somatropin) for the treatment of growth failure in children NICE technology appraisal guidance [TA188] Published date: 26 May 2010
6. Contraindications (please note this does not replace the SPC or BNF and should be read in conjunction with it).	• Evidence of current or potential tumour growth • Not to be used after renal transplantation • Not to be used for growth promotion in children with closed epiphyses (or near closure in Prader- Willi syndrome) • Severe obesity or severe respiratory syndrome in Prader- Willi syndrome • Patients with acute critical illness suffering complications following open heart surgery, abdominal surgery, multiple accidental trauma, acute respiratory failure or similar conditions must not be treated with somatropin • Hypersensitivity to the active substance or to any of the excipients. • Paediatricians should pay particular attention when giving somatropin to children with diabetes mellitus or its risk factors, slipped capital epiphyses, idiopathic intracranial hypertension
7. Prescribing in pregnancy and lactation	This drug cannot be prescribed in the pregnant or breastfeeding patient. Under these circumstances prescribing should be the responsibility of the Specialist.
8. Dosage regimen for continuing care	***Route of administration*** Subcutaneous injection

Preparations available (include in this section any necessary information relating to availability of special preparations for children or those with swallowing difficulties)

Brand	Form	Strength
Genotropin	MiniQuick Syringe	0.2mg, 0.4mg, 0.6mg, 0.8mg. 1mg, 1.2mg, 1.4mg, 1.6mg, 1.8mg, 2mg
	Cartidges	5.3mg, 12mg
Humatrope	Cartridge	6mg, 12mg, 24mg
Norditropin	Cartridges	5mg, 10mg, 15mg
NutropinAq	Cartridge	10mg
Omnitrope	Cartridge	10mg, 15mg
Saizen	Cartridge	6mg, 12mg, 20mg
Zomacton	Cartridge	10mg

Please prescribe:

Diagnosis	Doses: microgram/kg/day	$mg/m^2/day$
GH deficiency	23 to 39	0.7 to 1
Turner syndrome	45 to 50	1.4
Chronic renal insufficiency	45 to 50	1.4
Prader-Willi syndrome (PWS)	35 (max dose 2.7mg daily)	1
Small for gestational age (SGA)	35	1
SHOX deficiency	45 to 50	-

Somatropin is self-administered or given to the child by an adult, at home, usually as a subcutaneous injection, 6–7 times a week.
GH should not be stopped by default, however treatment should be discontinued if any of the following apply:

- growth velocity increases less than 50% from baseline in the first year of treatment
- final height is approached and growth velocity is less than 2 cm total growth in 1 year
- there are insurmountable problems with adherence
- final height is attained.
- In Prader–Willi syndrome evaluation of response to therapy should also consider body composition.
- Treatment should not be discontinued by default. The decision to stop treatment should be made in consultation with the patient and/or carers either by:
- a paediatrician with specialist expertise in managing growth hormone disorders in children, or
- an adult endocrinologist, if care of the patient has been transferred from paediatric to adult services.

Is titration required		**No**

Adjunctive treatment regime:
In patients with Prader-Willi syndrome, treatment should always be in combination with a calorie-restricted diet.

Conditions requiring dose reduction:
e.g. impaired renal/ liver function
There is no information on the use of growth hormone in renal, hepatic or cardiac insufficiency.

Usual response time :
A noticeable linear growth response is expected 3-6 months after starting treatment.

Duration of treatment:
Until near final adult height is attained (height velocity <2cm/year when the patient is at an advanced stage of pubertal development)

Treatment to be terminated by:
The tertiary care specialist

NB. All dose adjustments will be the responsibility of the initiating specialist care unless directions have been specified in the medical letter to the GP.

9.Drug Interactions

For a comprehensive list consult the BNF or Summary of Product Characteristics

The following drugs must not be prescribed without consultation with the specialist:

Glucocorticoids: Concomitant treatment with glucocorticoids may inhibit the growth-promoting effects of somatropin containing products.

The following drugs may be prescribed with caution:

Insulin: Somatropin may reduce insulin sensitivity. For patients with diabetes mellitus, the insulin dose may require adjustment after somatropin therapy is instituted. Patients with diabetes, glucose intolerance, or additional risk factors for diabetes should be monitored closely during somatropin therapy.

Some manufacturers found that somatropin may increase the clearance of drugs that are metabolised by cytochrome P450 isoenzymes, in particular CYP3A4. They therefore predict that somatropin may increase the clearance of these drugs and reduce their levels. Until clinical data are available, it would seem prudent to bear the possibility of an interaction in mind.

10. Adverse drug reactions

For a comprehensive list (including rare and very rare adverse effects), or if significance of possible adverse event uncertain, consult Summary of Product Characteristics or BNF

Specialist to detail below the action to be taken upon occurrence of a particular adverse event as appropriate. Most serious toxicity is seen with long-term use and may therefore present first to GPs.

If the patient experiences an adverse event, inform the Paediatric Endocrine team.

Adverse event System – symptom/sign	**Action to be taken** Include whether drug should be stopped prior to contacting secondary care specialist	**By whom**
Local discomfort at the site of injection	This can be avoided by varying the injection site.	GP
Headache may be noted transiently in some patients on higher dosage regimens. Rarely benign intracranial hypertension has been reported.	This is rare. It is less likely to occur if treatment is started with a relatively low dose and that is what the Paediatric Endocrine team will initiate. If nature of the symptoms suggests raised intracranial pressure treatment to be stopped while awaiting further advice from the Paediatric Endocrine team.	GP
Peripheral oedema, especially in girls with Turner syndrome who have a history of lymphoedema	Inform Paediatric Endocrine team	GP
Slipped upper femoral epiphyses (SUFE)	This is rare. If nature of the symptoms suggests SUFE treatment to be stopped while awaiting further advice from the Paediatric Endocrine team.	GP

Hyperglycaemia and Ketosis	In children with existing diabetes, glycaemic control and insulin therapy may need readjustment	GP / Paediatric diabetes team
Sleep aponea and upper airway obstruction (including onset of or increased snoring)	Treatment to be interrupted until and new ENT assessment has been performed	GP/ Endocrine consultant
Visual problems	Inform Paediatric Endocrine team	GP
Nausea and vomitting	Inform Paediatric Endocrine team	GP
Arthralgia	Inform Paediatric Endocrine team	GP
Hypothyroidism	Thyroid status will be regularly monitored by Paediatric Endocrine team. Inform Paediatric Endocrine team	GP
Myalgia	Inform Paediatric Endocrine team	GP
Carpal tunnel syndrome	Rare in children and adolescents. Inform Paediatric Endocrine	GP
Paraesthesia	Inform Paediatric Endocrine team	GP
Antibody formation	Exceedingly rare. Inform Paediatric Endocrine team	GP

The patient should be advised to report any of the following signs or symptoms to their GP without delay:

- Troublesome headache, irritability and/or vomiting and especially if these occur on waking up in the morning
- Pain in the hip or pain referred to the knee, which is persistent, restricts mobility/movement and affects gait (limping)

Patients and their carers will be given contact telephone numbers and instructed to contact the Paediatric Endocrine team in the first instance. The team are available during routine working hours. In addition, the team are also available out of hours in case of any emergencies.

Other important co morbidities (e.g. Chickenpox exposure). Include advice on management and prevention and who will be responsible for this in each case:

Hypothyroidism: Growth hormone increases the extrathyroidal conversion of T4 to T3 and may, as such, unmask incipient hypothyroidism. Monitoring of thyroid function should therefore be conducted in all patients, and this will be done by the Paediatric Endocrine team. In patients with hypopituitarism, standard replacement therapy must be closely monitored when somatropin

	therapy is administered. Somatropin may reduce insulin sensitivity. For patients with diabetes mellitus, the insulin dose may require adjustment after somatropin therapy is instituted. Patients with diabetes, glucose intolerance, or additional risk factors for diabetes should be monitored closely during somatropin therapy.
	Any adverse reaction to a black triangle drug or serious reaction to an established drug should be reported to the MHRA via the "Yellow Card" scheme.
11.Baseline investigations	*List of investigations / monitoring undertaken by secondary care* • Clinical assessment including height and weight at each clinic review • Blood IGF-I before starting treatment and thereafter at least once a year while on treatment • Thyroid function before starting treatment and thereafter to be monitored regularly in those patients on thyroxine replacement, who have GHD or Turner syndrome. • Before initiation of treatment with somatropin in patients with Prader-Willi syndrome, signs for upper airway obstruction, sleep apnoea, or respiratory infections should be assessed.

12. Ongoing monitoring requirements to be undertaken by GP and specialist

Is monitoring required?	**Yes or No (if yes complete following section)**			Yes
Monitoring	**Frequency**	**Results**	**Action**	**By whom**
Monitor for side-effects			See section 10: adverse reactions	GP
Sleep apnoea should be assessed before onset of growth hormone treatment by recognised methods such as polysomnography or overnight oxymetry, and monitored if sleep apnoea is suspected. All patients with Prader-Willi syndrome should be monitored for sleep apnoea. Patients should be monitored for signs of respiratory infections, which should be diagnosed as early as possible and treated aggressively.	History suggestive of sleep apnoea and respiratory symptoms will be elicited from parents/carers at each 4-monthly clinic follow-up Weight monitoring and advice will be given at each 4-monthly clinic follow-up		If during treatment with somatropin patients show signs of upper airway obstruction (including onset of or increased snoring), treatment should be interrupted, and a new ENT assessment performed	Paediatric Endocrinologist

	All patients with Prader-Willi syndrome should also have effective weight control before and during growth hormone treatment.				
	Scoliosis is common in patients with Prader-Willi syndrome. Scoliosis may progress in any child during rapid growth.	Signs of scoliosis will be monitored during treatment at each 4-monthly clinic follow-up		If patient has scoliosis, opinion will be sought from the Paediatric Spinal surgeon	Paediatric Endocrinologist
13. Pharmaceutical aspects	*e.g. special storage requirements, washout periods Or where there are "no special considerations"* Products should be stored in a refrigerator (2° C to - 8° C) and kept in the outer carton in order to protect from light				
14. Responsibilities of initiating specialist	• Initiate treatment and prescribe until dose is stable • Undertake baseline monitoring. • Dose adjustments. • Choose the most cost-effective device taking into account patient choice. • Reinforce calorie-restricted diet for Prader Willi patients • Monitor patient's initial reaction to and progress on the drug. • Ensure that the patient has an adequate supply of medication until GP supply can be arranged. • Patients will be considered suitable for transfer to GP prescribing ONLY when they meet the criteria listed in section 3 above. • The consultant team will write formally to the GP to request shared care using the GMMMG agreed process. Failure to supply all the required information will result in the refusal of the request until all information has been supplied • Patients will only be transferred to the GP once the GP has agreed. • Continue to monitor and supervise the patient according to this protocol, while the patient remains on this drug, and agree to review the patient promptly if contacted by the GP • Provide GP with diagnosis, relevant clinical information and baseline results, treatment to date and treatment plan, duration of treatment before consultant review and revised plans after review. • Provide GP with details of outpatient consultations, ideally within 14 days of seeing the patient or inform GP if the patient does not attend appointment. • Provide GP with advice on when to stop this drug. • Act upon communication from the GP in a timely manner. • Provide patient with relevant drug information to enable Informed consent to therapy. • Provide patient with relevant drug information to enable understanding of potential side effects and appropriate action. • Provide patient with relevant drug information to enable understanding of the role of monitoring. • Provide patient with monitoring booklet where appropriate. • Be available to provide patient specific advice and support to GPs as necessary. • Training of parents and/or patients in technique of growth hormone injection.				

15. Responsibilities of the GP	• Continue treatment as directed by the specialist. • Act upon communication from the specialist in a timely manner. • Ensure no drug interactions with concomitant medicines. • To monitor and prescribe in collaboration with the specialist according to this protocol. • To ensure that the monitoring and dosage record is kept up to date (if applicable). • Symptoms or results are appropriately actioned, recorded and communicated to secondary care when necessary. • GPs should reply to request for shared care to either accept or decline within 14 days. A form is available on the GMMMG website to facilitate this, if you so wish. • If the GP does not feel it is appropriate to take on the prescribing then the prescribing responsibilities will remain with the specialist. The GP should indicate the reason for declining. • Enter a READ code (8BM5.00) on to the patient record to highlight the existence of shared care for the patient. • Monitor the patient's general wellbeing. • Inform the consultant immediately if a patient has become pregnant or is planning to become pregnant for treatment options to be considered • Notify the consultant of any circumstances that may preclude the use of growth hormone for example, the use of illicit drugs or contraindications to treatment. • Seek urgent advice from secondary care if: ➢ Non- compliance is suspected ➢ Adverse effects are suspected ➢ There is marked deterioration in the patient's condition • The shared care agreement will cease to exist, and prescribing responsibility will return to secondary care, where: ➢ The clinical situation deteriorates such that the shared care criterion of stability is not achieved. ➢ The clinical situation requires a major change in therapy. ➢ The patient is a risk to self or others ➢ GP feels it to be in the best stated clinical interest of the patient for prescribing responsibility to transfer back to the Consultant. The Consultant will accept such a transfer within a timeframe appropriate to the clinical circumstances. There must be discussion between the consultant team and GP on this matter and agreement from the consultant team to take back full prescribing responsibility for the treatment of the patient. The consultant team should be given 14 days' notice in which to take back prescribing responsibilities from primary care.
16. Responsibilities of the patient	• To take medication as directed by the prescriber, or to contact the GP if not taking medication • To attend hospital and GP clinic appointments. • Failure to attend will result in medication being stopped (on specialist advice). • To report adverse effects to their Specialist or GP.

17.Additional Responsibilities e.g. Failure of patient to attend for monitoring, Intolerance of drugs, Monitoring parameters outside acceptable range, Treatment failure, Communication failure	**List any special considerations**	**Action required**	**By whom**	**Date**

	Failure of patient to attend specialist clinic for monitoring	The Paediatric Endocrine team will contact the family and rearrange the appointment. The GP will be informed if there is persistent failure to attend.	Specialist	
	Treatment to be stopped (patient has reached near final adult height OR lack of response to treatment OR noncompliance OR adverse effects)	The Paediatric Endocrine Team will inform the GP	Specialist	
18. Supporting documentation	The SCG must be accompanied by a patient information leaflet- see Appendix 2			
19. Patient monitoring booklet (may not be applicable for all drugs)	The patient must receive a monitoring booklet from the specialist upon initiation of treatment. The patient must bring this booklet to all specialist and GP appointments where it will be updated by the health professional conducting the appointment. The patient must also produce the booklet to any health professional involved in other aspects of their care e.g. pharmacists and dentists.			
20. Contact details	See Appendix 1			

Appendix 1 – Local Contact Details

Lead author contact information	**Name:** Professor Leena Patel
	Email: leena.patel@cmft.nhs.uk
	Contact number: 01617011632
	Organisation: Central Manchester University Hospitals NHS Foundation Trust

Commissioner contact information	**Name:** *[insert text here]*
	Email: *[insert text here]*
	Contact number: *[insert text here]*
	Organisation: *[insert text here]*

Secondary care contact information	**If stopping medication or needing advice please contact:**
	Dr Indi Banerjee, Dr Raja Padidela, Dr Mars Skae, Prof Leena Patel, Prof Peter Clayton
	Contact number: 01617011632
	Fax:01617011631
	Hospital: Royal Manchester Children's Hospital, Central Manchester University Hospitals NHS Foundation Trust

Appendix 2 – Patient Information Leaflets

GENOTROPIN® 5.3 mg and 12 mg powder and solvent for solution for injection:
https://www.medicines.org.uk/emc/PIL.23424.latest.pdf

Genotropin MiniQuick 0.2mg, 0.4mg, 0.6mg, 0.8mg, 1.0mg, 1.2mg, 1.4mg, 1.6mg, 1.8mg, 2.0mg powder and solvent for solution for injection:
https://www.medicines.org.uk/emc/PIL.10438.latest.pdf

Humatrope® 6 mg/ 12 mg/ 24 mg powder and solvent for solution for injection:
https://www.medicines.org.uk/emc/PIL.2340.latest.pdf

Norditropin® SimpleXx® 10 mg/1.5 ml solution for injection in cartridge:
https://www.medicines.org.uk/emc/PIL.2847.latest.pdf

Norditropin® SimpleXx® 15 mg/1.5 ml solution for injection in cartridge:
https://www.medicines.org.uk/emc/PIL.2848.latest.pdf

Norditropin® SimpleXx® 5 mg/1.5 ml solution for injection in cartridge:
https://www.medicines.org.uk/emc/PIL.2846.latest.pdf

NutropinAq 10 mg/2 ml (30 IU) solution for injection:
https://www.medicines.org.uk/emc/PIL.14245.latest.pdf

Omnitrope 10 mg/1.5 ml solution for injection:
https://www.medicines.org.uk/emc/medicine/28239

Omnitrope 15 mg/1.5 ml solution for injection:
https://www.medicines.org.uk/emc/medicine/30397

Saizen 5.83 mg/ml solution for injection:
https://www.medicines.org.uk/emc/PIL.26384.latest.pdf

ZOMACTON 10mg/ml, powder and solvent for solution for injection:
https://www.medicines.org.uk/emc/PIL.21685.latest.pdf

Shared Care Guideline Summary:
Somatropin for the treatment of Growth Hormone Deficiency; Turner Syndrome; Chronic Renal Insufficiency; Prader-Willi Syndrome; born Small for Gestational Age with subsequent growth failure at 4 years of age or later; Short Stature Homeobox-containing gene deficiency

Drug	Somatropin
Indication	Growth Hormone Deficiency (GHD) ; Turner Syndrome (TS); Chronic Renal Insufficiency (CRI); Prader-Willi Syndrome (PWS); born Small for Gestational Age (SGA) with subsequent growth failure at 4 years of age or later; Short Stature Homeobox-containing gene (SHOX) deficiency; Growth hormone deficiency post renal transplant in children (unlicensed)
Overview	***Growth hormone deficiency (GHD***) GHD is the commonest endocrine disorder presenting with short stature. The clinical diagnosis of GHD includes short stature, slow growth (a documented height velocity (HV) below the 25th centile for at least one year), and delayed bone age. In severe GHD the HV may be < 4 cm/year. Affected children have increased skin folds; appear plump with immature faces, small hands, feet and genitalia. Milder forms may remain unrecognised until the child is older. The diagnosis of GHD is supported by a peak plasma GH level <7 mcg/L to 1 or 2 stimulation tests (stimulation with arginine or glucagon). ***Turner syndrome (TS)*** Incidence of TS is 1 in 2000 live born females. The majority (80-100%) have short stature with a reduction in FH of 20-21cm, and a mean untreated FH of 136-147 cm. Patients show mild intra-uterine growth retardation, poor growth during infancy and childhood, and blunted pubertal growth spurt. Dysmorphic features are often present. ***Chronic renal insufficiency (CRI)*** Growth failure in CRI is multi-factorial, with one of the factors thought to be reduced sensitivity to GH rather than decreased GH levels. ***Prader-Willi syndrome (PWS)*** The syndrome is characterised by hyperphagia, hypogonadism, short stature, dysmorphism, hypoventilation and behavioural problems. Mean FH is approximately 154 cm in males and 145-149 cm in females. GH therapy results in improvements in height, body composition, and muscle strength. ***Small for gestational age (SGA)*** GH is licensed for children born SGA (birth weight and/or length below –2 SD (2nd centile), who fail to show catch-up growth (height velocity < 0 during the last year) by 4 years of age or later, and who are short both compared to their peers (height < -2.5 SD) and parents (parental adjusted height < -1 SD).
Specialist's Responsibilities	**Initial investigations:** Dependent upon indication **Initial regimen:**

Diagnosis	Doses: µg/kg/day	mg/m^2/day
GH deficiency	23 to 39	0.7 to 1
Turner syndrome	45 to 50	1.4
Chronic renal insufficiency	45 o 50	1.4
Prader-Willi syndrome (PWS)	35 (max dose 2.7mg)	1
Small for gestational age (SGA)	35	1
SHOX deficiency	45 to 50	-

Clinical monitoring: Provision of 3 to 6 monthly review appointments
Frequency: 3 to 6 monthly
Safety monitoring:
Prescribing duration: Until near final adult height is attained (height velocity <2cm/year when the patient is at an advanced stage of pubertal development)
Prescribing details: Specialist initiated. Transferred to the GP once stabilised.

	Documentation: The consultant team will write formally to the GP to request shared care using the GMMMG agreed process. Patients will only be transferred to the GP once the GP has agreed. Provide GP with diagnosis, relevant clinical information, treatment plan, duration of treatment with 14 days of seeing the patient or inform GP if the patient does not attend appointment.
GP's Responsibilities	**Maintenance prescription:** Prescribe somatropin in accordance with the specialist's recommendations. **Clinical monitoring:** To report to and seek advice from the specialist on any aspect of patient care which of concern to the GP and may affect treatment **Safety monitoring:** Monitor for adverse effects. **Duration of treatment:** Until near final adult height is attained (height velocity <2cm/year when the patient is at an advanced stage of pubertal development) **Documentation:** GPs should reply to request for shared care to either accept or decline within 14 days. A form is available on the GMMMG website to facilitate this, if you so wish.
Adverse Events	If the patient experiences an adverse event, inform the Paediatric Endocrine team.

	Action
Local discomfort at the site of injection	This can be avoided by varying the injection site.
Headache may be noted transiently in some patients on higher dosage regimens. Rarely benign intracranial hypertension has been reported.	This is rare. It is less likely to occur if treatment is started with a relatively low dose and that is what the Paediatric Endocrine team will initiate. Treatment to be stopped if nature of the symptoms suggests raised intracranial pressure.
Peripheral oedema, especially in girls with Turner syndrome who have a history of lymphoedema	Inform Paediatric Endocrine team
Slipped upper femoral epiphyses	This rare. Treatment to be stopped if symptoms are suggestive of this.
Hyperglycaemia and Ketosis	In children with existing diabetes, glycaemic control and insulin therapy may need readjustment.

Contra-indications Cautions Drug Interactions	Please refer to the BNFC online and/or SPC for information
Other Information	
Contact Details	**Name:** *[insert text here]* **Address:** *[insert text here]* **Telephone:** *[insert text here]*