Insights into MAnaging Growth for Endocrine Nurses

18-19 October 2018, Marseille, France

An Independent Medical Education Event for Paediatric Nurses

MEETING REPORT

IMAGE 2018: Insights into MAnaging Growth for Endocrine Nurses

This year's IMAGE conference took place in Marseille, France and was attended by nurses from France, Germany, Finland, Switzerland, Estonia, Canada and the UK.

Our main focus this year was disorders of the thyroid gland, but we also revisited the transitional care of patients with growth hormone disorders and adherence to growth hormone, and had our first visit from a professional development coach for an introduction to assertive communication and motivational interviewing.

We hope you enjoyed the sessions and gained new knowledge to support your practice. Here we provide a recap of the key points of this year's presentations.

Why children need a thyroid gland

In the opening presentation, Juliane Léger, from Robert Debré University Hospital in Paris, France, outlined the critical role of the thyroid gland for normal development.

Thyroid hormone is essential for brain development and cognitive function, growth and bone maturation, and for metabolic regulation, and the need for optimal levels begins well before birth. Many critical events of brain development occur during the first two trimesters of gestation, before the foetus begins to produce sufficient quantities of its own thyroid hormone, so optimal levels of maternal thyroid hormone are essential.

Maternal hypothyroxinaemia due to iodine insufficiency, for example, results in "profound" cognitive impairment in children, and there is a U-shaped association between maternal thyroid hormone levels within the normal range and offspring IQ, with both low and high levels associated with lower IQ at age 6–8 years.

Further support for the relationship between thyroid hormone and cognition comes from research showing that birth screening for congenital hypothyroidism was associated with a significant increase in patients' average IQ and eliminated the occurrence of IQs below 70.

Léger thus described screening as a "public health triumph".

When acquired during childhood, hypothyroidism results in impaired growth, but treating the disorder results in "dramatic" catch-up growth, noted Léger.

There are multiple consequences of inadequate treatment, including effects on puberty, fertility and social functioning and an increased risk of cardiometabolic comorbidities.

At the other end of the scale, maternal hyperthyroidism can result in severe intrauterine growth retardation and severe tachycardia. However, Léger said that, while thyroid hormone can cross the placenta, so too can the drugs used to treat hyperthyroidism, "so we can treat the foetus by treating the mother".

The role of the nurse

The responsibilities of paediatric endocrine nurses vary between countries, but in some, such as the UK, nurses can have a leading role in the care of thyroid patients.

Sue Sparrow, from Cambridge University NHS Foundation Trust in the UK, discussed the nurse-led thyroid clinic in which she works, outlining its development from the initial business plan to the current situation of ensuring ongoing improvement. The nurses see patients over the age of 2 years with congenital or acquired hypothyroidism and no other hormone deficiencies, and aim to deliver an "all in one" service, so that patients can attend and have their auxology, blood tests and consultation done during one visit. The nurses can adjust medication doses if required.

Sparrow said that such a clinic has benefits for nurses:

- Raises their profile
- Aids staff development
- Provides extra appointment slots
- Generates income

And also for patients:

- Provides continuity of care.
- Offers prompt test results and medication dose adjustments.
- Facilitates appointments for repeat blood tests.

She said that patients and their families have reacted favourably to being seen in the nurse-led clinic. However, she stressed the need to ensure that support is available, in the form of emergency help for unexpected events and unwell patients as well as specialist play support and experienced phlebotomy.

Paediatric hypothyroidism

In his presentation on hypothyroidism, Tim Cheetham (Newcastle-upon-Tyne Hospitals, UK) revealed that one of the "games we play" in his team's post-clinic meetings is to list all possible causes of an elevated thyroid-stimulating hormone (TSH) concentration in children.

The thyroid in practice

Case study 1: when multidisciplinary care is essential

Lee Martin, from the Royal London Hospital in the UK, outlined a case in which hypothyroidism was a consequence of treatment for a rare but serious genetic condition. The patient had multiple endocrine neoplasia type 2B (MEN-2B), which requires prophylactic thyroidectomy because of very aggressive medullary thyroid carcinoma.

At presentation, aged 3.4 years, thyroid hormones were normal but calcitonin was very high, due to C-cell hyperplasia. But MEN-2B affects multiple systems; this patient had chronic constipation since birth (the primary symptom of concern), lesions on the upper lip and lower eyelid and possible achalasia, and MEN-2B can also affect the adrenals.

For this reason, Martin stressed the need for multidisciplinary care, involving an endocrinologist, surgeon, geneticist, psychologist and nurse. He advised liaison with the adult team, who will have more experience of the condition.

Some inclusions in his list of 20 possible causes were:

- iodine deficiency;
- adrenal insufficiency;
- thyroid hormone resistance;
- obesity;
- radiotherapy;
- pseudohypoparathyroidism; and
- congenital hypothyroidism.

"It just really highlights the fact that we have to engage brain", said Cheetham. "Not all raised TSH concentrations will be autoimmune thyroid disease."

He noted the case of a child in the UK who died of adrenal crisis due to undiagnosed Addison's disease, having been under review for some time for tiredness and mildly elevated TSH.

Cheetham also stressed that TSH levels alone are not always an ideal diagnostic indicator for hypothyroidism; they are likely to be elevated in primary hypothyroidism, including subclinical, but not in secondary hypothyroidism in which there is a wide range of possible levels.

Free T4 will be low in both primary and secondary hypothyroidism, but not necessarily in subclinical forms, and free T3 is affected only in euthyroid patients with severe illnesses such as diabetic ketoacidosis.

In addition, Cheetham stressed that TSH levels are naturally high in very young children, so when clinicians interpret results they need to consider whether their reference range is based on adult or paediatric measurements.

Cheetham illustrated a number of points using case studies. These included a baby with congenital hypothyroidism and an ectopic thyroid gland that, stimulated by elevated TSH, caused stridor breathing.

Another patient with low free T4 and only mildly elevated TSH looked pale and "not quite right", and proved to have iodine deficiency caused by a very restrictive diet.

A third case was a clear-cut instance of autoimmune hypothyroidism. Cheetham noted that the absent thyroid gland and consequent high TSH levels can cause patients to develop and present with severe symptoms that might not immediately suggest hypothyroidism, such as abdominal pain due to enlarged ovaries, visual problems due to an enlarged pituitary gland and slipped capital femoral epiphysis.

Treatment is essential for these patients, but there are caveats such as behavioural changes, the need for multiple adjustments while determining the optimal dose and the fact that these children are unlikely to achieve their ideal final height.

The thyroid in practice

Case study 2: a thyroid storm

The message from Christine Davies (Children's Hospital for Wales, UK) was to never underestimate the damage an overactive thyroid gland can cause. She presented a rare case of a patient who experienced a "thyroid storm", with free T4 levels greater than 100 pmol/L, accompanied by tachycardia, fever, palpitations and diarrhoea.

At her initial hospital examination, the patient, who was 6 years old, had cardiac failure and a left ventricular thrombus, and during treatment in the paediatric intensive care unit, she also had two ischaemic strokes. After discharge, she required physiotherapy and speech therapy, and the experience had a marked psychological impact on the child and her family.

Two cases Cheetham presented raised the question of whether to treat mildly elevated TSH. The patient in the first instance had abundant free T4 but mildly elevated TSH as part of Down's syndrome, and there is evidence that treating elevated TSH does not benefit these patients.

In the second case, of mild autoimmune thyroid disease, the patient was in her teens and had elevated TSH but free T3 and T4 within the normal ranges. Here the evidence is not clear, because there are good reasons to treat, such as combatting tiredness and guarding against deterioration of the condition, but also good reasons to not treat, including the bother of taking medication and the that fact mild autoimmune thyroid disease can spontaneously resolve.

And a recent study showed no differences in life quality, mood or cognition if patients were treated versus not treated.

This emphasises the need to involve adolescents in the decision-making process, to make them aware that treatment may make them feel no different, to ensure a trial of no treatment and to follow them up to see if the condition resolves.

Clinicians should "manage the family, not the TSH", said Cheetham. "Giving drugs is easy, but taking them is a lot more difficult."

Paediatric hyperthyroidism

Juliane Léger then returned to give an overview of hyperthyroidism in children. She stressed that 98% of cases relate to Graves' disease, but there are other possible causes, including thyroiditis, McCune Albright syndrome, pituitary tumours and genetic and exogenous causes.

Even Graves' disease itself is very rare in children – the one in 10,000 children who develop it account for only approximately 5% of all cases. Most cases in children occur during adolescence and in females, and 20% of cases are familial.

Graves' disease signs and symptoms include:

- tachycardia;
- goiter;
- hyperactivity;
- change in behaviour;

- disturbed sleep;
- staring eyes/protrusion of the eyes;
- diarrhoea; and
- increased appetite without weight gain.

Léger noted that a decline in academic performance is also common and that children present with increased height velocity and advanced bone age. Graves' disease often presents in conjunction with other autoimmune diseases such as type 1 diabetes, coeliac disease and rheumatoid arthritis.

Overall, symptoms are very variable, meaning that children will often have seen several other specialists before reaching an endocrinologist.

Children with Graves' disease have undetectable TSH, high and very variable free T3 and 4 levels, and TSH receptor antibodies. Ultrasound is now the standard means of examining the thyroid, revealing an enlarged gland with diffuse parenchymal hypervascularity.

Currently the first-line management approach for hyperthyroidism is medical treatment with anti-thyroid drugs. However, there is debate about the optimal length of time, and there is, overall, no evidence base for the optimal management of hyperthyroidism in children.

Major complications of anti-thyroid drugs are rare (0.2–0.5%) but serious, and include agranulocytosis and liver toxicity. Common minor side effects include urticaria, arthralgia and fever. Some side effects are dose dependent, said Léger, so high doses should be avoided where possible and the dose should be reduced, usually by 30–50%, when euthyroidism is achieved.

The big advantage of drug treatment is that, in some patients, it can result in restoration of normal thyroid function and drug-free remission.

Léger said that the evidence from adult studies does not support more than 2 years of anti-thyroid drug treatment. However, children may require longer treatment periods than adults, and patients of any age may prefer to continue on a low dose rather than opt for more radical treatments.

One long-term study in children found that almost all relapses from drug-free remission after an initial 2 years of treatment occurred within the first year of follow-up. Around two-thirds of patients relapsed over 2 years of follow-up, and predictors of relapse were:

- younger age;
- non-Caucasian ethnicity;
- duration of treatment;
- high fT4 levels; and
- high TSH receptor antibody levels.

A predictive score constructed from these variables allows the stratification of relapse risk, including the identification of a group of around 15% of patients who will all relapse. These patients may therefore be considered earlier for definitive treatment options.

However, Léger said that radioactive iodine therapy is best avoided in children younger than 5 years, because of the theoretical cancer risk. Moreover, research shows that the probability of patients achieving remission increases with increasing duration of therapy after 2 years, plateauing at around 8 years of treatment.

Persisting with anti-thyroid drug treatment is therefore worthwhile, especially for the youngest children.

Even with longer durations of treatment, the majority of relapses still occur relatively soon after stopping treatment – 74% within 2 years in one study. Another study linked early normalisation of TSH receptor antibodies during treatment to an increased likelihood of remission.

Long-term treatment may break the vicious cycle of Graves' disease, in which hyperthyroidism generates antibodies, which in turn promote hyperthyroidism, said Léger.

However, she stressed that the optimal length of treatment remains unknown, and how to manage patients after relapse following long-term anti-thyroid drug therapy is also controversial.

One option is to restart drug treatment, and Léger related a case in which this was successful – the patient received three courses of anti-thyroid drug between the ages of 3 and 15 years, and he remains in drug-free remission 9 years later.

Other, more radical treatment options are radioiodine and total thyroidectomy. Radioiodine treatment is effective and low risk, but Léger said that it is best proposed only after puberty and she stressed that it necessitates lifelong levothyroxine treatment.

Thyroidectomy is also effective and can be used in children who are too young for radioiodine treatment, or who have a very large goiter, but it has a high complication rate, so should be performed by a high-volume surgeon.

Léger stressed that patients and their families should be made aware of all the treatment options for hyperthyroidism, but also of the uncertainty and controversy surrounding them.

The long-term consequences of childhood thyroid disorders

Stephen Shalet, an adult endocrinologist from Christie Hospital and the University of Manchester in the UK, gave an overview of the research into the longer-term outcomes of patients diagnosed with thyroid disorders in childhood.

Most studies to date have focused on patients with congenital hypothyroidism, and the majority of the research was led by Juliane Léger.

The thyroid in practice

Case study 3: the presenting complaint can be deceptive

The 4-year-old patient described by Kate Davies (London Southbank University, UK) presented with a persistent cough. The cough ultimately resolved without intervention; however, detailed history-taking and clinical examination at presentation revealed that she was tall for her age, was tired and had been sweating and had mild tachycardia.

Further investigation uncovered an enlarged thyroid gland and thyroid hormone levels indicative of hyperthyroidism.

Davies stressed that:
- the presenting complaint can be misleading;
- and symptoms of hyperthyroidism can be easily overlooked;
- so detailed history-taking and clinical examination is vital.

She also highlighted the need for patient and family education, particularly in cases such as this where the child was brought to the doctor with assumed transient symptoms of a cold, but was ultimately diagnosed with a complex and ongoing endocrine condition.

Issues identified in patients with congenital hypothyroidism include:

- health-related quality of life impairment;
- depression;
- reduced self-esteem;
- delayed social development;
- lower socioeconomic status;
- more chronic diseases; and
- increased risk of hearing loss and visual problems.

Shalet cautioned, however, that it is difficult to establish if hypothyroidism is a direct contributor to any of these factors, given problems such as the studies' reliance on self-reporting and the difficulties of ascertaining the adequacy of treatment.

In addition, the research found that patients with congenital hypothyroidism had an increased mortality risk relative to population controls, and were specifically more likely to die of causes related to the central nervous system and congenital malformations.

Congenital hypothyroidism also affected fecundity. It was associated with delays in falling pregnant when actively trying, particularly for women with severe hypothyroidism. When pregnant, women with congenital hypothyroidism had more gestational hypertension, emergency Caesarean sections, induced labour and prematurity.

TSH levels of at least 10 mU/L were associated with preterm delivery and neonatal macrosomia, and with an increased risk of poor motor coordination and communication skills in the infants at 1 year of age.

By contrast, transient hypothyroxinaemia of prematurity had no detectable effects on neurodevelopmental outcomes.

Adult survivors of paediatric differentiated thyroid carcinoma had increased rates of physical problems and consequent role limitations, and increased mental fatigue, as well as some specific issues such as sensory complaints and chilliness. Despite this, their quality of life was broadly similar to that of controls.

Growth disorders: medication adherence and transitions of care

Theories of adherence

Following on from last year, John Weinman, from King's College London in the UK, outlined current theories of medication adherence and gave an overview of an adherence workshop run at his institute.

There are three distant stages of adherence, he said: uptake; implementation; and persistence. He noted that the first 6 months are crucial, with patients being deterred by a perceived lack of benefit or the existence of side effects; 30–50% of patients become nonadherent within this time.

Early theories of nonadherence mostly focused on poor communication between healthcare providers and patients. Communication is in fact "a relatively small reason" for nonadherence, "but we act as if that's the main reason", said Weinman, noting that the vast majority of new strategies to support adherence are based on reminding people to take their medicines.

Current evidence supports two types of nonadherence: unintentional (deriving from factors such as poor communication, problems with planning, and financial barriers) and intentional, but these influence each other, with for example dislike of a medication contributing to people forgetting to take it.

The recently developed "COM-B" model – representing Capability, Opportunity, and Motivation, which together account for Behaviour – is therefore a more sophisticated way of explaining adherence.

The strongest predictors of adherence identified in the literature are patients' concerns about treatment and beliefs about their illness, their perceived need for and efficacy of therapy, and treatment costs.

Weinman said that the implication of these findings is that healthcare providers should use consultations to understand the patient's perspective, to anticipate and plan for barriers and to personalise interventions. The challenge, he said, is to help patients make their medication-taking easy and routine, and part of their daily habits. He noted that the weight of evidence shows that interventions for adherence are most effective when they are delivered on a one-to-one basis and are personalised.

Weinman then gave an overview of the workshop run at his institute to help healthcare practitioners support their patients' medication adherence. Participants are guided through materials given to assist their practice, which include a brief questionnaire for patients to complete before consultations, containing seven questions that help to identify specific adherence issues and give a basis for discussion.

They then engage in role play using those materials and make a personal plan for how they will use the materials in their clinic.

The thyroid in practice

Case study 4: when parental reaction compromises the child's best interest

Bailie Tabek (The Hospital for Sick Children, Toronto, Ontario, Canada) discussed a 10-year-old child who was referred with suspected thyroid cancer. Ultrasound findings supported the diagnosis, showing thyroid nodules and abnormal lymph nodes measuring less than 1 cm, but both the biopsy to confirm the diagnosis, and surgery to treat it, were severely delayed.

The delay was caused by the family's difficulty in accepting the diagnosis; they initially wanted to treat the child with naturopathic remedies, and they then became non-contactable for nearly a year, in which time the father consulted an additional four specialists.

By the time the family returned to the clinic, the abnormal lymph nodes had increased to more than 2 cm and the patient had pulmonary metastases, which is incurable in 30–50% of children. Fortunately, the prognosis is good nonetheless, said Tabek, with 30-year survival rates exceeding 90%.

She said the case highlights how important it is to establish "therapeutic relationships" with patients and their families, to help them accept treatment plans and move through the stages of grief (denial, anger, bargaining, etc). It also shows the need for effective psychosocial support.

Managing expected and unexpected situations

Following Weinman's presentation on adherence, professional development coach Katie Frost, from London, UK, led an interactive session exploring the techniques that can help nurses to have positive, productive conversations with patients and their families.

Discussions started with helpful and unhelpful behaviours during a conversation, covering the importance of using open questions, and of finishing with a good summary of the conversation to show that you were listening and build rapport.

A good summary, Frost said:

- captures the essence of what was discussed;
- does not contain the opinions of the speaker; and
- finishes with a closed question, such as: "Have I understand that correctly?"

During a difficult conversation, the participants must strike a balance between ensuring their views are heard and accounted for, and accounting for the views of others. In these situations, people benefit greatly from being skilled at assertive communication. Frost led discussions exploring the body language, verbal language and tone of voice used in passive, aggressive and assertive communication, and set out a framework for assertive communication within a planned conversation.

1. "Set the climate" – ensure a situation that facilitates a successful conversation.
2. Make sure that you actively listen and ask questions, to ensure that you hear and understand and that the other participant knows that you do.
3. Say what you think and how you feel, and explain why.
4. Suggest a way to move forwards.

Frost stressed that a key part of successful assertive communication is managing one's own emotional reactions, and encouraged nurses to share the different ways in which they manage their emotions at work; suggestions ranged from mindfulness to talking with colleagues. The discussion then moved to how assertive communication techniques – such as open questions, a positive inner dialogue and explicit recognition of others' feelings – can help to defuse a challenging situation.

Frost then introduced the basics of motivational interviewing. In the context of medication adherence, she noted that the reasons for good adherence ideally need to come from the patients rather than the medical professionals, which highlights the need to avoid a directing style of conversation.

Motivational interviewing is a collaborative process, with four core skills represented by the mnemonic "OARS":

- Open questions.
- Affirmations.
- Reflections.
- Summaries.

Using these skills can help nurses to adopt a position beside their patients and families, supporting them during their decisional and emotional journeys, rather than leading them or requiring them to lead.

Patients often have mixed feelings about taking medication, and Frost suggested some questions that may help patients to explore these feelings and, hopefully, move towards a more positive viewpoint of their own volition, rather than simply opposing or agreeing with the opinion of the medical professional:

- What do you like about not changing?
- What do you see as the downside?
- How do you see your choices on this?
- What do you see as the barriers?
- What do you think about making a change on this?

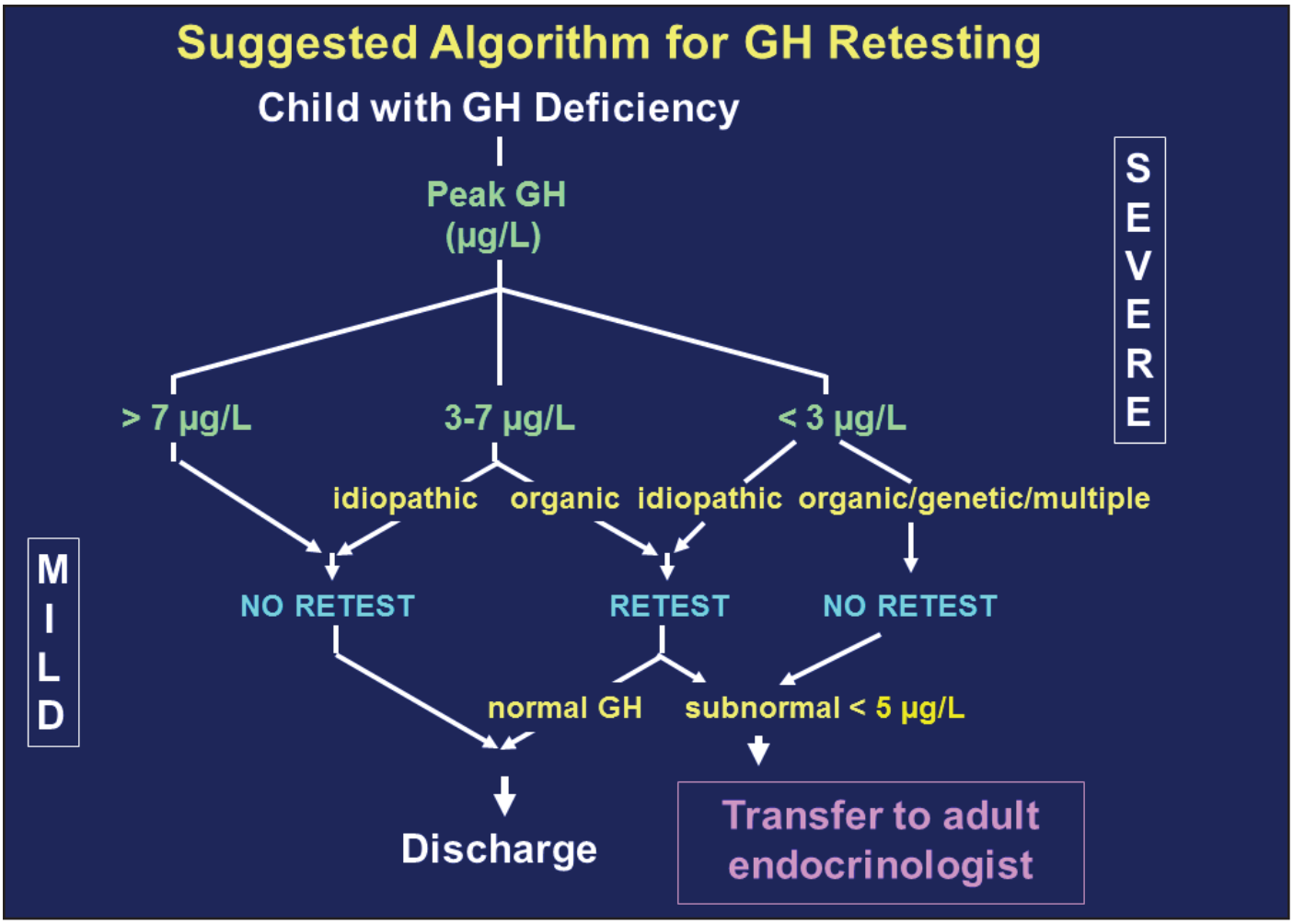
Transitioning to adult care

Rounding off the meeting, Martin Savage (Barts and the London School of Medicine & Dentistry, UK) and Stephen Shalet joined forces to recap the principles of effective transition from paediatric to adult endocrine care for patients with growth hormone deficiency.

Savage said that a transition service should be a dedicated service, run by experienced clinicians, with input from both paediatric and adult endocrinology, but noted that the precise format will be determined by local resources. The service requires support from specialist nurses, he said, as well as from reproductive medicine specialists, psychologists and social workers.

The need for transitional care for patients with growth hormone deficiency (GHD) was officially recognised in 1990, in response to accumulating evidence of the continuing important effects of GH throughout adulthood – on body composition and cardiometabolic risk, for example.

For this reason, many patients with growth hormone deficiency will require adult endocrinology care, as do patients with conditions such as hypopituitarism, adrenal insufficiency and disorders of sexual development. Whether patients with GHD require ongoing care, however, depends on the severity and underlying cause of the deficiency, and Savage suggested an algorithm as below:



By contrast, patients with constitutional delay of growth and puberty, genetic short stature, or precocious puberty do not need medical follow-up in adulthood, and those with congenital hypothyroidism can receive care from a general practitioner.

Stephen Shalet then gave a closer look at recent evidence in support of continuing GH treatment in adulthood. This comprised a mixture of discontinuation studies, where patients were monitored after stopping GH when they reached their final adult height, and randomised, controlled trials, which tested continued GH (paediatric or reduced adult dose) against discontinuation.

Findings from these trials included the following:

- Bone turnover slows down if GH is discontinued.
    - But it increases when GH is restarted.
- Fat mass increases markedly and lean body mass only slightly after GH discontinuation.
    - Whereas fat mass falls and lean body mass increases if patients continue with GH.
- Quality of life for associated domains such as body shape are reduced in transition age GHD patients.
    - This is improved if patients continue with GH.
- Stopping GH is also associated with adverse cardiometabolic effects: endothelial dysfunction, reduced left ventricular mass and dyslipidaemia.

And to close the session, Lee Martin and Christelle Tressens (Hôpital des Enfants, Purpan, Toulouse, France) presented case studies charting the journeys of two patients through the transitional period.