

## **Pediatric Endocrinology Fellowship Training Program Rotation Goals and Objectives**

### **1. Inpatient Consult Service**

a. *Inpatient Endocrine and Diabetes Clinical Content:* By the end of fellowship, each fellow should be proficient in the evaluation, diagnosis, and management of the following inpatient etiologies:

- i. Diabetes mellitus
  1. New onset type 1 diabetes, with or with diabetes ketoacidosis
  2. Type 2 diabetes requiring admission for insulin management initiation
  3. Cystic fibrosis related diabetes
  4. Steroid induced hyperglycemia
- ii. Hypoglycemia
- iii. Sodium metabolism
  1. Hyponatremia, including diabetes insipidus
  2. Hyponatremia
- iv. Calcium metabolism
  1. Hypocalcemia
  2. Hypercalcemia
  3. Rickets
- v. Adrenal insufficiency
- vi. Differences in sex development
- vii. Congenital hypopituitarism/septo optic dysplasia
- viii. Thyroid
  1. Hyperthyroid induced thyroid storm
  2. Neonatal Graves disease
  3. Congenital hypothyroidism

b. *Patient Care*

- i. Pre-rounding: Fellows are responsible for patient care prior to rounds when on overnight call. Fellows should be up to date on interval and overnight events for primary and consult patient lists prior to rounds.
- ii. Rounds: Fellows are expected to coordinate and lead rounds, both with primary inpatient resident team (Coast team), as well as coordinating seeing patients.
  1. Fellows are expected to delegate primary point person of team to follow and present each patient at daily rounds, and write patient care progress notes.
- iii. After rounds: Fellows continue to supervise Coast team and consult resident and medical students, coordinating patient care, new consults, and supervising that delegated tasks are completed in a timely manner.
  1. Consults: Fellow responsible to coordinate new inpatient consults with residents, medical students, and supervising attending. New consults are expected to be seen the same day as initial urgent consult, or within 24 hours if routine consult depending timing of consult.
  2. Fellows are expected to be proficient in triaging new consults and other patient care related calls for outpatient versus inpatient evaluation and management.

- iv. Medical errors: Fellows are expected to know appropriate protocols to recognize and report medical errors, near misses to supervising attending and DCH.
- c. *Medical Education*: While on inpatient service, fellows are expected to ensure that residents and medical students participate in their scheduled learning opportunities, including morning report, endocrine didactic series, pediatric grand rounds, and endocrine Friday morning case conference.
- i. Fellows are expected to participate in presenting scheduled didactics during the resident and medical student rotation.
  - ii. Additionally, fellows should teach by example during non-scheduled clinical and non-clinical opportunities to enrich learners' rotation experience.
    - 1. Guiding reading by patient related topics.
    - 2. "On the fly" teaching on rounds.
    - 3. Diabetes for a Day.
- d. *Team Roles and Leadership*: It is the goal of this fellowship to prepare each fellow to become clinical, scientific, and educational leaders of the field. Functioning as a leader of the inpatient service team is a crucial aspect of each fellow's development.
- i. Communicating as consultant with primary inpatient teams in various clinical settings including pediatric floor, hematology oncology floor, pediatric emergency room, NICU, PICU.
  - ii. Coordinating care of patients in multidisciplinary team settings.
    - 1. Participating in patient care conferences when indicated.
  - iii. Supervising multiple learners and delegating patient care tasks appropriately for each learner's level.
  - iv. Maintaining clinical care coordination and updates with attending supervisor.

## 2. General Endocrine Clinic

- a. *Diagnose and manage growth disorders in children*
- i. List criteria that define short stature in children.
  - ii. Describe criteria that define intrauterine growth retardation; small-for-gestational age.
  - iii. Identify features in the history and physical exam pointing to chronic illness as a cause of growth retardation.
  - iv. Develop a panel of laboratory tests to screen for occult chronic illness as a cause of growth retardation. Describe findings on exam of the growth curve, parental heights, and assessment of skeletal maturation that separate genetic short stature from constitutional delay of growth.
  - v. Identify features on history, exam, imaging and lab testing that suggest a diagnosis of Turner Syndrome, Noonan syndrome or a monogenic cause of short stature.
  - vi. Recognize the features of history, exam of the growth curve, and laboratory tests to diagnose growth hormone deficiency.
  - vii. Understand the indications for and interpretation of growth hormone stimulation tests for the diagnosis of growth hormone deficiency.

- viii. Select candidates for and direct management of supplemental growth hormone therapy.
- b. *Diagnose and manage disorders of puberty in children*
- i. Describe the range for age of onset of normal pubertal development in girls; in boys.
  - ii. Describe the typical sequence of physical changes of puberty in girls; in boys. (Be familiar with Tanner stages of pubertal development in girls; in boys.)
  - iii. List criteria (age of onset, physical exam findings) that define precocious puberty in girls; in boys.
  - iv. Identify findings on physical exam and laboratory testing that separate “central” (hypothalamic-pituitary) from “peripheral” (gonadal) precocious pubertal development.
  - v. Be familiar with criteria used to decide on treatment with “hormone blockers” in children with precocious puberty.
  - vi. List criteria (age of onset, physical exam findings) that define delayed puberty in girls; boys.
  - vii. Create a differential diagnosis for primary amenorrhea in a 15 year old adolescent female.
  - viii. Be familiar with treatment for hypogonadism in girls; boys.
- c. *Diagnose and manage thyroid disorders in children*
- i. Describe the timing, specimen, and tests undertaken by the Oregon Newborn Screening Program to detect congenital hypothyroidism.
  - ii. List the most common etiologies of congenital hypothyroidism
  - iii. Be familiar with the thyroid function tests and frequency of monitoring in infants with congenital hypothyroidism on thyroid hormone treatment.
  - iv. Describe the most common presenting clinical manifestations of acquired hypothyroidism in children.
  - v. Describe the most common presenting clinical manifestations of hyperthyroidism in children.
  - vi. Create a differential diagnosis for goiter in children.
  - vii. Develop a diagnostic work-up for a thyroid nodule in an adolescent.
- d. *Diagnose and manage adrenal disorders in children*
- i. Create a differential diagnosis for a 10 day old neonate with hyponatremia.
  - ii. Describe the most common presenting clinical manifestations of Addison’s disease in children.
  - iii. List the abnormalities one would expect on a CMP in a child with Addison’s disease.
  - iv. Outline diagnostic tests to separate central from primary adrenal insufficiency.
  - v. Describe clinical manifestations that differentiate Cushing’s syndrome from simple obesity.
  - vi. Develop a diagnostic work-up for an adolescent suspected of having Cushing’s syndrome.
  - vii. Be familiar with the clinical features and laboratory findings in a child with a pheochromocytoma.

- e. *Evaluate childhood obesity and manage its complications*
  - i. List the criteria that define “overweight” and obesity in children.
  - ii. Identify the endocrine disorders associated with obesity (hint: hypothalamic-pituitary; thyroid; parathyroid; adrenal; gonadal).
  - iii. Describe features suspicious for a genetic or syndromic etiology of obesity.
  - iv. List the common untoward consequences of obesity in children.
  - v. Create a surveillance plan for adverse metabolic effects of obesity in children.
  - vi. Develop a management plan for a child with “simple” obesity.
  - vii. Describe typical presenting features of polycystic ovarian syndrome (PCOS).
  - viii. Be familiar with hormone treatment options in an adolescent with PCOS.
  
- f. *Understand the role of calcium regulating hormones in normal bone and mineral metabolism*
  - i. Draw the actions and interactions of PTH and 1,25 OH Vitamin D on the kidney, bone and intestine. Understand how these hormones alter calcium and phosphorus levels.
  - ii. Explain the difference between ionized and total calcium and effects of binding proteins on total calcium.
  - iii. Know the effects of medications on the renal handling of calcium (thiazide diuretics, furosemide, glucocorticoids).
  - iv. Understand the role of magnesium in PTH action and secretion.
  
- g. *Diagnose and manage PTH related abnormalities*
  - i. Differentiate between hypoparathyroidism and pseudohypoparathyroidism. Know how to treat hypocalcemia from hypoparathyroidism and pseudohypoparathyroidism.
  - ii. Describe other endocrinopathies associated with Albrights Hereditary Osteodystrophy.
  - iii. Recognize polyglandular syndromes associated with hypoparathyroidism (APS1, Schmidt’s syndrome).
  - iv. Know the differential diagnosis of hyperparathyroidism and be aware of and when to screen for associated disorders (MEN I, MEN II).
  
- h. *Diagnose and manage disorders of Vitamin D*
  - i. Know the populations at risk for Vitamin D deficiency and who should be screened.
  - ii. Recognize that nutritional Vitamin D deficiency is associated with rickets and may also cause hypocalcemia and/or failure to thrive.
  - iii. Define vitamin D deficiency and design a reasonable treatment plan.
  - iv. Understand the pathophysiology of secondary hyperparathyroidism which accompanies renal insufficiency or vitamin D deficiency.
  - v. Know that deficiencies in 1 alpha-hydroxylase (Vit D dependent rickets type 1) and vitamin D receptors (Vit D resistant rickets) exist and how to recognize these conditions.
  - vi. Create a differential distinguishing between calcipenic from phosphopenic rickets.

- i. *Diagnose and manage disorders of calcium and phosphorus*
    - i. Know causes of early and late neonatal hypocalcemia including genetic and “acquired” forms of hypoparathyroidism, DiGeorge Syndrome, hypomagnesemia, infant of diabetic mother, increased phosphate intake, etc.
    - ii. Know how maternal hypercalcemia can cause neonatal hypocalcemia. Know appropriate therapies for individual causes of hypocalcemia.
    - iii. Identify causes of hypercalcemia (i.e. Williams syndrome, Benign familial hypocalcuria hypercalcemia, hyperparathyroidism, malignancy).
    - iv. Know how to treat symptomatic hypercalcemia and be aware of long term risks of hypercalcemia.
    - v. Recognize that most common cause of hypophosphatemia is renal phosphate wasting (Hypophosphatemic rickets).
    - vi. Describe the role of FGF 23 in phosphorus management.
- 3. Diabetes Clinic**
- a. *Diagnose and manage diabetes mellitus (by the end of clinical year 1)*
    - i. Differentiate various types of diabetes (Type 1, type 2, MODY, neonatal and mitochondrial forms) on the basis of findings from clinical history, physical examination and laboratory tests.
    - ii. Recognize common challenges in differentiating between Type 1 and Type 2 diabetes in children and adolescents at presentation and pursue adequate follow up diagnostic procedures.
    - iii. Prescribe appropriate treatment plan for patients based on type of diabetes, using all available medications and technological devices.
    - iv. Propose a treatment plan for newly diagnosed patients with diabetes, taking into account individual needs of the patient and their family.
    - v. Demonstrate ability to independently educate families in “survival skills” necessary to safely manage diabetes at home.
    - vi. Recognize role of multi-disciplinary team in managing patients with diabetes and interact with the team during both in-hospital and outpatient care.
    - vii. Recognize role of developmental stages in creating age-appropriate diabetes management plan.
    - viii. Devise plan for transition and transfer of care for patients graduating from pediatric diabetes program.
    - ix. Classify stages of Type 1 Diabetes based on progression of autoimmune reaction and identify appropriate recommendation for each stage.
    - x. Recognize immediate life-threatening complications of diabetes, including ketoacidosis, and prescribe adequate management, including referral to intensive care.
    - xi. Recognize long term complications of diabetes and implement appropriate recommended screening tests for those (i.e. retinopathy, nephropathy and neuropathy).
    - xii. Identify autoimmune disorders common in patients with diabetes and implement appropriate screening for those (i.e. thyroid and celiac disease).

- xiii. Identify co-morbid conditions associated with Type 2 diabetes (i.e. acanthosis, PCOS) and understand the common pathophysiology pathways (role of hyperinsulinemia).
- xiv. Understand increase in adulthood risk for cardiovascular pathology for patients with diabetes and devise management plan for contributing risk factors, including obesity, hypertension and hyperlipidemia.
- xv. Identify and manage diabetes associated with other conditions, including CFRD, Down Syndrome, Prader-Willi syndrome and other.

#### 4. Doernbecher Gender Clinic

- a. *Manage children and adolescents with gender diversity and/or gender dysphoria*
  - i. Define sex, gender, gender identity, gender expression and sexual orientation.
  - ii. Describe the development of gender and gender identity.
  - iii. Summarize current knowledge pertaining to biological underpinnings of gender identity, including genetics, hormonal influences, neurobiology, and brain differences.
  - iv. Discuss the elements that are important to consider and incorporate when counseling a patient with gender dysphoria and their family.
  - v. List options for patients wishing to undergo gender transition (including social transition, medical and surgical options).
  - vi. Discuss the benefits, risks and limitations of GnRH analogs when used for pubertal suppression in children and adolescents with gender dysphoria.
  - vii. Discuss the benefits, risks and limitations of feminizing or masculinizing hormones.
  - viii. List surgical options.
  - ix. Discuss hormonal and surgical options for youth identifying as non-binary.

#### 5. DUETT Clinic

- a. *Diagnose and manage infants and children with differences in sexual development*
  - i. Define the differences between sex, sex of rearing, gender identity, and gender expression.
  - ii. Describe the typical process of sexual development for 46,XX and 46,XY fetuses.
  - iii. Distinguish between CAH and other forms of virilization in 46,XX infants.
  - iv. Describe the evaluation process for a virilized 46,XX infant.
  - v. Recognize micropenis, including diagnosis, potential etiologies and management strategies.
  - vi. Recognize and differentiate between the enzymatic blocks affecting testosterone or dihydrotestosterone synthesis.
  - vii. Describe the evaluation process for an undervirilized 46,XY infant.
  - viii. Discuss the importance of a multi-disciplinary team in the care of an infant with a DSD.
  - ix. Discuss the elements that are important to consider and incorporate when counseling a family of an infant with DSD (assigning sex of rearing, surgical management, gender identity, fertility potential).

## 6. Skeletal Dysplasia/OI Clinic

### *a. Diagnose and manage disorders of low bone density*

- i. Know how to diagnose the genetic disorders of low bone density in children (Juvenile osteoporosis, Osteogenesis imperfecta).
- ii. Know the characteristics of the more common forms of osteochondrodystrophies. Know the techniques and limitations of methods to assess bone mineral density in children.
- iii. Know the primary therapies for treatment of low bone mass in children and when bisphosphonates should be considered.

## 7. Thyroid Nodule Clinic

### *a. Evaluate and Manage Thyroid Nodules in Children and Adolescents*

- i. Describe the ultrasound characteristics of a thyroid nodule that increase the risk of thyroid cancer.
- ii. Define how the thyroid nodule characteristics that determine risk of carcinoma in children differ from adults.
- iii. List the syndromes that are associated with an increased risk of thyroid nodules.
- iv. Determine when a thyroid nodule should be biopsied by FNA and when it can be safely monitored.
- v. Understand the role of a radioactive iodine uptake and scan in the evaluation of thyroid nodules associated with hyperthyroidism.

### *b. Evaluate and Manage Thyroid Cancer in Children and Adolescents*

- i. Describe the evaluation and treatment of papillary thyroid carcinoma.
- ii. Determine when post surgical radioactive iodine treatment should be used as follow up therapy and when monitoring alone is adequate.
- iii. Understand how to stage papillary thyroid carcinoma based on size, nodal involvement and distant metastasis.
- iv. Develop appropriate follow up plans for monitoring patients for thyroid cancer recurrence.
- v. Recognize the relationship between genotype and phenotype in MEN 2.
- vi. Develop appropriate treatment plan for children with MEN2 based on the RET oncogene genotype that is based on their risk for medullary thyroid carcinoma.

## 8. Neuro-Oncology Clinic

### *a. Direct surveillance of pituitary hormone function following treatment of childhood brain tumors*

- i. Recognize the risk of pituitary dysfunction following surgery, focal radiation, craniospinal radiation and chemotherapy for benign and malignant central nervous system tumors.
- ii. Understand the timeline and common order of development of pituitary hormone deficiencies in childhood brain tumor patients and long-term survivors.

- iii. Recognize the signs and symptoms of pituitary hormone deficiency.
- iv. Develop a symptom monitoring and testing scheme to discover endocrinopathies resulting from treatment of childhood brain tumors.

*b. Evaluate and treat hormone deficiencies resulting from treatment of childhood brain tumors.*

- i. Understand the roles of random hormone sampling versus dynamic endocrine testing in diagnosing pituitary hormone deficiencies.
- ii. Order and interpret growth hormone stimulation tests and cortisol stimulation tests in the neuro-oncology clinic population.
- iii. Understand the risks and benefits of growth hormone replacement in childhood brain tumor survivors.
- iv. Prescribe and manage growth hormone, thyroid hormone, hydrocortisone, DDAVP and sex steroid replacement therapies.

**9. Butterfly Clinic (Multidisciplinary Turner Syndrome Clinic)**

*a. Be aware of the impact of karyotype on Turner syndrome presentation and morbidity.*

*b. Evaluate and Manage growth failure in Turner syndrome*

- i. Describe the typical growth pattern of a girl with Turners syndrome.
- ii. Know the etiology and assessment of growth failure in Turners syndrome.
- iii. Understand when growth hormone therapy is indicated in Turners syndrome, and be able to counsel families on outcome/risks of growth hormone therapy in this condition.
- iv. Understand the impact of timing of puberty/ pubertal induction in Turners syndrome on growth outcome.
- v. Be aware of additional therapies for Turner syndrome associated growth failure.

*c. Evaluate and treat ovarian failure in Turner syndrome.*

- i. Be able to counsel families on puberty and fertility in Turner syndrome.
- ii. Understand the evaluation of ovarian failure in Turner syndrome.
- iii. Be familiar with options for pubertal induction in Turner syndrome.
- iv. Be familiar with options for hormone replacement once puberty is complete in Turner syndrome.
- v. Be aware of emerging fertility options of Turner syndrome associated ovarian failure.
- vi. Be aware of the risks of pregnancy in Turner syndrome in relationship to Turner syndrome phenotype.

*d. Understand additional Turner syndrome morbidity in childhood and beyond.*

- i. Be familiar with of current guidelines regarding monitoring for associated medical morbidity such as hearing loss in Turner syndrome.

- ii. Recognize the increased risk of learning disability, attention deficit disorder and anxiety in Turner syndrome and be familiar with guidelines regarding assessment for these conditions in Turner syndrome.
- iii. Be aware of adult outcomes in Turner syndrome and the need for ongoing specialty care in adulthood.