

**Fellowship**  
**Phoenix Children's Hospital**  
**Pediatric Endocrinology and Diabetes**  
**Curriculum (Competency-Based)**

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**MEDICAL KNOWLEDGE:** Demonstrate knowledge about established and new biomedical, clinical, epidemiological and social-behavioral sciences and the application of this knowledge to the field of pediatric endocrinology and diabetes in both the clinical and research fields (see Fellow's policies and handbook pp. 4-6).

**GOAL (CLINICAL):** During their clinical course of study, fellows are expected to develop a strong fund of knowledge commensurate with that obtained from reading and comprehending a major clinical pediatric and/or general endocrinology textbook.

**OBJECTIVES:** Provide a broad as well as in-depth clinical training in the field of pediatric endocrinology, diabetes, metabolism and clinical nutrition. This includes diseases of the pituitary, thyroid and adrenal glands; diabetes mellitus and the metabolic syndrome; hypoglycemic syndromes; lipid disorders; calcium disorders and metabolic bone disease; oncologic endocrinology; childhood growth and development; nutritional counseling; and endocrine diagnostic testing. Review Arizona state newborn screens that relate to genetic endocrine disorders.

### **Curriculum Content Outline:**

- a. Carbohydrate Metabolism
  - i. Physiology of systemic glucose metabolism
  - ii. Type 1 diabetes mellitus
  - iii. Type 2 diabetes mellitus
  - iv. Hypoglycemia
  
- b. Thyroid Disorders
  - i. Fetal and neonatal physiology
  - ii. Thyroid hormone and receptors
  - iii. Congenital hypothyroidism
  - iv. Acquired hypothyroidism
  - v. Hyperthyroidism
  - vi. Thyroiditis
  - vii. Morphologic abnormalities
  - viii. Impact of nonthyroidal illness on thyroid function
  
- c. Pituitary Gland and Hypothalamus
  - i. Neuroendocrine regulation of anterior pituitary
  - ii. Neurohypophyseal function
  - iii. Anterior pituitary hormones
  - iv. Disorders of hypothalamic-pituitary function
  - v. Treatment of disorders of hypothalamic-pituitary dysfunction
  
- d. Adrenal Disorders
  - i. Biosynthesis and metabolism of adrenal steroids
  - ii. Hypoadrenocorticism
  - iii. Hyperadrenocorticism

- iv. Hyperaldosteronism
  - v. Virilizing and feminizing adrenal tumors
  - vi. Virilizing adrenal hyperplasia
  - vii. Premature adrenarche
  - viii. Adrenal medulla
- e. Gonadal Disorders
- i. Development and differentiation of the reproductive system
  - ii. Hormone synthesis, secretion, transport, metabolism and action
  - iii. Normal sexual maturation
  - iv. Abnormal development
  - v. Disorders of puberty
- f. Mineral Metabolism
- i. Calcium
  - ii. Phosphate
  - iii. Magnesium
  - iv. PTH
  - v. Vitamin D
  - vi. Calcitonin
  - vii. Bone formation and associated disorders
  - viii. Hypophosphatemia
- g. Growth
- i. Short stature
  - ii. Obesity
  - iii. Tall stature
  - iv. Eating Disorders
  - v. Growth factors
  - vi. Normal growth and development
- h. Hormone Assays and Lipoprotein Metabolism
- i. Molecular biology
  - ii. Hormone receptors
  - iii. Gastrointestinal hormones
  - iv. Atrial natriuretic hormone
  - v. Hormone assays
- i. Statistics and Experimental Design
- i. Study design
  - ii. Use of informed consent
  - iii. Research hypothesis and methodology
  - iv. Collection and interpretation of data
  - v. Medical statistics
  - vi. Interpreting and publishing results

## **INSTRUCTIONAL STRATEGIES:**

- 1) Participation in Pediatric Endocrinology and Diabetes Inpatient Service between fellow and attending, resident, medical student and ancillary staff.
- 2) Participation in Pediatric Endocrinology and Diabetes Outpatient Service between fellow and attending, resident, medical student and ancillary staff.
- 3) Pediatric Endocrinology and Diabetes bi-monthly Journal Club.
- 4) Combined Adult/Pediatric Endocrinology weekly didactic meeting.
- 5) Participation in fellows' summer school (orientation), that includes, laboratory techniques and cytogenetics (see Fellow's policies and handbook pp. 12-13).
- 6) Review of endocrine histopathology.
- 7) Participate in local, regional and national conferences.
- 8) Attend monthly research club.
- 9) Organize and attend annual camp AZDA (diabetes camp).
- 10) Interaction with experts at the state newborn program and Palo Verde Laboratory.
- 11) Independent inquiry.

## **EVALUATION TOOLS:**

- 1) Competency evaluations (correspondence evaluation, multi-disciplinary evaluation, endocrine stimulation testing evaluation form, multi-disciplinary team member (360°) evaluation form, evaluation form: interpretation of bone age X-ray, family (360°) evaluation form, mini-clinical evaluation form, pediatric endocrinology fellowship program faculty evaluation).
- 2) Attendance noted or sign-in sheet maintained (Category 2 CME credit).
- 3) CME credit.

## **Scholarly Activities**

**GOAL (RESEARCH/STATISTICS):** Through the Scholarship Oversight Committee (SOC) develop the basis of basic science and/or clinical research (see Fellow's policies and handbook pp. 9).

**OBJECTIVES:** The objectives for research involve the following time line of scholarly activity:

### **Scholarly activity timeline:**

1. First year: The formation of Scholarship Oversight Committee (SOC) takes place. A specific mentor and scholarly activity project is to be chosen by end of first nine months.

2. Second/Third years: The scholarly activity project is to begin within the first two months. Completion of goals should be achieved before end of fellowship.

The objectives include the ability to perform literature review and search strategies while utilizing online literature databases, computer technology for biostatistics, grant writing, and preparing manuscripts for publication. Compile evidenced based review of specific clinical questions using critical appraisal skills.

The various other objectives include: understand laboratory techniques, including the basic science behind radioimmunoassay and other diagnostic assays; understand the methodology of hormone measurement and receptor activation, and know how a bioassay differs from other methods of assaying hormones; understand the current principles of endocrine histology.

With respect to bio-statistics, the fellow will be able to discuss and understand sensitivity, specificity and predictive values of diagnostic tests, how they are used, and how tests are selected and interpreted; understand the impact of prevalence of disease on the predictive values (and the interpretation) of a diagnostic test; understand the meaning of statistical significance and differentiate it from clinical significance; learn to evaluate observational study designs such as cross-sectional, case-control, and cohort studies; understand the structure of a randomized controlled trial as well as its strengths and weaknesses.

The fellow will also deal with collection of material of human origin, such as tissues for a biorepository, know the various technical skills involved in specimen collection (i.e. the handling of hazardous materials); and be able to perform subject recruitment and obtain informed consent (under the supervision of the mentor) using scientific, ethical, and legal aspects of biomedical research.

#### **INSTRUCTIONAL STRATEGIES:**

- 1) Human investigations program available that includes lectures, and ethical conduct with subjects.
- 2) CITI course in protection of human research subjects to include HIPAA regulations (or equivalent National Institutes of Health on-line course).
- 3) Pediatric Endocrinology and Diabetes bi-monthly Journal Club.
- 4) Combined Adult/Pediatric Endocrinology weekly didactic meeting.
- 5) Participation in fellows' summer school (orientation), that includes, laboratory techniques and cytogenetics (see Fellow's policies and handbook pp. 12-13).
- 6) Review of endocrine histopathology.
- 7) Participate in local, regional and national conferences at professional and scientific society meetings.
- 8) Attend monthly research club.
- 9) Independent inquiry.

#### **EVALUATION TOOLS:**

- 1) Competency evaluations.
- 2) Attendance noted or sign-in sheet maintained (Category 2 CME credit).
- 3) Research/HIPAA training certificates of completion.
- 4) In-service examinations.
- 5) Feedback/report from scholarship oversight committee (SOC).

**PATIENT CARE:** Fellows must be able to provide patient care that is compassionate, appropriate, and effective for the treatment of health problems and the promotion of health (see Fellow's policies and handbook pp. 4-6).

**GOAL:** Gather essential and accurate information about fellow's patients (obtain history and physical and order laboratory and radiological studies).

**OBJECTIVES:** The objectives include selection of appropriate diagnostic testing for evaluation of common pediatric endocrine disorders. Develop and carry out patient management plans based on patient information, preferences, up-to-date scientific evidence, and clinical judgment.

The fellowship is structured to provide broad and in-depth clinical training in the field of pediatric endocrinology, metabolism and clinical nutrition. This includes diseases of the pituitary, thyroid and adrenal glands; diabetes mellitus and the metabolic syndrome; hypoglycemic syndromes; lipid disorders; calcium disorders and metabolic bone disease; oncologic endocrinology; childhood growth and development; nutritional counseling; and endocrine diagnostic testing.

**INSTRUCTIONAL STRATEGIES:**

- 1) Participation in Pediatric Endocrinology and Diabetes Inpatient Service between fellow and attending, resident, medical student and ancillary staff.
- 2) Participation in Pediatric Endocrinology and Diabetes Outpatient Service between fellow and attending, resident, medical student and ancillary staff.
- 3) Pediatric Endocrinology and Diabetes bi-monthly Journal Club.
- 4) Combined Adult/Pediatric Endocrinology weekly didactic meeting.
- 5) Participate in local, regional and national conferences.
- 6) Attend monthly research club.
- 7) Independent inquiry.

**EVALUATION TOOLS:**

- 1) Competency evaluations (correspondence evaluation, multi-disciplinary evaluation, endocrine stimulation testing evaluation form, multi-disciplinary team member (360°) evaluation form, evaluation form: interpretation of bone age X-ray, family (360°) evaluation form, mini-clinical evaluation form, pediatric endocrinology fellowship program faculty evaluation).
- 2) Spontaneous verbal feedback.
- 3) Impromptu discussion of clinical cases and literature review.

- 4) Direct supervision of patient care.
- 5) Spotlight and caught in the act of caring awards.
- 6) Attendance noted.
- 7) CME credit.
- 8) Sign-in sheet maintained (Category 2 CME credit).

**GOAL:** Each fellow's maturation process will be closely monitored and encouraged through guidance in the ability to select appropriate diagnostic testing.

**OBJECTIVES:** The objectives include each fellow being required to mature in his or her ability to select appropriate diagnostic testing for evaluation of common pediatric endocrine disorders. The fellow will also become competent in the interpretation of results of common endocrine laboratory tests; stimulation and suppression tests; histopathology slides; and bone age X-ray, brain MRI, and other common imaging studies used in the evaluation of pediatric endocrine patients.

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- 3) Pediatric Endocrinology and Diabetes bi-monthly Journal Club.
- 4) Combined Adult/Pediatric Endocrinology weekly didactic meeting.
- 5) Participate in local, regional and national conferences.
- 6) Attend monthly research club.
- 7) Independent inquiry.

**EVALUATION TOOLS:**

- 1) Competency evaluations (correspondence evaluation, multi-disciplinary evaluation, endocrine stimulation testing evaluation form, multi-disciplinary team member (360°) evaluation form, evaluation form: interpretation of bone age X-ray, family (360°) evaluation form, mini-clinical evaluation form, pediatric endocrinology fellowship program faculty evaluation).
- 2) Spontaneous verbal feedback.
- 3) Impromptu discussion of clinical cases and literature review.
- 4) Direct supervision of patient care.
- 5) Spotlight and caught in the act of caring awards.
- 6) Attendance noted or sign-in sheet maintained (Category 2 CME credit).
- 7) CME credit.
- 8) Fellow orientation.

**GOAL:** Function as an integral member of the multidisciplinary education team in the provision of compassionate patient care. In addition, prevent health problems and promote healthy living.

**OBJECTIVES:** The objectives include: 1) Development of diabetes treatment plans in conjunction with a multidisciplinary team, including the patient and family, endocrinologists and fellows, certified diabetes educators, dietitians, social workers, child life specialists, other subspecialists (e.g. ophthalmologist, podiatrist, etc.) and primary care provider. 2) Initiate insulin regimens including carbohydrate counting, calculating insulin sensitivity factor and high sugar correction. 3) Diabetes assessment and treatment plans are augmented by in-office analysis of hemoglobin A1c. 4) Empower patients with diabetes and their families to effectively manage diabetes at home. 5) Effectively incorporate the multidisciplinary team in providing educational materials. 6) Maintain understanding of current devices in development to improve the lives of diabetic children, such as, continuous glucose monitoring, insulin pumps and meters. In addition, use of new strategies, such as, insulin dose calculator, inhaled insulins and other therapies. 7) Perform the download and interpretation of data from glucose meters into database.

The objectives regarding newly diagnosed diabetes patients, include fellows' participation in daily insulin dosage adjustments as part of their on-call duties. Families call in nightly to report blood glucose values for about one week after discharge home from PCH. When on call, the fellow makes decisions regarding insulin dose adjustments, communicates them with the family, and finally shares them with the attending endocrinologist. Convey information to patient and families regarding concepts of low blood sugar treatment and sick day rules including urine and blood ketone testing.

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- 3) Pediatric Endocrinology and Diabetes bi-monthly Journal Club.
- 4) Combined Adult/Pediatric Endocrinology weekly didactic meeting.
- 5) Participate in local, regional and national conferences.
- 6) Attend monthly research club.
- 7) Independent inquiry.
- 8) Fellow orientation (see Fellow's policies and handbook pp. 12-13).

**EVALUATION TOOLS:**

- 1) Competency evaluations (correspondence evaluation, multi-disciplinary evaluation, endocrine stimulation testing evaluation form, multi-disciplinary team member (360°) evaluation form, evaluation form: interpretation of bone age X-ray, family (360°) evaluation form, mini-clinical evaluation form, pediatric endocrinology fellowship program faculty evaluation).
- 2) Spontaneous verbal feedback.
- 3) Impromptu discussion of clinical cases and literature review.
- 4) Direct supervision of patient care.
- 5) Spotlight and caught in the act of caring awards.

- 6) Attendance noted or sign-in sheet maintained (Category 2 CME credit).
- 7) CME credit.

**PRACTICE-BASED LEARNING AND IMPROVEMENT:** A process of self-study and exploration that leads to an improvement in the practice of pediatric endocrinology and diabetes (see Fellow's policies and handbook pp. 7-10).

**GOAL:** Evaluation of patient care practices, use of important scientific literature with an emphasis of improving patient care.

**OBJECTIVES:** The objectives include using own documents of practice experience and perform self-analysis with the goal of practice-based improvement. Collection of data using PedEMR software about personal patients and the larger practice population. Search the body of medical literature regarding specific cases as it relates to the patients' health problems. Understand study designs and statistical methods to elucidate medical literature and apply to patient management. Apply experience to teach students and other health care professionals.

**INSTRUCTIONAL STRATEGIES:**

- 1) Pediatric Endocrinology and Diabetes bi-monthly Journal Club.
- 2) Combined Adult/Pediatric Endocrinology weekly didactic meeting.
- 3) Participate in local, regional and national conferences at professional and scientific society meetings.
- 4) Monthly presentation to junior medical students.
- 5) Attend monthly research club.
- 6) Hospital-wide morbidity and mortality conference.
- 7) Independent inquiry.

**EVALUATION TOOLS:**

- 1) Evaluation of presentations at Pediatric Endocrinology and Diabetes bi-monthly Journal Club.
- 2) Combined Adult/Pediatric Endocrinology weekly didactic meetings.
- 3) Feedback at local, regional and national conferences.
- 4) Evaluations of presentations made at research club.
- 5) Evaluations of morbidity and mortality conferences.
- 6) Resident and junior medical student evaluations.
- 7) Semi-annual review with program director.

**SYSTEMS-BASED PRACTICE:** Learn how the physician-patient relationship fits into the larger picture of the system of healthcare. This involves having the ability to tap into the various resources available throughout the intra-hospital, inter-hospital, state and national systems.

**GOAL:** Effectively use the system of healthcare to improve the physician-patient relationship.

**OBJECTIVES:** The objectives include learning the various components of the healthcare system to improve the delivery of healthcare to the individual patient. Assist patients to maximize the available services in order to have healthy outcomes. Interact with members of the multidisciplinary team that make up the hospital system. Learn the issues surrounding health care management in order to balance health care delivery and financial pressures. Assist with State Newborn Screening laboratory program

**INSTRUCTIONAL STRATEGIES:**

- 1) Participation in Pediatric Endocrinology and Diabetes Inpatient Service between fellow and attending, resident, medical student and ancillary staff.
- 2) Participation in Pediatric Endocrinology and Diabetes Outpatient Service between fellow and attending, resident, medical student and ancillary staff.
- 3) Pediatric Endocrinology and Diabetes monthly management meeting.
- 4) Interaction with experts at the state newborn program.
- 5) Hospital-wide morbidity and mortality conference.

**EVALUATION TOOLS:**

- 1) Competency evaluations (including 360°).
- 2) Sign-in sheet maintained.
- 3) Spontaneous verbal feedback.
- 4) Evaluations of morbidity and mortality conferences.

**PROFESSIONALISM:** Throughout fellowship training, emphasis is placed on fostering the ability to form and maintain effective physician-patient relationships. Fellows will also strive to develop and maintain a code of professional ethics to guide their daily practice, as well as a commitment to improving the lives of patients and their families.

**GOAL:** Continuous improvement in the capacity to engage in a professional manner as a physician.

**OBJECTIVES:** The objectives include forming and maintaining effective physician-patient relationships. Develop and maintain a code of professional ethics to guide daily practice. Maintain a commitment to improving the lives of patients and their families. Develop manners that are sensitive and responsiveness to patients' culture, age, gender and disabilities. Respect patient confidentiality. Involvement in community service that improves patients' lives.

**INSTRUCTIONAL STRATEGIES:**

- 1) Participation in Pediatric Endocrinology and Diabetes Inpatient Service between fellow and attending, resident, medical student and ancillary staff.

- 2) Participation in Pediatric Endocrinology and Diabetes Outpatient Service between fellow and attending, resident, medical student and ancillary staff.
- 3) Organize and attend annual camp AZDA (diabetes camp).
- 4) CITI course in protection of human research subjects to include HIPPA regulations (or equivalent National Institutes of Health on-line course).
- 5) Participation at St. Vincent's de Paul clinic (free clinic-community service).
- 6) News specials, for example, community outreach efforts with local news agencies.
- 7) American Diabetes Association Expo involvement.

**EVALUATION TOOLS:**

- 1) Competency evaluations (including 360°).
- 2) Sign-in sheet maintained. (Category 2 CME credit).biostatistics/epidemiology course.
- 3) Attendance noted.
- 4) Research/HIPAA training certificates of completion.
- 5) Feedback/report from scholarship oversight committee (SOC).
- 6) Spotlight and caught in the act of caring awards.
- 7) Spontaneous verbal feedback.

**INTERPERSONAL SKILLS AND COMMUNICATION SKILLS:**

Develop the skills that lead to effective interpersonal interaction and teaming with patients, their families, and other health professionals.

**GOAL:** Continuous improvement in the capacity to communicate, relate and empathize as a physician.

**OBJECTIVES:** The objectives include creating and sustaining a therapeutic and ethically sound relationship with patients, using effective listening skills to elicit and provide information; using effective nonverbal, explanatory, questioning, and writing skills, and working effectively with others as a member or leader of a health care team or other professional group.

Fellows are expected to develop their oral and written communication and teaching skills by organizing and leading resident, student, and nurse education sessions via formal patient-oriented presentations.

The fellow will learn to function as an integral member of a multidisciplinary team in the provision of excellent patient care.

Throughout fellowship training, emphasis is placed on fostering the ability to form and maintain effective physician-patient relationships. Fellows will also strive to develop and maintain a code of professional ethics to guide their daily practice, as well as a commitment to improving the lives of patients and their families.

**INSTRUCTIONAL STRATEGIES:**

- 1) Participation in Pediatric Endocrinology and Diabetes Inpatient Service between fellow and attending, resident, medical student and ancillary staff.
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- 5) Participation in fellows' summer school (orientation), that includes, laboratory techniques and cytogenetics (see Fellow's policies and handbook pp. 12-13).
- 6) Review of endocrine histopathology.
- 7) Participate in local, regional and national conferences and scientific society meetings.
- 8) Attend monthly research club.
- 9) Monthly presentation to junior medical students.
- 10) Hospital-wide morbidity and mortality conference.
- 11) Discussions with community and hospital physicians and State Newborn Screening program.

**EVALUATION TOOLS:**

- 1) Evaluation of presentations at Pediatric Endocrinology and Diabetes bi-monthly Journal Club.
- 2) Combined Adult/Pediatric Endocrinology weekly didactic meetings.
- 3) Feedback at local, regional and national conferences.
- 4) Evaluations of presentations made at research club.
- 5) Evaluations of morbidity and mortality conferences.
- 6) Resident and junior medical student evaluations.
- 7) Semi-annual review with program director.
- 8) Feedback/report from scholarship oversight committee (SOC).
- 9) Spotlight and caught in the act of caring awards.

Note: All Evaluation Tools: see Fellow's policies and handbook pp. 10-11.