

TEACHING CURRICULUM

ALLERGY ASTHMA, AND CLINICAL IMMUNOLOGY ELECTIVE FOR RESIDENTS AND MEDICAL STUDENTS

Sponsored By:

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Allergy, Asthma, and Clinical Immunology Elective
for Residents and Medical Students

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Allergy, Asthma, and Clinical Immunology Elective for Residents and Medical Students

Introduction

This is a clinical rotation about the most common, chronic diseases affecting both children and adults. This elective should be most helpful for medical students in their third or fourth year rotation and for residents in family practice, pediatrics, or internal medicine.

Rotators will be introduced to allergy, asthma, and clinical immunology. They will become familiar with the skills of history taking, examination of patients, laboratory techniques, and interpretation of the results as they relate to the specialty. There will be involvement with outpatient management of conditions such as asthma, rhinitis, atopic dermatitis, anaphylaxis, drug reactions, food reactions and urticaria. Rotators will learn how to approach and resolve problems of immunodeficiency states. They should become familiar with allergy skin testing, pulmonary function testing, and the indications for allergen immunotherapy.

Most activities will involve out-patient visits but also could include hospital rounds, departmental conferences and informal discussions with the allergy consultant. Rotators should observe the administration of immunotherapy, skin testing and pulmonary function testing procedures, and should be given time to do detailed new and follow-up examinations of the patients. Each page has a list of learning objectives. Recognizing that these lists contain more objectives than can be covered in a typical 4-week rotation, priorities are listed at the top. They are:

- Priority 1: required
- Priority 2: recommended
- Priority 3: desirable
- Priority 4: optional

Informal discussion sessions with the allergist/clinical immunologist should include the following subjects:

1. Asthma-diagnosis, pathophysiology and treatment
2. Status asthmaticus - diagnosis and treatment
3. Rhinitis - classification, diagnosis and treatment
4. Care of patients with asthma and/or allergic rhinitis during pregnancy
5. Sinusitis
6. Drug reactions - diagnosis and treatment
7. Food reactions - diagnosis and treatment
8. Allergic contact dermatitis - diagnosis and treatment
9. Atopic dermatitis - diagnosis and treatment
10. Stinging insect reactions - diagnosis and treatment
11. Anaphylaxis - diagnosis and treatment
12. Urticaria - diagnosis and treatment
13. Procedures
 - a) pulmonary function tests
 - b) allergy skin testing immediate and delayed
 - c) immunotherapy
 - d) In vitro serum IgE allergen specific assays
14. Clinical immunology-components of the immune system, immunological reactions, and the more common immunodeficiency states.

Learning Objectives

Asthma

Priorities: Pediatrics 1, Internal Medicine 1,
Family Practice 1, Student 1

OBJECTIVES

Upon completion of this rotation, the allergy rotator should be able to:

1. Define asthma
 2. Define the meanings of the terms:
 - a) wheezing
 - b) rhonchus
 - c) crackles (rales)
 - d) stridor
 3. List the three major pathologic factors responsible for airway obstruction in asthma and differentiate asthma from emphysema
 - 3b. Explain the pathophysiology of asthma regarding the:
 - a) IgE mechanism
 - b) adrenergic mechanism
 - c) cholinergic mechanism
 4. Discuss precipitating factors including:
 - a) infection
 - b) irritants
 - c) exercise
 - d) allergens
 - e) medications
 - f) intrinsic factors including gastroesophageal reflux disease
 5. Describe the clinical findings typical of asthma
 6. Create a differential diagnosis of asthma
 7. Describe the different spirometric tests of lung function and the changes produced in these tests by asthma
 8. Discuss etiologic evaluation of asthma by:
 - a) history
 - b) skin testing
 9. Explain environmental control measures.
 10. Discuss classifying asthma severity in patients based on day and night time symptoms & lung function-mild intermittent, mild persistent, moderate persistent, severe persistent.
 11. Discuss the different classes of drugs used in the medical management of asthma and their side effects and their use in step therapy based on asthma severity:
 - a) epinephrine
 - b) beta agonists
 - c) theophylline (methylxanthenes)
 - d) cromolyn and nedocromil
 - e) steroids, inhaled and systemic
 - f) atropine, ipratropium bromide
 - g) leukotriene modifiers
 12. Demonstrate proficiency in the proper use of the meter dosed inhaler, spacer device, dry power inhaler and how to instruct patients in their use.
 13. Explain goals and precautions of immunotherapy in patients with asthma
 14. Discuss use of peak flow meters in the clinical management of asthma and develop an asthma action plan based on levels of peak flow measurements
 15. Describe a basic program of outpatient management for:
 - a) a 22-year-old female who has asthma with a febrile viral respiratory tract infection
 - b) a 28-year-old male with seasonal asthma each August and September
 - c) a 15-year-old adolescent with exercise-induced bronchospasm
 - d) a 45-year-old factory worker in whom asthma develops after exposure to an industrial chemical
 16. Define and explain the management of status asthmaticus
 17. Discuss quality of life issues regarding patients with chronic asthma
 18. Recognize emotional/behavioral aspects of caring for patients with asthma
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Learning Objectives

Rhinitis

Priorities: Pediatrics 1, Internal Medicine 1
Family Practice 1, Student 1

OBJECTIVES

Upon completion of this rotation, the rotator should be able to:

1. Classify rhinitis in the categories of seasonal allergic rhinitis, perennial allergic rhinitis, perennial nonallergic rhinitis, and vasomotor/chronic rhinitis
2. Describe the signs and symptoms of allergic rhinitis and contrast them with those of vasomotor/chronic rhinitis
3. Summarize the natural history of allergic rhinitis and contrast it with that of vasomotor/chronic rhinitis
4. Explain the pathophysiology of allergic rhinitis and contrast it with that of vasomotor/chronic rhinitis
5. Identify precipitating factors for rhinitis in
 - a) outdoor allergens (with knowledge of seasons, trees, grasses, weeds, and molds)
 - b) indoor allergens (dust mites, animal dander, cockroach feces, etc.)
 - c) irritants
 - d) physical factors
 - e) endocrine factors
6. Explain the roles of nasal smears and skin testing in the diagnosis of rhinitis
7. Describe methods to manage allergic rhinitis,
 - a) environmental control: home, school, work
 - b) antihistamines (oral, topical) including descriptions of different classes of antihistamines; relative contraindications, (benign prostatic hypertrophy, airplane pilot); and use in patients with concomitant asthma
 - c) decongestants
 - d) sympathomimetics (oral, topical)
 - e) cromolyn sodium
 - f) topical steroids
 - g) immunotherapy
8. List the complications of untreated allergic

rhinitis (including sinusitis, orthodontic problems, otitis media)

9. Describe quality of life issues in patients with allergic rhinitis
10. Discuss allergic/nonallergic conjunctivitis

Pregnant Patients With Asthma and/or Allergic Rhinitis

Priorities: Pediatrics 4, Internal Medicine 2,
Family Practice 1, Student 3

OBJECTIVES

Upon completion of this rotation, the rotator should be able to:

1. Describe the changes in pulmonary physiology with pregnancy
2. Discuss the effects of anti-asthma drugs on development of the fetus and the course of the pregnancy
3. List the drugs of choice for the treatment of mild intermittent asthma, mild persistent asthma, moderate persistent asthma, and severe persistent asthma in pregnancy
4. Describe the treatment of acute asthma in pregnancy
5. Describe the treatment of allergic rhinitis in pregnancy
6. Discuss the treatment of respiratory infections in pregnancy
7. Discuss allergy management in pregnancy, including environmental control and immunotherapy

Learning Objectives

Sinusitis

OBJECTIVES

1. Classify sinusitis based on duration of symptoms into (a) acute, (b) subacute, (c) chronic.
2. Describe signs and symptoms of acute versus chronic sinusitis.
3. Differentiate the microbiological causes of acute versus chronic sinusitis in children versus adults.
4. Discuss the pathophysiology of sinus disease and how underlying factors can be contributory including (a) allergic rhinitis, (b) basal polyposis, (c) anatomic/structural abnormalities, (d) viral URI.
5. Discuss tests used in the diagnosis of sinusitis including nasal smear, nasal culture and sensitivity, plain sinus x-ray versus CT scan.
6. Discuss the contribution of nasal polyps in patients with sinusitis.
7. Review paranasal sinus anatomy and development and discuss age limitations and the use of radiography (plain films or CT scan) in the diagnosis of sinusitis in children.
8. Discuss the radiographic findings of sinus x-ray/CT scan in patients with acute viral URI and allergic rhinitis versus sinusitis.
9. Discuss the incidence of aspirin sensitivity in patients with sinusitis.
10. Describe the different potential therapeutic modalities used in the treatment of sinusitis: (a) antibiotics, (b) decongestants (oral, topical), (c) antihistamines, (d) corticosteroids, topical and systemic, (e) duration of therapy.
11. Discuss surgical therapy for sinusitis in adults versus children.
12. Describe complications of sinusitis.
13. Describe effects of sinusitis on asthma.

Adverse Drug Reactions

Priorities: Pediatrics 1, Internal Medicine 1
Family Practice 2, Student 2

OBJECTIVES

Upon completion of this rotation, the rotator should be able to:

1. Classify adverse drug reactions and give examples, including:
 - a) toxicity
 - b) intolerance
 - c) side effects
 - d) idiosyncrasy
 - e) drug allergy
 - f) drug interactions
2. Explain the pathophysiology of drug allergy
 - a) Type I, immediate hypersensitivity (IgE mediated) drug reaction with several examples
 - b) Type II, cytotoxic-type drug reactions with examples
 - c) Type III, serum sickness: Arthus-type drug reaction with examples
 - d) Type IV, cellular hypersensitivity-type drug reaction with examples
3. Using penicillin as a model,
 - a) define hapten
 - b) list several different penicillin reactions, both immunologic and nonimmunologic
4. Explain the roles of clinical history, physical examination, and laboratory testing in the evaluation of adverse drug reactions
5. Discuss skin testing for penicillin allergy
6. Describe reactions to local anesthetics and use of graduated dose therapeutic trial
7. Identify several drugs that have been implicated in anaphylactic reactions

Learning Objectives

Adverse Reactions to Foods

Priorities: Pediatrics 1, Internal Medicine 3
Family Practice 2, Student 2

OBJECTIVES

Upon completion of this rotation, the rotator should be able to:

- 1 . Classify adverse reactions to foods and give examples of:
 - a) physiologic reaction
 - b) genetic enzymatic reactions
 - c) reactions of intolerance
 - d) toxic reactions
 - e) idiosyncratic reactions
 - f) reactions to food additives, bisulfites, tartrazine
2. Describe the pathophysiology of Type I, IgE-mediated food allergy reactions
3. List foods commonly implicated in Type I, IgE-mediated, hypersensitivity anaphylactic reactions
4. Explain methods to diagnose IgE-mediated hypersensitivity food reactions

Allergic Contact Dermatitis

Priorities: Pediatrics 2, Internal Medicine 2
Family Practice 3, Student 3

OBJECTIVES

Upon completion of this rotation, the rotator should be able to:

- 1 . Describe the etiology of this Type IV, cellular immunity type reaction
2. Describe typical distribution of contact dermatitis caused by different common contactants,
3. Describe patch tests and their role in the diagnosis of contact dermatitis
4. Outline a program of management for a patient with contact dermatitis including:
 - a) avoidance
 - b) oral steroids
 - c) topical steroids
 - d) soothing skin soaks
 - e) antipruritic drugs

Learning Objectives

Atopic Dermatitis

Priorities: Pediatrics 2, Internal Medicine 2
Family Practice 2, Student 3

OBJECTIVES

Upon completion of this rotation, the rotator be able to:

1. Define the terms “atopic dermatitis” and “eczema”
2. Identify the characteristic age at onset of atopic dermatitis and the typical distribution of skin involvement by age of the patient.
3. Discuss the triggers of atopic dermatitis including:
 - a) allergens including foods & airborne allergens
 - b) infections including staphylococcal
 - c) irritants such as soaps
4. Discuss the natural history of atopic dermatitis
5. List the complications of atopic dermatitis
6. List the differential diagnosis of atopic dermatitis
7. Describe typical laboratory findings in patients with atopic dermatitis
8. Outline a management for a patient with atopic dermatitis including:
 - a) environmental control
 - b) topical humidification & lubrication
 - c) topical steroids
 - d) dietary factors
 - e) treatment of complications

Stinging Insect Reactions

Priorities: Pediatrics 2, Internal Medicine 2
Family Practice 2, Student 3

OBJECTIVES

Upon completion of this rotation, the rotator should be able to:

1. List the insects that are members of the order Hymenoptera
2. Identify where in the natural habitat one could typically find a honey bee, wasp, yellow jacket, hornet, and fire ant
3. List common insects that may be responsible for untoward reactions, but are not of the order Hymenoptera, for example: kissing bug, mosquito, deerfly, and spider
4. Differentiate the reactions that can occur after insect stings including:
 - a) normal reactions
 - b) exaggerated local reactions
 - c) systemic reactions
 - d) delayed reactions
5. Describe the pathophysiology of a systemic reaction to a stinging insect
6. Explain the role of venom skin testing and in vitro serum IgE allergen specific assays in the diagnosis of stinging insect hypersensitivity
7. Outline an emergency treatment for a patient with:
 - a) local reaction to insect sting
 - b) exaggerated local reactions to insect sting
 - c) systemic reactions to insect sting
8. Explain long-term management of patient with insect sting reaction
9. List indications for venom immunotherapy in the prophylaxis of stinging insect hypersensitivity

Learning Objectives

Anaphylaxis

Priorities: Pediatrics 1, Internal Medicine 1
Family Practice 1, Student 1

OBJECTIVES

Upon completion of this rotation, the rotator should be able to:

1. Define anaphylaxis
2. List several causes of anaphylaxis including foods and medication
3. List the common causes of death from anaphylaxis
4. Explain the long term prophylactic management of anaphylaxis including:
 - a) prevention of occurrence through avoidance
 - b) Medic-alert identification
5. Create an emergency management plan for a patient with anaphylaxis including:
 - a) subcutaneously and intravenously administered epinephrine
 - b) IV fluids
 - c) endotracheal intubation
 - d) vasopressors
 - e) corticosteroids
 - f) antihistamines

Urticaria/Angioedema

Priorities: Pediatrics 3, Internal Medicine 3
Family Practice 3, Student 3

OBJECTIVES

Upon completion of this rotation, the rotator should be able to:

1. Define urticaria
2. Discuss the pathophysiology of the urticarial lesion (the wheal) including triple response of Lewis
3. Describe the natural history of
 - a) acute urticaria/angioedema
 - b) recurrent acute urticaria/angioedema
 - c) chronic urticaria/angioedema
4. Describe the pathophysiology of urticaria/angioedema, including Types I, II, and III hypersensitivity mechanisms; nonimmune mechanisms, including direct histamine release; and modifying factors including hormonal agents and medications such as aspirin.
5. List the categories of etiologic factors for urticaria/angioedema including:
 - a) ingestants
 - b) injectants
 - c) inhalants
 - d) disease states
 - e) emotional stress
 - f) hereditary factors
6. Outline logical attempts to identify etiologic factors contributing to urticaria/angioedema including:
 - a) history
 - b) physical exam
 - c) appropriate laboratory investigation
7. Outline a management program for a patient with urticaria/angioedema including:
 - a) environmental control
 - b) dietary manipulation
 - c) antihistamine therapy
 - d) sympathomimetic therapy
 - e) oral corticosteroid therapy
8. Describe hereditary angioedema including:
 - a) clinical presentation
 - b) laboratory findings
 - c) management-acquired versus congenital form

Learning Objectives

Pulmonary Function Tests

Priorities: Pediatrics 1, Internal Medicine 1
Family Practice 1, Student 1

OBJECTIVES

Upon completion of this rotation the rotator should be able to:

1. Label the lung capacities and lung volumes in a line drawing
2. Describe methods by which standard pulmonary function values have been obtained
3. List the most common pulmonary function values that are obtained in an office setting (peak flow measurement, spirometry, flow volume loop)
4. Discuss the role of spirometry in the diagnosis and management of asthma
Describe the typical spirometric and flow volume loop findings in patients with asthma, COPD, and laryngeal obstruction
6. Discuss functional versus non-functional causes of upper airway obstruction (vocal cord dysfunction)
7. Explain the measurement of non-specific bronchial hyperactivity by methacholine or histamine inhalation challenge
Explain exercise challenge testing including methods and interpretation of results
9. Explain antigen inhalation challenge test and pulmonary function test method to assess the results
10. Explain the aspirin challenge test including:
 - a) method
 - b) interpretation of results
 - c) risks associated with this procedure

Allergy Skin Testing

Priorities: Pediatrics 1, Internal Medicine 1
Family Practice 1, Student 1

OBJECTIVES

Upon completion of this rotation the rotator should be able to:

1. Describe the techniques of allergy skin testing
 - a) puncture (prick)
 - b) intradermal
2. List the advantages and disadvantages of each method
3. Explain the significance of a delayed skin reaction
4. List medications that interfere with allergy skin testing
5. Explain methods of antigen standardization
6. List 10 common antigens available for allergy skin testing
7. Describe clinical indications for performing allergy skin testing:
 - a) to make a diagnosis
 - b) to assist in environmental control
 - c) to predict the timing of a patient's allergy season
 - d) to determine the composition of extracts used for immunotherapy

Learning Objectives

Immunotherapy (allergy shots)

Priorities: Pediatrics 1, Internal Medicine 1
Family Practice 1, Student 3

OBJECTIVES

Upon completion the rotator should be able to:

1. List the indications for allergen immunotherapy including:
 - a) the presence of IgE-mediated allergy
 - b) clinical symptoms on exposure to the relevant allergens
 - c) unavoidable exposure to allergens to which the patient is sensitive
 - d) inadequate response to medical treatment and environmental control
2. List the contraindications for allergen immunotherapy including:
 - a) concomitant treatment with beta adrenergic-blockers or ACE inhibitors
 - b) cardiovascular insufficiency making it unlikely that the patient would survive anaphylaxis
 - c) pregnancy is a relative contraindication,
3. List equipment that should be available in any location where immunotherapy is given including:
 - a) epinephrine
 - b) inhaled beta agonist
 - c) IV fluids
 - d) oxygen
 - e) cardiac crash cart
4. List safety precautions to take when giving immunotherapy including:
 - a) measure peak flow before giving shots
 - b) patients should wait 20-30 minutes
 - c) shots should be given in a medical facility
5. Describe the treatment of a systemic reaction to an allergy shot.

Total and Allergen-Specific IgE

Priorities: Pediatrics 2, Internal Medicine 3
Family Practice 3, Student 3

OBJECTIVES

Upon completion the rotator should be able to:

1. List ranges of normal serum IgE levels according to age:
 - a) newborn
 - b) one-year-old child
 - c) ten-year-old child
 - d) adult
2. Discuss sensitivity and specificity of total serum IgE level as a screening test for patients with allergic disease
3. Describe in vitro techniques available to assay allergen specific IgE
4. Describe how the results of in vitro allergen specific IgE assays are reported in clinical practice
5. List conditions in which levels of total serum IgE are elevated; include examples of atopic and non-atopic diseases

Clinical Immunology

Clinical Immunology

Priorities: Pediatrics 1, Internal Medicine 1
Family Practice 3, Student 3

OBJECTIVES

Upon completion of this rotation the rotator should be able to:

1. Discuss the laboratory methodology for designating T-lymphocytes, B-lymphocytes, and NK cells
2. Explain the basic CD classification
3. List functions of Th1, Th2, and B cells
4. Describe briefly the interaction between T cells, B cells and macrophages
5. Describe the various classes of immunoglobulins and their functions
6. Rank IgE, IgA, IgG, IgM, and IgD in order of most concentrated in the serum
7. Discuss functions of IgG subclasses and their use in diagnosis of immunodeficiency
8. Discuss the use of functional antibody assays in the diagnosis of humoral immune deficiency
9. List the component of the complement system
10. Discuss the complement cascade including:
 - a) classic pathway
 - b) alternative pathway
11. Explain the immunobiologic role of each complement component
12. Explain the steps of phagocytosis
13. List two diseases with phagocytic dysfunction
14. Describe the known cytokines, interferons, and the growth factors including their role in inflammatory reactions
15. Classify hypersensitivity reactions
16. Explain anti-receptor reactions
17. Explain anti-idiotypic reactions
18. Classify immunodeficiency diseases including:
 - a) B cell immunodeficiency diseases
 - b) T cell immunodeficiency diseases
 - c) combined B cell and T cell immunodeficiency diseases
 - d) phagocyte dysfunction diseases
 - e) complement abnormalities
 - f) interleukin defects
19. For the immunodeficiency states above describe:
 - a) common presenting signs and symptoms
 - b) common physical findings
 - c) types of organisms typically causing infection
20. List three laboratory methods for screening for deficiency antibody-mediated immunity
21. List two laboratory methods for screening for cell-mediated immunity
22. List two laboratory test methods for screening for phagocytic deficiency
23. List two laboratory methods for screening of complement deficiency
24. List three laboratory methods for screening for autoimmune disease
25. List three laboratory methods of screening for HIV disease

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