

Information Pages

In 1991–1992, a number of ad hoc SPR committees were formed to address many issues before the society. Each committee has functioned effectively for three or more years – establishing practice guidelines, fostering new programs, encouraging membership participation and supporting leadership initiatives.

The work of one of these committees, Education and Training, is reported in this issue. This committee was charged to work to improve education at the medical student, resident, fellow and postgraduate levels. Initially, the committee was chaired by Don Kirks and more recently by Alan Schlesinger. The committee consists of ten members (Sam Auringer, Paula Brill, Ed Burton, Susan John, Don Kirks, Sarah Klein, Richard Markowitz, Donald Newman, Alan Schlesinger and Beverly Wood). The committee has conducted surveys of medical student teaching and has worked to develop pediatric radiology core curricula for different levels of training.

We anticipate that on this page or in accompanying journal articles we will communicate other SPR committee activities, review board work and announce meeting plans. Please suggest topics for upcoming issues.

Respectfully submitted,
Eric L. Effmann, M. D.
Chair, Board of Directors

A curriculum in pediatric radiology for diagnostic radiology residents

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Introduction

Webster's definition of 'curriculum' ("A set of courses constituting an area of specialization") is both concise and applicable. In 1992 the Education Committee of the Society for Pediatric Radiology (SPR) set out to establish a core curriculum for diagnostic radiology residents in the field of pediatric radiology. Several initial editorial decisions had to be made:

Was the curriculum to be organ centered or modality centered?

Was the curriculum to be a long list of diseases or a more concise document dealing with the more common entities?

Was the curriculum intended to be inclusive so that only those entities on the curriculum needed to be studied or was it intended to be a framework or guideline?

The answer to the above is a concise, organ-oriented, inclusive framework for learning. It is intended as a guide for the general diagnostic radiology resident studying pediatric radiology and for residency directors in planning resources for education in pediatric radiology. This curriculum has been endorsed by the Board of Directors of the SPR and is presented for use by educators in diagnostic radiology.

Preamble

This curriculum in pediatric radiology is intended as a guideline for training diagnostic radiology residents rotating on pediatric radiology. The resident should have experience with all of the included modalities and clinical entities. It is recognized that it is impossible during a rotation to have hands-on experience with each clinical entity. Therefore, the resident should supplement actual clinical practice with teaching materials (including teaching files and independent reading) as well as conferences.

These guidelines are provided as a framework for the body of knowledge which we would expect a radiology resident to have as part of his/her pediatric radiology training.

Cardiovascular System

I. Imaging Modalities

- A. Chest radiographs
 - 1. limitations
- B. Angiocardiography
 - 1. indications
 - 2. projections
- C. Echocardiography
 - 1. standard views
- D. CT (including ultrafast and helical)
- E. MR
 - 1. indications
 - 2. anatomy
- F. Nuclear cardiology

II. Congenital Heart Disease

- A. Congenital heart disease with decreased pulmonary blood flow (right-to-left shunt)
 - 1. Tetralogy of Fallot
 - 2. Ebstein anomaly
 - 3. tricuspid atresia
- B. Cyanotic congenital heart disease with increased pulmonary blood flow (left-to-right shunt)
 - 1. truncus arteriosus

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2. transposition of great arteries
3. single ventricle
4. total anomalous pulmonary venous return
5. endocardial cushion defect
- C. Acyanotic congenital heart disease with increased pulmonary blood flow (left-to-right shunt)
 1. ASD
 2. VSD
 3. PDA
 4. endocardial cushion defect
- D. Congenital heart disease with pulmonary venous congestion or normal pulmonary blood flow
 1. coarctation of aorta
 2. hypoplastic left heart syndrome
 3. aortic/mitral stenosis
 4. total anomalous pulmonary venous return below diaphragm
- E. Anomalies of visceratrial situs
 1. asplenia
 2. polysplenia
- F. Vascular rings and other congenital anomalies of great vessels
 1. left arch with anomalous right subclavian artery
 2. circumflex aorta (right aortic arch with left descending aorta)
 3. anomalous left pulmonary artery
 4. right aortic arch
 5. double aortic arch
- G. Syndromes with congenital heart disease or vascular disease
 1. Holt-Oram syndrome
 2. Marfan syndrome
 3. Turner syndrome
 4. William syndrome
 5. trisomy 21
 6. Schone syndrome
- H. Miscellaneous
 1. congenital absence of pericardium

III. Acquired Heart Disease

- A. Infectious/inflammatory
 1. pericarditis
 2. myocarditis
 3. rheumatic heart disease
 4. Kawasaki disease

IV. Cardiac Operations

- A. Palliative
 1. Glenn shunt
 2. Blalock-Taussig shunt
 3. Waterston shunt
- B. Operative repair
 1. Norwood procedure
 2. arterial switch
 3. Fontan procedure
 4. RV-to-pulmonary artery conduit
- C. Transplant

Gastrointestinal System

I. Imaging Modalities

- A. Plain radiographs
- B. UGI/SBFT
- C. Enteroclysis
- D. BE/air enema
- E. US
- F. CT
- G. MR
- H. ERCP
- I. Nuclear medicine

II. Normal Variants

III. Biliary System

- A. Congenital
 1. biliary atresia
 2. neonatal hepatitis
 3. choledochal cyst
- B. Acquired miscellaneous
 1. cholelithiasis
 2. hydrosis of gallbladder

IV. Liver

- A. Infection
 1. pyogenic abscess (including chronic granulomatous disease of childhood)
 2. ascending cholangitis
- C. Tumors and tumor-like conditions
 1. benign
 - a. mesenchymal hamartoma
 - b. hemangioendothelioma
 2. malignant
 - a. hepatoblastoma
 - b. metastases
- D. Trauma
 1. lacerations
 2. subcapsular hematoma
 3. contusion
- E. Portal hypertension
 1. cavernous transformation of portal vein
- F. Miscellaneous
 1. portal venous gas
 2. glycogen storage disease
 3. transplant

V. Spleen

- A. Congenital
 1. abnormal visceratrial situs
 2. wandering spleen
- B. Neoplasms
 1. benign
 - a. lymphangioma
 2. malignant
 - a. lymphoma/leukemia

- C. Trauma
 1. laceration
 2. contusion
 3. shattered spleen
 4. subcapsular hematoma
- D. Splenic infarction
 1. sickle cell disease

VI. Pancreas

- A. Congenital
 1. pancreas divisum
 2. cystic fibrosis
- B. Pancreatitis (and pseudocyst)
 1. trauma
 2. congenital anatomic abnormalities
 - a. pancreas divisum
 - b. choledochal cyst
 3. familial pancreatitis

VII. Pharynx and Esophagus

- A. Congenital and developmental anomalies
 1. esophageal atresia and TE fistula
- B. Inflammatory lesions
 1. retropharyngeal abscess/cellulitis
- C. Trauma
 1. foreign body
 2. iatrogenic pharyngeal perforation (due to NG or ET tube)
- D. Miscellaneous
 1. GE reflux

VIII. Stomach

- A. Congenital
 1. duplications
 2. antral webs
- B. Gastric outlet obstruction – acquired
 1. HPS
- C. Inflammatory
 2. corrosive ingestion
 3. chronic granulomatous disease
- D. Miscellaneous
 1. bezoars
 2. spontaneous rupture of stomach (neonates)
 3. volvulus

IX. Small Bowel

- A. Congenital
 1. malrotation (including preduodenal portal vein)
 2. duodenal, jejunal, and ileal stenosis and/or atresia
 3. annular pancreas
 4. meconium ileus

5. meconium peritonitis
 6. mesenteric and omental cysts
 7. duplication cysts
 8. Meckel diverticula (including omphalo-mesenteric band)
 9. omphalocele, gastroschisis
 10. hernias
- B. Neoplasms
1. benign
 2. malignant
 - a. lymphoma
- C. Malabsorption
1. CF
 2. cow's milk allergy
 3. intestinal lymphangiectasia
- D. Miscellaneous
1. necrotizing enterocolitis
 2. ischemic bowel
 3. intussusception
 4. Henoch-Schönlein purpura

X. Colon

- A. Congenital
1. imperforate anus
 2. duplications
 3. colonic atresia
- B. Functional disorders
1. Hirschsprung disease
 2. meconium plug/neonatal small left colon syndrome
- C. Infectious/inflammatory
1. appendicitis
- D. Neoplasms
1. benign
 2. malignant
 - b. lymphoma

XI. Miscellaneous

- A. Lines and catheters
1. umbilical arterial catheter
 2. umbilical venous catheter
- B. Pneumoperitoneum (signs on plain radiographs)

Genitourinary System

Imaging Modalities

- A. Plain radiographs
- B. IVU
- C. VCUG
- D. Retrograde urethrogram
- E. Nephrostogram
- F. Retrograde ureterogram
- G. US
- H. CT
- I. MR
- J. Nuclear medicine
- K. Interventional techniques
- L. Genitography

II. Normal Variants

III. Kidneys

- A. Congenital anomalies
1. UPJ
 2. duplication
 3. multicystic dysplasia
 4. agenesis
 5. hypoplastic kidney
 6. ectopia
 - a. ptosis
 - b. pelvic
 - c. crossed ectopia
 7. relationship of congenital renal anomalies with other congenital anomalies (VATER association, spinal dysraphism, etc.)
 8. cystic renal disease
 - a. autosomal recessive
 - b. autosomal dominant
 - c. cysts associated with malformation syndromes
- B. Inflammatory
1. acute pyelonephritis
 2. reflux nephropathy
- C. Neoplasms
1. Wilms tumor and variants
 2. nephrogenic rests
 3. mesoblastic nephroma
 4. multilocular cystic nephroma
 5. leukemia/lymphoma
- D. Trauma
1. subcapsular hematoma
 2. laceration (including those communicating with collecting system)
 3. contusion
 4. avulsion of renal pedicle
 5. UPJ avulsion or laceration
- E. Miscellaneous
1. renal vein thrombosis
 2. urolithiasis/nephrocalcinosis
 3. renal transplantation
 4. renovascular hypertension

IV. Adrenal Gland

- A. Neoplasms
1. neuroblastoma
- B. Trauma
1. hemorrhage and adrenal calcification

V. Bladder, Ureters, and Urethra

- A. Congenital
1. posterior urethral valves
 2. ureterovesical junction obstruction
 3. primary megaureter
 4. bladder diverticuli
 5. ureteral duplication
 6. ureterocele
 7. urachal abnormalities

8. hypospadias
 9. epispadias/exstrophy
 10. prune belly syndrome
 11. urologic sequela of ano-rectal anomalies
- B. Infectious/inflammatory
1. urinary tract infection
 2. viral cystitis
- C. Neoplasms
1. rhabdomyosarcoma
- D. Miscellaneous
1. vesicoureteral reflux
 2. neurogenic bladder
 3. dysfunctional voiding

VI. Male Genital Tracts

- A. Testicular torsion
- B. Infectious/inflammatory
1. epididymitis/orchitis
- C. Neoplasms
1. germ cell tumors
 2. germ cell plus stroma cell tumors
 3. gonadal stromal tumors

VII. Female Genital Tracts

- A. Congenital
1. congenital vaginal occlusion (hydrometrocolpos, etc.)
 2. fusion anomalies of the müllerian ducts (uterus didelphys, etc.)
 3. cloacal anomalies
- B. Neoplasms
1. ovaries
 - a. ovarian cysts (including torsion)
 - b. germ cell tumors
 2. uterus and vagina
 - a. rhabdomyosarcoma
 - b. clear cell adenocarcinoma
- C. Miscellaneous
1. differential diagnosis of intralabial masses
 - a. prolapsing ectopic ureterocele
 - b. obstructed paraurethral gland
 - c. imperforate hymen with hydrometrocolpos
 - d. urethral prolapse
 - e. sarcoma botryoides
 2. Intersex states
 - a. differential diagnosis
 - b. work-up

Neuroradiology

I. Imaging Modalities

- A. Plain radiographs
- B. CT
- C. MR
- D. Sonography
- E. Myelography
- F. Angiography

II. Normal Variants

III. Skull

- A. Congenital
 1. craniofacial syndromes
 2. congenital dermal sinus
 3. premature craniosynostosis
- B. Inflammatory
 1. osteomyelitis
- C. Trauma
 1. caput succedaneum
 2. subgaleal hemorrhage
 3. cephalohematoma
 4. fractures

IV. Spine

- A. Congenital
 1. absence or hypoplasia of odontoid
 2. os odontoideum
 3. segmentation anomalies
 4. Klippel-Feil anatomy
 5. Sprengel deformity
 6. VATER association
 7. butterfly vertebra
 8. spinal dysraphism
 9. diastematomyelia
 10. sacral agenesis (including caudal regression syndrome)
 11. partial absence (including Currarino triad)
- B. Inflammatory
 1. discitis
 2. tuberculous spondylitis
- C. Neoplasms
 1. Ewing sarcoma
 2. aneurysmal bone cyst
 3. osteoblastoma
 4. osteoid osteoma
 5. Langerhans cell histiocytosis of bone
 6. metastases (including leukemia and lymphoma)
- D. Trauma
 1. fractures/dislocations
 2. atlanto-dens and atlanto-occipital injuries
 3. spondylolysis/spondylolisthesis
- E. Miscellaneous
 1. Scheuermann disease
 2. scoliosis
 3. intervertebral disc calcification

V. Brain

- A. Congenital
 1. migrational disorders
 - a. lissencephaly
 - b. pachygyria
 - c. schizencephaly
 - d. heterotopic gray matter
 - e. polymicrogyria

- 2. holoprosencephaly
- 3. anomalies of corpus callosum
- 4. hydranencephaly
- 5. Dandy-Walker malformations
- 6. Chiari malformation
- 7. cephalocele
- 8. neurocutaneous syndromes
- 9. vein of Galen malformation
- 10. aqueductal stenosis
- B. Inflammatory
 1. bacterial infections (including meningitis, cerebritis and abscess)
 2. tuberculosis infections
 3. viral infections (encephalitis)
 - a. TORCH infections
 - b. AIDS
- C. Neoplasms
 1. posterior fossa
 - a. medulloblastoma
 - b. ependymoma
 - c. brainstem glioma
 - d. astrocytoma
 2. supratentorial
 - a. pineal region tumors
 - b. craniopharyngioma
 - c. astrocytoma
 - d. oligodendroglioma
 - e. PNET
 - f. choroid plexus tumors
- E. Cerebral infarction/ischemia
 1. arteritis
 2. sickle cell
 3. carotid occlusion
 4. venous sinus thrombosis
 5. hypoxic/ischemic injury in the newborn
 - a. intracranial hemorrhage
 - b. periventricular leukomalacia
- D. Trauma (including shaken baby syndrome)
 1. cerebral injury (including shearing injuries and concussion)
 2. subdural hematoma
 3. epidural hematoma
 4. subarachnoid hemorrhage
- F. Metabolic brain disorders
 1. leukodystrophies

VI. Spinal Cord

- A. Congenital
 1. myelomeningocele/meningocele
 2. lipomyelomeningocele
 3. diastematomyelia
 4. tethered cord
 5. dermal sinus
 6. intradural lipoma
 7. hydrosyringomyelia
- B. Tumors
 1. neurofibroma
 2. astrocytoma
 3. ependymoma
 4. metastases
 5. neuroblastoma, ganglioneuroblastoma, ganglioglioma
 6. sacrococcygeal teratoma

Chest and Airway

I. Imaging Modalities

- A. Plain radiographs
- B. CT (including high resolution)
- C. Bronchography
- D. Sonography
- E. Fluoroscopy
- F. Esophagography
- G. MR

II. Normal Variants

III. Upper Airway

- A. Congenital
 1. cystic hygroma
 2. branchial cleft cyst
 3. thyroglossal duct cyst
 4. tracheomalacia/bronchomalacia
 5. laryngeal stenosis, atresia, web
 6. laryngomalacia
 7. choanal atresia
- B. Inflammatory
 1. tonsillar enlargement/adenoidal hypertrophy
 2. croup
 3. epiglottitis
- C. Neoplasm
 1. juvenile angiofibroma
 2. subglottic hemangioma
 3. laryngeal papilloma
- D. Trauma
 1. foreign body
 2. acquired subglottic stenosis

IV. Chest

- A. Congenital
 1. agenesis/hypoplasia
 - a. venolobar syndrome
 2. bronchial atresia
 3. bronchopulmonary foregut malformation
 - a. sequestration
 - b. bronchogenic cyst
 - c. cystic adenomatoid malformation
 - d. congenital lobar emphysema
 4. tracheal bronchus
 5. lymphangiectasia
- B. Inflammatory
 1. infections
 - a. bacterial pneumonia (including *Streptococcus*, *Staphylococcus*, pertussis, *Chlamydia*, *Mycoplasma*, *H. influenza*) including round pneumonia, abscess, and postinfectious pneumatocele
 - b. viral pneumonia (including RSV, varicella, measles)
 - c. tuberculosis
 - d. *Pneumocystis* infection
 - e. fungal infections

2. AIDS
3. reactive airways disease
4. bronchiectasis
5. cystic fibrosis (including immobile cilia syndrome)
- C. Neoplasms
 1. mediastinal neoplasms
 - a. lymphoma/leukemia
 - b. teratoma
 - c. thymoma
 - d. neurogenic tumors
 2. primary lung tumors
 - a. adenoma
 - b. hamartoma
 - c. hemangioma
 - d. mesenchymal sarcoma (and its association with developmental cystic lesions of lung)
 3. metastatic lung neoplasms
 4. chest wall neoplasms (including Askin tumor)
- D. Trauma
 1. contusion
 2. airleak
 - a. pneumothorax
 - b. pneumomediastinum
 - c. pulmonary interstitial emphysema
 - d. bronchopleural fistula
 - e. fracture of tracheobronchial tree
 - f. airway foreign body
 - g. post-traumatic bronchial stenosis
 - h. post-traumatic diaphragmatic hernia
 - i. complications of tubes and lines
- E. Unique problems in neonate
 1. hyaline membrane disease
 2. transient tachypnea of newborn
 3. neonatal pneumonia
 4. congenital diaphragmatic hernia
 5. bronchopulmonary dysplasia
 6. meconium aspiration syndrome
 7. persistent fetal circulation
 8. ECMO therapy and its complications
 9. chylothorax
 10. airleak in the neonate
- F. Miscellaneous
 1. idiopathic pulmonary hemosiderosis
 2. collagen vascular diseases
 3. spontaneous pneumothorax
 4. cardiogenic and noncardiogenic pulmonary edema (including ARDS)
 5. histiocytosis

Musculoskeletal System

I. Imaging Modalities

- A. Plain radiographs
- B. CT

- C. MR
- D. Ultrasonography
- E. Nuclear medicine
- F. Arthrography
- G. Angiography

II. Normal Variants

III. Congenital

- A. Bone dysplasias
 1. osteochondrodysplasias affecting growth of tubular bones and spine (identifiable at birth)
 - a. thanatophoric dysplasia
 - b. chondrodysplasia punctata
 - c. achondroplasia
 - d. asphyxiating thoracic dystrophy
 2. osteochondrodysplasias affecting growth of tubular bones and spine (identifiable in later life)
 - a. metaphyseal chondrodysplasia
 - b. multiple epiphyseal dysplasia
 3. osteochondrodysplasias with disorganized development of cartilage and fibrous components of the skeleton
 - a. multiple cartilaginous exostoses
 - b. enchondromatosis
 - c. polyostotic fibrous dysplasia
 - d. neurofibromatosis
 4. abnormalities of density of cortical diaphyseal structure and metaphyseal modeling
 - a. osteogenesis imperfecta
 - b. osteopetrosis
 - c. pycnodysostosis
 - d. diaphyseal dysplasia
 - e. metaphyseal dysplasia
- B. Limb reduction anomalies (including proximal focal femoral deficiency and radial ray anomalies)
- C. Amniotic band syndrome
- D. Congenital bowing deformities and pseudoarthroses
- E. Congenital foot deformities
 1. pes planus
 2. talipes equinovarus
 3. pes cavus
 4. metatarsus adductus
- F. Skeletal abnormalities associated with Down syndrome
- G. Skeletal abnormalities associated with mucopolysaccharidoses and mucopolysaccharidoses
- H. Developmental dysplasia of hip
- I. Skeletal abnormalities associated with neuromuscular diseases
 1. meningocele
 2. cerebral palsy
 3. musculodystrophy

IV. Infectious/Inflammatory

- A. Pyogenic osteomyelitis
- B. Septic arthritis
- C. Toxic synovitis of the hip
- D. Tuberculosis
- E. Syphilis
- F. Juvenile rheumatoid arthritis
- G. Hemophilic arthropathy

V. Neoplasm

- A. Benign
 1. osteochondroma
 2. unicameral bone cyst
 3. aneurysmal bone cyst
 4. nonossifying fibroma/fibrous cortical defect
 5. fibrous dysplasia
 6. Langerhans cell histiocytosis of bone
 7. osteoid osteoma
 8. osteoblastoma
 9. chondroblastoma
 10. chondromyxoid fibroma
- B. Malignant
 1. Ewing sarcoma
 2. osteogenic sarcoma
 3. metastases (including leukemia/lymphoma)

VI. Trauma

- A. Fractures
 1. accidental trauma (including Salter-Harris, greenstick-bowing, and buckle fractures)
 2. nonaccidental trauma (battered child syndrome)
 3. slipped capital femoral epiphysis
 4. thermal injury

VII. Metabolic/Endocrine

- A. Rickets
- B. Renal osteodystrophy
- C. Hyperparathyroidism
- D. Hypoparathyroidism
- E. Hypophosphatasia
- F. Scurvy
- G. Bone age determination

VIII. Osteochondroses

- A. Legg-Perthes disease
- B. Kohler disease
- C. Freiberg disease
- D. Osteochondritis dissecans
- E. Blount disease and physiologic bowing