

Pediatric Health Care in Family Practice

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This paper describes the 32,926 health care problems of 9,117 pediatric patients visiting 12 Colorado family practices (4 rural, 3 urban, and 5 residency practices) over a one-year period. All 12 practices utilize the Family Medicine Information System (FMIS), a selectively automated system for storing and analyzing medical, family, and billing data. Age-sex distribution, visiting patterns, and morbidity are described for patients under 18 years of age. The 25 most frequent pediatric diagnoses account for 77 percent of visits, and 121 diagnoses account for 94 percent of pediatric visits. All diagnostic categories are explored in detail, and comparisons are made among urban, rural, and residency practices.

In recent years, several studies have outlined the general content of family practice in the United States.¹⁻⁸ Most of these have presented rank order listings of diagnoses across the whole age spectrum of family practice patients. The next step in understanding the content of family practice is the analysis of specific age ranges and disorders.

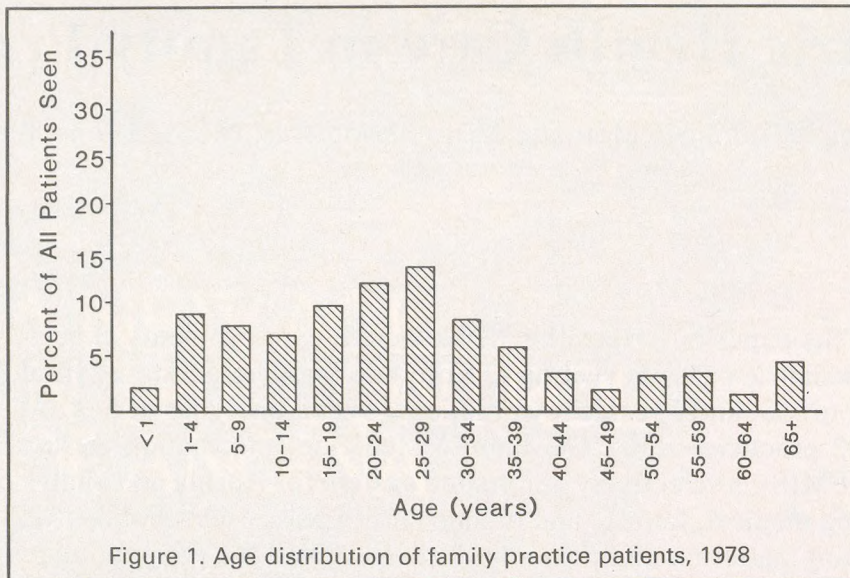
The only study in the United States with specific information on pediatric patients and diagnoses in family practice is the Virginia Study.¹ However, data in that study are presented by age groups that do not reflect the developmental stages in childhood, and there is no analysis of

childhood data. In addition, there are few data on newborn care in family practice, and there are no studies describing differences in pediatric problems for urban, rural, and residency family practices. This study reviews the pediatric experience of 12 private and teaching family practices during the year 1978 with attention to these issues.

Methods

The 12 participating practices contributed a uniform data set through the Family Medicine Information System (FMIS). The FMIS is a selectively automated medical information system that utilizes a paper record and centralized digital computer to record and analyze medical, family, and billing data.^{9,10} Data are coded by physicians and staff and entered through terminals in each office. Diagnoses are coded using the 1975 International Classification of Health Problems in Primary Care (ICHPPC) rubrics.¹¹ Table 1 describes the 12

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practices and the pediatric experience contributed by each type of practice. Urban and rural practices were defined according to *A Glossary of Primary Care*.¹²

Data were retrieved on all visits of patients less than 18 years of age in the one year from January 1, 1978, through December 21, 1978. The data were tabulated by age, sex, number of visits, and diagnoses. The pediatric age range was divided into the following groups: newborns, birth to discharge from hospital; infants, discharge to 24 months; preschoolers, 2 through 4 years; school age, 5 through 12 years; early to mid adolescence, 13 through 15 years; and mid to late adolescence, 16 through 18 years. Computer programs for retrieval and analysis of data were checked independently by two programmers and have been successfully used in previous studies.^{9,10}

Some of the ICHPPC rubrics do not lend themselves to pediatric diagnoses. In such cases, charts of pediatric patients receiving that diagnostic code were randomly audited in order to delineate the conditions included in it. All charts of newborns with diagnoses other than well-newborn care were reviewed in order to describe newborn diagnoses more fully than the ICHPPC system allows.

The Mantel-Haenszel chi-square procedure for multiple 2 x 2 tables¹³ was used to test for paired statistically significant differences among rural,

urban, and residency practice data. This procedure adjusts for differences in the age and sex distributions of the comparison groups.

Results

The 12 family practices utilizing the Family Medicine Information System saw 27,137 patients and made 115,074 diagnoses at 88,847 visits. Figure 1 depicts the age distribution of patients in these practices, which indicates that young families predominate. Age-sex distribution was similar for urban, rural, and teaching practices.

A total of 9,117 patients (33.6 percent of all patients) were less than 18 years of age. These pediatric patients accounted for 27,496 visits (30.9 percent of the total) and 32,926 diagnoses coded (28.6 percent). Urban practices had a much lower proportion of pediatric patients compared with rural and teaching practices (Table 1). Age-sex distribution and visiting patterns were very similar for all three groups. The pediatric age ranges in which the family physicians saw the most patients were infants and school-age children. Boys and girls were seen in equal numbers until mid to late adolescence, at which time the ratio of females to males shifted to 3 to 2. Infants were seen most

Table 1. Comparison of Practices, 1978

	Urban	Rural	Teaching	Total
Practices	3	4	5	12
Family physicians	4	5	10	19
Residents	0	0	68	68
Patients seen during year	6,102	6,813	14,222	27,137
Pediatric patients seen during year	1,423	2,689	5,005	9,117
Pediatric patients (%)	23.3	39.5	35.2	33.6

frequently, having 4.5 visits per year. Visiting frequency is consistent through childhood until adolescence. In late adolescence boys are seen less frequently and girls more frequently.

The top 25 pediatric diagnoses are presented in Table 2. The percent of diagnoses indicates the percentage of all diagnoses for the year that a particular diagnosis represents, regardless of whether it was the primary reason for the visit. These 25 diagnoses account for 77.5 percent of all diagnoses made on pediatric patients during the year. Percent of all pediatric patients refers to the percent of all pediatric patients who received the particular diagnosis at least once during the year. For example, upper respiratory tract infection accounted for 12 percent of all diagnoses, and 31.2 percent of all pediatric patients seen during the year had upper respiratory tract infection coded at least once.

Pediatric morbidity by organ system and general category is shown in Table 3. The categories are ranked according to the total number of times diagnoses in the category were made during the year. For example, respiratory disorders are the second most frequently diagnosed category, accounting for 7,211 diagnoses (21.9 percent of all diagnoses).

Well-child care was the most frequent reason for pediatric visits. There was no significant difference in percentage of well-child care visits for boys and girls at any age, including adolescence.

Patterns of well-child care were compared with the expected patterns according to guidelines suggested by the American Academy of Pediatrics. According to AAP guidelines, 100 percent of infants and preschoolers would be expected to re-

ceive well-child care each year. If school-age children and adolescents are expected to receive well-child care every two years, then 50 percent should receive well-child care each year. In the FMIS practices, rates in each age range came close to meeting expected rates except for preschoolers, who were seen one half as often as expected.

Respiratory tract disorders were the second most frequent diagnoses overall. The top 11 respiratory disorders accounted for 95 percent of the diagnoses in this category: upper respiratory tract infection (3,960 diagnoses, 54.9 percent), pharyngitis and tonsillitis (1,174 diagnoses, 16.3 percent), bronchitis and bronchiolitis (593 diagnoses, 8.2 percent), hayfever (436 diagnoses, 6.1 percent), asthma (286 diagnoses, 4.0 percent), pneumonia (260 diagnoses, 3.6 percent), laryngotracheitis or croup (117 diagnoses, 1.6 percent), sinusitis (102 diagnoses, 1.4 percent), influenza syndrome (89 diagnoses, 1.2 percent), epistaxis (42 diagnoses, 0.6 percent), and chest pain (42 diagnoses, 0.6 percent).

Ear disorders accounted for 1 in 10 diagnoses overall and 1 in 5 in infancy. Five disorders accounted for over 99 percent of ear disorders diagnosed in the family practices: acute otitis media (2,517 diagnoses, 74.3 percent), chronic/serous otitis media (634 diagnoses, 18.7 percent), otitis externa (116 diagnoses, 3.4 percent), wax in ear (65 diagnoses, 1.9 percent), and hearing loss (37 diagnoses, 1.1 percent).

Pediatric trauma had varying frequencies across age groups. One in 20 diagnoses in infants involved trauma, 1 in 10 in young school-age children, and 1 in 4 in adolescent boys. For infants and preschoolers, the most frequent diagnoses were

Table 2. Rank Order of Pediatric Diagnoses: Top 25 Diagnoses, 1978

Diagnoses	Percent of All Pediatric Diagnoses	Percent of All Pediatric Patients
1 Well-child care	25.2	53.8
2 Upper respiratory tract infection	12.0	31.2
3 Acute otitis media	7.6	14.2
4 Prenatal care	4.3	3.5
5 Pharyngitis/tonsillitis	3.5	9.0
6 Laceration	2.7	6.5
7 Sprains/strains	2.0	4.8
8 Chronic or serous otitis media	1.9	4.8
9 Bronchitis/bronchiolitis	1.8	4.8
10 Viral syndrome	1.4	4.6
11 Hayfever	1.3	2.5
12 Fracture	1.3	2.2
13 Bruise/contusion	1.2	4.0
14 Administrative*	1.2	3.6
15 Conjunctivitis	1.2	3.7
16 Infectious diarrhea	1.1	3.2
17 Abdominal pain (unknown etiology)	1.1	2.9
18 Warts	1.0	2.1
19 Cystitis	1.0	2.5
20 Asthma	0.9	1.7
21 Pneumonia	0.8	1.7
22 Eczema	0.7	2.0
23 Psychophysiologic gastrointestinal symptoms	0.7	1.8
24 Acne	0.6	1.6
25 Fever without an identified source	0.6	2.0
	77.5%	

*Administrative services for which the patient was billed, including filling out forms, writing letters, and making referrals

bruises/contusions, abrasions, lacerations, burns, and head injury. For older children and adolescents, sports injuries predominate, with sprains/strains and fractures becoming more common.

Dermatological disorders also varied with age. In infants and preschoolers, dermatological problems made up 5 percent of all pediatric problems; among adolescents, it was 10 percent. The top 16 diagnoses accounted for nearly 90 percent of the pediatric dermatologic problems: warts (326 diagnoses, 15.3 percent), eczema (229 diagnoses, 10.7 percent), acne (221 diagnoses, 9.9 percent), skin infections (175 diagnoses, 8.2 percent), nonspe-

cific rash, nonviral (166 diagnoses, 7.8 percent), impetigo (147 diagnoses, 6.9 percent), contact dermatitis (121 diagnoses, 5.7 percent), diaper rash (97 diagnoses, 4.6 percent), tinea (90 diagnoses, 4.2 percent), nonspecific viral exanthem (86 diagnoses, 4.0 percent), urticaria (59 diagnoses, 2.8 percent), chickenpox (56 diagnoses, 2.6 percent), bites and stings (47 diagnoses, 2.2 percent), seborrheic dermatitis (40 diagnoses, 1.9 percent), scabies (23 diagnoses, 1.1 percent), and pityriasis rosea (20 diagnoses, 0.9 percent).

Pediatric obstetrics is a major area in which family practice differs from pediatrics. The 317

**Table 3. Major Categories of Pediatric Morbidity
in Family Practice, 1978**

Category	Percent of All Pediatric Diagnoses	Number of Diagnoses
Well-child care	25.2	8,310
Respiratory tract disorders	21.9	7,211
Ear disorders	10.3	3,388
Trauma	8.9	2,930
Dermatologic problems	6.5	2,132
Obstetrical problems	4.3	1,417
Gastrointestinal disorders	4.0	1,317
Central nervous system disorders	1.9	625
Gynecological disorders	1.8	604
Psychosocial problems	1.8	595
Eye disorders	1.5	490
Hematological disorders	1.3	437
Urinary tract disorders	1.3	429
Administrative (letters, forms, referrals, etc)	1.2	405
Skeletal disorders (nontraumatic)	1.1	372
Perinatal morbidity	0.5	171
Endocrine disorders	0.3	107
Cardiovascular disorders	0.3	100
Nutritional problems	0.3	91
Growth and development disorders	0.3	89
Male genital disorders	0.2	66
Neoplasms	0.1	40
Muscle disease	0.1	7
Other	2.7	884
Undiagnosed problems	2.2	709
Total	100.0	32,926

patients (3.4 percent of all patients) who were seen for prenatal care accounted for over 4 percent of pediatric visits. Among school-age girls (6 to 12 years), 1 out of every 500 visits (0.2 percent) were for prenatal care. Among early to mid adolescence (13 to 15 years), 6 percent of visits were for prenatal care; and in mid to late adolescence (16 to 18 years), 30 percent of visits were for prenatal care. Of the 317 young women receiving prenatal care, 55 (17.4 percent) had complications.

Gastrointestinal disorders was one of the areas in which the ICHPPC codes presented the most difficulty in delineating pediatric diagnoses. Fourteen diagnoses accounted for 97 percent of all diagnoses in this category: infectious diarrhea

(353 diagnoses, 26.8 percent), abdominal pain, unknown etiology (349 diagnoses, 26.5 percent), psycho-physiologic gastrointestinal symptoms (224 diagnoses, 17.0 percent), undiagnosed nausea/vomiting (64 diagnoses, 4.8 percent), constipation (48 diagnoses, 3.6 percent), anal fissures (38 diagnoses, 2.9 percent), peptic ulcer disease (36 diagnoses, 2.7 percent), gastritis (35 diagnoses, 2.7 percent), inguinal hernia (33 diagnoses, 2.5 percent), oral cavity problems (30 diagnoses, 2.3 percent), appendicitis (26 diagnoses, 2.0 percent), hepatitis (20 diagnoses, 1.5 percent), esophageal disorders—chalasia, reflux (18 diagnoses, 1.4 percent), and ulcerative colitis/Crohn's disease (12 diagnoses, 0.9 percent). In order to discover how

the physicians coded various pediatric gastrointestinal diagnoses, randomly selected charts of patients with gastrointestinal diagnoses were informally reviewed. Abdominal pain of unknown etiology tended to include primarily self-limited, acute abdominal pain of probable viral origin (75 percent) and recurrent abdominal pain or probable psychosomatic origin (25 percent). Undiagnosed nausea/vomiting was mostly acute, self-limited, and apparently of viral origin.

Atopic disorders were found in 562 patients (6.2 percent of all pediatric patients). These disorders had the following distribution: allergic rhinitis (436 diagnoses, 45.8 percent), asthma (286 diagnoses, 30.1 percent), and eczema (229 diagnoses, 24.1 percent).

Central nervous system disorders mainly comprised three major categories of disease: headache (206 diagnoses, 33.0 percent), seizure disorders (188 diagnoses, 30.1 percent), and syncope/light-headedness (150 diagnoses, 24.0 percent).

Gynecological disorders accounted for 1 in 50 diagnoses overall, but the rate was more than 1 in 10 for adolescent girls. Five rubrics accounted for nearly 95 percent of all diagnoses in this category: contraception (190 diagnoses, 31.5 percent), vaginitis, all types (156 diagnoses, 25.8 percent), menstrual problems (151 diagnoses, 25.0 percent), pelvic inflammatory disease (44 diagnoses, 8.6 percent), and cervicitis (19 diagnoses, 3.2 percent). The most common form of contraception was oral (80 percent), followed by intrauterine device (10.0 percent). Ten percent of the visits for contraception were for contraceptive education only.

Psychosocial problems was another area made difficult to evaluate because of the ICHPPC rubrics. In this category, 12 rubrics account for nearly 90 percent of all diagnoses: parent-child interaction problems (121 diagnoses, 20.3 percent), behavioral problems (76 diagnoses, 12.8 percent), suicide attempt (69 diagnoses, 11.6 percent), enuresis (63 diagnoses, 10.6 percent), marital or family disruption (54 diagnoses, 9.1 percent), anxiety (48 diagnoses, 8.1 percent), depression (35 diagnoses, 5.9 percent), educational/learning problems (26 diagnoses, 4.4 percent), substance abuse (23 diagnoses, 3.9 percent), social maladaptation (9 diagnoses, 1.5 percent), psychoses (8 diagnoses, 1.3 percent), and unwed pregnancy (8 diagnoses, 1.3 percent). Chart review of selected rubrics was

necessary to identify the common pediatric psychosocial diagnoses. Parent-child interaction problems contained a host of issues: discipline problems, infant and preschooler behavior problems, anxious parents, vulnerable children, overprotective parents, and child abuse and neglect. Behavioral problems tended to be related to parental concerns or complaints about specific behaviors in the school-age child and adolescent. Hyperactivity accounted for about one quarter of the diagnoses in this category. Marital or family disruption usually referred to problems in the child pertaining to divorce, separation, or strife among parents. Anxiety and depression were diagnosed only in adolescents; and both were seen more often in girls (75 percent) than boys (25 percent). Boys received the diagnoses of behavior problems and educational/learning problems more often (70 percent) than girls (30 percent).

Eye disorders included a relatively limited number of disorders. The three most common were conjunctivitis (393 diagnoses, 80.2 percent), refractive error (40 diagnoses, 8.2 percent), and blocked tear duct (34 diagnoses, 6.9 percent).

Hematological disorders, using ICHPPC codes, fell into four categories: adenitis (165 diagnoses, 37.8 percent), anemias (153 diagnoses, 35.0 percent), mononucleosis (110 diagnoses, 25.2 percent), and coagulation disorders (9 diagnoses, 2.0 percent). Adenitis was nearly always acute or subacute cervical adenitis. Iron deficiency anemia was diagnosed six times more often than all other anemias combined, and the peak, predictably, was in infancy and early preschool years.

Urinary tract disorders were predominantly infectious (90 percent). Disorders in this category included cystitis (324 diagnoses, 75.5 percent), urethritis (31 diagnoses, 7.2 percent), pyelonephritis (30 diagnoses, 7.0 percent), and glomerulonephritis (24 diagnoses, 5.6 percent). The frequency of urinary tract infections was similar for boys and girls in infants and school-age children (an incidence of 0.7 percent). There were two peak ages for girls: preschoolers (3.0 percent of all diagnoses in the age group) and mid to late adolescence (2.5 percent of all diagnoses in that age group).

Nontraumatic skeletal disorders refer to disorders of the skeletal system not associated with acute trauma. The most common disorders in this category included low back pain (130 diagnoses,

35 percent), osteochondroses (62 diagnoses, 16.7 percent), and scoliosis (55 diagnoses, 14.8 percent).

Neonatal morbidity is a single rubric in ICHPPC into which all neonatal diagnoses other than well newborn are placed; therefore, this category was explored by chart review. Of all newborns delivered by the family physicians in the FMIS, 10.5 percent received the diagnosis of neonatal morbidity. Twenty-one diagnoses account for 95 percent of all problems coded. The top nine accounted for 75 percent: hyperbilirubinemia (54 diagnoses, 31.6 percent), prematurity (17 diagnoses, 9.9 percent), cephalhematoma (10 diagnoses, 5.9 percent), small for gestational age (9 diagnoses, 5.3 percent), hypoglycemia (8 diagnoses, 4.9 percent), psychosocial problems (8 diagnoses, 4.9 percent), asphyxia (8 diagnoses, 4.9 percent), large for gestational age (7 diagnoses, 4.1 percent), and transient tachypnea of newborn (6 diagnoses, 3.5 percent).

Endocrine disorders were relatively infrequent and consisted predominantly of three types of disorders: diabetes mellitus (47 diagnoses, 43.9 percent), hypothyroidism (27 diagnoses, 25.2 percent), other thyroid disorders (19 diagnoses, 17.8 percent), and other (14 diagnoses, 13.1 percent). Diabetes mellitus was found in school-age children and adolescents only.

Cardiovascular disorders were also infrequent. Hypertension was the most common (55 diagnoses, 55.0 percent), followed by congenital heart disease (21 diagnoses, 21.0 percent), rheumatic fever (8 diagnoses, 8.0 percent), arrhythmias (6 diagnoses, 6.0 percent), and other (10 diagnoses, 10.0 percent). The rubric "benign murmurs" was not used by any of the physicians. Congenital heart disease was predominantly an infant diagnosis. The rest of the diagnoses increased in incidence with age.

Nutritional disorders included the following rubrics: obesity (56 diagnoses, 61.5 percent), feeding problems (28 diagnoses, 30.8 percent), and isolated nutritional deficiencies (7 diagnoses, 7.7 percent). Obesity was diagnosed predominantly in adolescent girls; feeding problems were diagnosed almost exclusively in infancy.

Developmental disorders referred to delayed development, speech disorders, gross and fine motor delays, mental retardation, and global retardation. They were diagnosed predominantly in infants and preschoolers.

Male genital disorders may have been under-coded, particularly hydroceles (15 diagnoses, 22.7 percent). Other diagnoses included phimosis/balanitis (15 diagnoses, 22.7 percent), undescended testes (12 diagnoses, 18.2 percent), minor trauma (8 diagnoses, 12.0 percent), epididymitis/orchitis (5 diagnoses, 7.6 percent), prostatitis (5 diagnoses, 7.6 percent), and testicular torsion (3 diagnoses, 4.6 percent).

Neoplasms included benign neoplasms (19 diagnoses, 47.5 percent), malignancies (17 diagnoses, 42.5 percent), and "unspecified neoplasms" (4 diagnoses, 10.0 percent).

Muscle disorders were very rare (7 diagnoses, 0.2 percent).

Other conditions that did not fit easily into the categories described above included seven rubrics: undiagnosed signs or symptoms (709 diagnoses, 2.2 percent), viral syndrome (465 diagnoses, 1.4 percent), fever without an identified source (208 diagnoses, 0.6 percent), congenital anomalies (83 diagnoses, 0.3 percent), fatigue/malaise (58 diagnoses, 0.2 percent), adverse effects of treatment (44 diagnoses, 0.1 percent), and failure to thrive (26 diagnoses, 0.1 percent).

Comparisons of Rural, Urban, and Teaching Practices

Although urban practices differed in the proportions of pediatric patients, all practices were very similar in content. The top diagnoses were essentially the same for each type of practice, and the rank orders of these diagnoses were very similar.

Discussion

This study substantiates the assumption that the pediatric population in residency practices is similar to that in private family practices in age-sex distribution, visiting patterns, and morbidity patterns. The major differences between practices was the lower proportion of pediatric patients in urban practices, which probably reflects shared care with pediatricians, who tend to concentrate in urban areas. The difference between practices in the frequencies of certain diagnoses may simply reflect interphysician variability in coding. The association of high rates of teenage pregnancy and

increased rates of parent-child interaction problems in residency practices, however, is an interesting association.

Twenty-five diagnoses accounted for over 75 percent of visits, and 121 diagnoses made up 94 percent of pediatric care. There were few surprises among the top diagnoses, except for perhaps "pediatric" obstetrical care. There were some diagnoses made with surprisingly low frequency: benign murmurs, hydroceles, nevi, learning problems, developmental delays, gonorrhea, tobacco abuse (1 out of 600 adolescents) and other substance abuse (1 out of 1,500 patients). It is unclear whether this is undercoding, underdiagnosis, or real.

Previous studies of the content of family practice have often created as many, if not more, questions as they have answered. So, too, the data presented here have definite implications for practice and teaching, but suggest many other questions for further research.

Frequency data can be useful to the practitioner in several ways. The practitioner can identify the very common pediatric problems and develop educational materials regarding them in order to increase patient knowledge and decrease physician effort. Frequency data can also aid in choosing staff in-services. The recognition that 25 diagnoses account for three quarters of pediatric visits adds considerable justification for such allied health professionals as pediatric nurse practitioners, child health associates, and physicians' assistants. This is particularly true in rural sites, where pediatric care is 39.5 percent of the practice.

The residency practices appear to provide representative pediatric populations for the training of residents. The FMIS data also provide an indication of the common pediatric diagnoses handled by the family physician. Family practice curricula should, at a minimum, teach these common problems.

There are many common pediatric disorders for which the natural history is not yet completely researched. The family physician is in the best position to determine how the presentation of these common disorders relates to the family makeup, health, and illness patterns. For example, fever without an obvious source is a common pediatric problem in family practice (25th most common) and has received considerable attention in the pediatric literature. The pediatric studies have

been done in medical center emergency rooms and pediatric practices. The natural history, etiology, and management of this syndrome in family practice has not been documented.

Since descriptive studies such as this are dependent on the quality of charting or coding of data, there is a need for a coding system that more accurately portrays both pediatric diagnoses and behavioral science issues. In the 1970s family medicine began defining the content and limits of its domain. In the 1980s there is a need to shift from exploring the breadth of the specialty to defining its depth, by looking at specific subpopulations and specific conditions in greater detail.

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