Adolescent Health Care in Family Practice

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This paper describes the 12,414 health care problems of 3,657 adolescent 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, a selectively automated system for storing and analyzing medical, family, and billing data. Age-sex distribution, visiting patterns, and morbidity are described for patients between 13 and 20 years of age. The 25 most frequent adolescent diagnoses account for 74 percent of visits, and 134 diagnoses account for 95 percent of pediatric visits. Significant sex differences and differences among early, middle, and late adolescent age groups are described. All diagnostic categories are explored in detail, and comparisons are made between urban, rural, and residency practices.

Several studies have outlined the general content of family practice in the United States by presenting rank order listings of diagnoses across the whole age spectrum of family practice patients.[1-8] The next step in understanding the content of family practice is the analysis of specific age ranges and disorders. Although all of the previous studies have included adolescents, there have been no studies specifically analyzing adolescent health care in family practice.

Studies from other disciplines such as adolescent medicine, pediatrics, or internal medicine have evaluated data from in-hospital services, ju-venile detention centers, and ambulatory clinics of large hospitals, or have surveyed youth on their perception of their needs.[9-15] There have been no reports of actual diagnoses for adolescent patients in an office practice setting. This study reviews the adolescent health care experience of 12 family practices during 1978.

Methods

The 12 participating practices contribute a uniform data set through the Family Medicine Information System (FMIS). The FMIS, described previously,[16-18] 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. Data are coded

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
Adolescent patients seen during year	659	1,022	1,976	3,657
Percentage of adolescent patients	10.8	15.0	13.9	13.5

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. Table 1 describes the 12 practices and the adolescent patient care experience contributed by each type of practice. Urban and rural practices were defined according to the "Glossary for Primary Care."[19]

Data were retrieved on all visits of patients between 13 and 20 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 adolescent age range was divided into the following groups: early adolescence, 13 through 15 years; middle adolescence, 16 through 18 years; and late adolescence, 19 through 20 years. Computer programs for retrieval and analysis of data were checked independently by two programmers and have been successfully used in previous studies.[16,18]

Some of the ICHPPC rubrics do not lend themselves to adolescent diagnoses. In these cases, charts of adolescent patients receiving those diagnostic codes were audited to delineate the conditions included in it.

The standard chi-square procedure was used for comparisons between age and sex groups. The Mantel-Haenszel chi-square procedures for multiple 2×2 tables[20] were used to test for pairwise 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. Young families predominate in these practices, and the age-sex distribution was similar for urban, rural, and teaching practices.

A total of 3,657 patients (13.5 percent of all patients) were between 13 and 20 years of age. These adolescent patients accounted for 10,289 visits (11.6 percent of the total) and 12,414 diagnoses coded (10.8 percent). Urban practices had a lower proportion of adolescent patients compared with rural and teaching practices (Table 1). Visiting patterns were similar for all three groups. Male and female patients were seen in equal numbers until middle adolescence, when the female:male ratio shifted to 3:2. In late adolescence, the ratio became 2:1.

The top 25 adolescent diagnoses are presented in Table 2. These diagnoses are ranked according to the frequency with which they were coded during the year. These 25 diagnoses accounted for 74.1 percent of all diagnoses made on adolescent patients during the year. Percent of all patients refers to the percentage who received the particular diagnoses at least once during the year. For example, while obstetrical care (prenatal and delivery) was coded 1,974 times during the year, representing 15.9 percent of all diagnoses, only 12.5 percent of all adolescent patients seen during the year had obstetrical care. By contrast, upper res-

Table 2. Rank Order of Top 25 Adolescent Diagnoses		
Diagnosis	Percent of All Pediatric Diagnoses	Percent of All Adolescent Patients
1. Obstetrical care (prenatal and delivery)	15.9	12.5
2. General health maintenance	13.3	39.0
3. Upper respiratory tract infection	8.4	22.1
4. Sprain	4.2	7.9
5. Contraception	3.1	8.5
6. Laceration	2.7	6.2
7. Pharyngitis/tonsillitis	2.3	6.7
8. Abdominal pain, unknown etiology	1.8	4.4
9. Acne	1.8	4.2
10. Cystitis	1.7	4.0
11. Bruise/contusion	1.7	5.1
12. Vaginitis	1.7	4.6
13. Fracture	1.7	2.8
14. Menstrual disorders	1.6	3.6
15. Warts	1.6	3.1
16. Bronchitis	1.4	4.2
17. Hay fever	1.4	2.6
18. Acute otitis media	1.3	3.1
19. Headache, nonspecific or tension	1.2	3.3
20. Viral syndrome	1.1	3.4
21. Skin infection	1.1	2.4
22. Obesity	1.0	1.8
23. Mononucleosis	0.7	1.5
24. Asthma	0.7	1.3
25. Sinusitis	0.7	1.7
Total	74.1	100.0

piratory tract infection accounted for 8.4 percent of all diagnoses coded, and 22.1 percent of adolescent patients had an upper respiratory tract infection diagnosed and coded during the year.

Adolescent morbidity by disease category is shown in Table 3. The categories are ranked in order of cumulative frequency of all diagnoses during the year. For example, respiratory tract disorders were the most frequently diagnosed category of problems, accounting for 2,049 diagnoses (16.5 percent of all diagnoses). Overall, the top ten dis-

ease categories, together with health maintenance, accounted for nearly 90 percent of all diagnoses.

Respiratory tract disorders were the most frequently coded category overall. However, in mid and late adolescence, trauma generated more visits for boys and obstetrics for girls. There was no significant difference in the frequency of respiratory tract problems among age groups or between sexes. Nine disorders accounted for 96.5 percent of all diagnoses in this category: upper respiratory tract infection (51.3 percent), pharyngitis or tonsil-

Table 3. Major Categories of Adolescent Morbidity in Family Practice, 1978		
Category	Percent of All Adolescent Diagnoses	Number of Diagnoses
Respiratory tract disorders	16.5	2,049
Obstetrical care	16.2	2,013
General health maintenance	13.3	1,646
Trauma	12.3	1,527
Dermatologic disorders	7.9	977
Gynecologic disorders	7.9	977
Gastrointestinal disorders	4.3	528
Ear disorders	2.5	316
Central nervous system disorders	2.4	304
Urinary tract disorders	2.4	301
Psychosocial problems	2.2	268
Nontraumatic skeletal disorders	2.2	267
Hematologic disorders	1.6	201
Eye disorders	1.1	137
Administrative	1.0	125
Nutritional disorders	1.0	121
Cardiovascular disorders	0.9	107
Endocrine disorders	0.7	81
Neoplasms	0.3	33
Male genital disorders	0.1	17
Muscle diseases	0.1	9
Other	3.3	410
Total	100.0	12,414

litis (14.0 percent), bronchitis (8.9 percent), hay fever (8.8 percent), asthma (4.0 percent), sinusitis (3.9 percent), influenza (2.2 percent), chest pain, nonspecific (1.9 percent), and pneumonia (1.5 percent).

Obstetrical care was the second most frequent category overall, and the most frequent reason for a visit in middle and late adolescence. The 488 adolescent obstetrical patients (13.3 percent of all adolescents) accounted for 19.9 percent of all adolescent visits. Six percent of early adolescent girls received obstetrical care. This distinction between early and middle to late adolescent girls was highly significant ($\chi^2 = 140$, P < .000001). Complications were diagnosed in 63 of 457 pregnancies (13.8 percent). The complication rate was greatest among early adolescents (20 percent) and lowest among late adolescents (11 percent).

General health maintenance (GHM) ranked third overall, with early adolescents seeking a significantly greater amount of health maintenance than middle or late adolescents (P = .001). Throughout all age groups, more boys made health maintenance visits than did girls, though obstetrical care and some gynecologic care include an unquantified amount of health maintenance care as well. The American Academy of Pediatrics recommends GHM visits every two years. Only 39 percent of adolescents in this one-year review had GHM coded.

Trauma accounted for 12.3 percent of all diagnoses and was fourth in rank. This was the most

frequent reason for visits for boys (22 percent of all visits), and in all age groups, boys suffered significantly more trauma than did girls (P < .001 for all ages). Early and middle adolescents were similar in this category, suffering significantly more trauma than late adolescents (P < .001). Ten conditions accounted for 98.7 percent of all trauma: sprains (33.9 percent), lacerations (22.0 percent), fractures (14.0 percent), bruises or contusions (13.7 percent), abrasions (4.4 percent), burns (3.9 percent), closed head trauma (2.9 percent), dislocation (1.6 percent), foreign bodies (1.2 percent), and bites or stings (1.1 percent).

Dermatologic disorders were ranked fifth overall, accounting for 7.9 percent of all diagnoses. Visits for skin problems were slightly more frequent in early adolescence than in mid or late adolescence (P < .05). There was no sex difference in rate of diagnosis. The top ten diagnoses in this category account for just over 80 percent of all skin problems: acne (22.3 percent), warts (20.1 percent), skin infections (13.7 percent), contact dermatitis (5.5 percent), eczema (4.3 percent), tinea (4.2 percent), nonspecific rash (4.1 percent), herpes (3.3 percent), urticaria (1.7 percent), and pityriasis rosea (1.2 percent).

Gynecologic disorders were sixth overall, but fourth among girls, totaling 11.4 percent of their visits. Frequency of visits for gynecological disorders increased with age, and the frequency of visits for middle adolescent girls was nearer to the late adolescents than to the early adolescents. Five disorders account for 96.2 percent of problems: contraception (40.9 percent), vaginitis (22.6 percent), menstrual disorders (21.0 percent), pelvic inflammatory disease (9.5 percent), and cervicitis (2.2 percent). Gonorrhea was diagnosed in 15 girls (0.7 percent of all female patients) and in six boys (0.4 percent of all male patients). The most frequent form of contraception was the pill (57.2 percent), followed by intrauterine device (28.3 percent), and other (7.4 percent). Seven percent of visits involved counseling only. No boys had contraceptive care coded. Interestingly, breast disorders were nearly as common in boys (13 diagnoses) as in girls (15 diagnoses), with most male problems occurring in early adolescence.

Gastrointestinal disorders were seventh, with 4.3 percent of all diagnoses. Middle and late adolescents were similar in experiencing more gastrointestinal problems than early adolescents. By far,

the most frequent diagnosis in this category was abdominal pain of unknown etiology (42.8 percent), followed by infectious diarrhea (11.9 percent), psychophysiologic symptoms (7.6 percent), peptic ulcer disease (6.8 percent), gastritis (5.1 percent), appendicitis (4.2 percent), constipation (3.4 percent), inguinal hernia (2.3 percent), dental caries (1.6 percent), and hepatitis (1.3 percent). These 10 accounted for 87 percent of gastrointestinal disorders. Girls had significantly more abdominal pain of unknown cause than did boys (P < .001).

Ear disorders presented in 1 of 40 visits. The frequency decreased with age. Five problems represented 97 percent of ear disorders: acute otitis media (51.9 percent), serous otitis media (23.7 percent), otitis externa (12.0 percent), ear wax (5.7 percent), and hearing loss (3.5 percent).

Central nervous system disorders also accounted for 1 in 40 visits. There were no age or sex differences of significance. Problems in this category included headaches (48 percent), seizure disorder (25 percent), syncope or lightheadedness (14.5 percent), and other (12.5 percent). Headaches included tension (37.7 percent), migraine (24.6 percent), and others (37.7 percent).

Urinary tract disorders represented 2.4 percent of all diagnoses. Middle and late adolescents had significantly more problems in this area than did early adolescents (P < .01). Girls had significantly more problems than did boys (P < .001). Four diagnoses accounted for 97 percent of all problems: cystitis (80.9 percent), pyelonephritis (6.4 percent), urethritis (5.2 percent), and glomerulonephritis (4.5 percent).

Psychosocial problems were coded for about 1 in 50 visits. Middle adolescents again behaved in a manner similar to late adolescents, only in this case with fewer problems diagnosed than early adolescents. The major problems encountered included depression (15.7 percent), anxiety (15.7 percent), suicide attempt (10.4 percent), family disruption (9.3 percent), parent-child conflict (8.6 percent), behavior problems (8.2 percent), unwed pregnancy (6.3 percent), substance abuse (6.3 percent), learning disorder (3.7 percent), psychosis (3.0 percent), social maladjustment (2.2 percent), and enuresis (1.9 percent). Depression and anxiety were three times more common in girls (though numbers were small), and the peak for both disorders was in middle adolescence. By contrast, be-

havior problems, school problems, and learning disorders were diagnosed three times more commonly for boys than they were for girls.

Nontraumatic skeletal disorders included four main diagnoses: back pain (34.6 percent), osteochondrosis (22.2 percent), scoliosis (19 percent), and arthritis (13.1 percent).

Hematologic disorders accounted for 1.6 percent of all diagnoses. Four disorders accounted for 99 percent of diagnoses in this category: mononucleosis (42.8 percent), adenitis (33.8 percent), anemia (19.4 percent), and coagulation disorders (3.0 percent). Iron deficiency anemia was 12 times more common than all other anemias combined, and was diagnosed only in girls.

Eye disorders were diagnosed in only 1 out of every 100 visits. Four diagnoses accounted for over 85 percent of diagnoses in this category: conjunctivitis (49.0 percent), refractive error (19.0 percent), foreign body or corneal abrasion (16.0 percent), and loss of vision (1.5 percent). Foreign bodies were diagnosed predominantly in boys (91 percent).

Nutritional disorders were also diagnosed once in every 100 visits. Obesity was virtually the only diagnosis made in this category, and it was coded four times more commonly in girls.

Cardiovascular disorders were diagnosed slightly less than once in 100 visits. Five diagnoses accounted for 78.5 percent within this category: hypertension (50.0 percent), congenital heart disease (9.3 percent), rheumatic disease (7.5 percent), phlebitis (5.6 percent), and arrythmias (5.6 percent). Hypertension was diagnosed three times more frequently in boys.

Endocrine disorders involved 0.7 percent of visits. Three diagnoses accounted for 90 percent of this category: diabetes mellitus (44.4 percent), hypothyroidism (24.7 percent), and other thyroid disorders (21.0 percent). Thyroid disorders were diagnosed in girls only.

Neoplasms were coded in 1 out of every 333 visits. The majority were benign (76 percent).

Male genital disorders were diagnosed only 17 times out of 1,488 male patients seen. The distribution was prostatitis (7), orchitis or epididimitis (7), hydrocele (1), undescended testes (1), and other (1).

Muscle diseases were also rare, with a frequency of 9 diagnoses in 3,657 patients.

Other diagnoses that do not easily fit into the morbidity categories include viral syndrome (136 diagnoses, 1.1 percent of all diagnoses), malaise (54 diagnoses, 0.4 percent), and fever without a source (20 diagnoses, 0.2 percent).

Comparisons of Rural, Urban, and Teaching Practices

Although urban practices had fewer adolescent 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 also very similar.

Discussion

Adolescence is the stage of physiologic and psychological transition from childhood to adulthood. The data presented here indicate that adolescence is also a period of transition from pediatric to adult health care. The visiting patterns and diagnoses of the early adolescent group (13 to 15 years) resemble the pediatric age range, and those of the late adolescent group (19 and 20 years) resemble adults. The middle adolescent range (16 to 18 years) appears to be the group in greatest transition. But the transition appears uneven. For some diagnostic categories, the middle adolescent group resembles the pediatric range (trauma, dermatological disorders, and ear disorders); in other areas, their diagnoses resemble adult patterns (general health maintenance, obstetrics, gynecological disorders, genitourinary problems, and psychosocial problems). This certainly supports the notion that the broad training of family physicians makes them well-suited to care for adolescents.

Interestingly, there were no diagnoses made that were unique to the adolescent age range. All of the diagnoses are traditionally taught in pediatric, internal medicine, or obstetrical curricula. This may be an artifact of the coding system, which is not sensitive to adolescent problems. In

addition, it is likely that adolescents visit physicians at a low rate relative to the actual problems they have. If, however, these data accurately portray adolescent diagnoses, there are implications for training. Family practice training might focus less on traditional didactic teaching regarding diagnosis and treatment and more on (1) how adolescents perceive and react to these disorders, (2) how self-image is affected, (3) how physicians can best relate to the adolescent and his or her parents, (4) how physicians can enhance compliance, and (5) how the disorder interacts with the adolescent's developmental stage.

The FMIS data underscore the importance of several specific adolescent health care issues: teenage pregnancy; contraceptive counseling (including boys); sports medicine and orthopedics; recognition of adolescent substance abuse, depression, and anxiety; psychophysiologic symptoms; osteochondroses; adolescent obesity; and malaise. These data also point out interesting patterns of diagnosing (or coding) adolescent health problems. For example, depression and anxiety are predominantly diagnosed in adolescent girls, but school problems and behavior problems are predominantly male diagnoses. It is unclear whether these sex differences are real or due to the difficulty in identifying the depression underlying school problems and behavior problems ("masked depression"). Psychosocial problems in general were diagnosed in 1 of every 50 visits. There is considerable evidence that the incidence is likely to be much higher.[11,12,15] Substance abuse (tobacco, drug, or alcohol) was diagnosed in 4 of every 1,000 adolescent patients. Conservative estimates of actual incidence suggests at least 10 to 15 percent.[12] Thus, recognition of adolescent behavioral science issues has to be a high priority in family practice training programs.

This type of study not only can help family practice faculty focus attention on specific topics to be taught; it can also help residents develop a sense of the family physician's domain. It can be very reassuring for residents to find that 80 percent of the adolescent dermatological problems they will encounter can be managed by learning ten disorders. And 95 percent of the diagnoses adolescents will bring to them is accounted for by 134 diagnoses. What is more reassuring is that all of the 134 diagnoses are common in adults or children, and the resident is likely to learn the medical aspects of these disorders on other rotations. This frees the resident to learn more about adolescent needs and how to respond to them.

This type of data can be useful in curriculum design to the extent that it helps to identify common problems. Similar data are needed to better define the depth of family medicine in relation to other specific age groups and populations.

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