

The Hospital Work of a Family Practice Group in a Medium Size Community in New England

Ronald C. Slabaugh, PhD, MSSW, Mark Ringiewicz, BA, and Robert A. Babineau, MD
Worcester, Massachusetts

This study examines the hospital work of four family physicians in group practice in a community of 45,000 in north central Massachusetts. During the study year, these four physicians assumed primary management responsibility for 1,021 hospitalizations for an average of 255 admissions per physician. Most admissions (98 percent) were to a 242-bed community hospital, and these 997 admissions were studied in detail.

Obstetrical admissions accounted for 21 percent of the total (not counting newborns), with 169 deliveries. Pediatric admissions (newborn to age 21 years) accounted for 42 percent of the total. Sixteen percent were patients over 65 years of age. One or more consultations were requested in 14 percent of the admissions. Some form of cardiovascular disease constituted the most frequent discharge diagnoses, with newborn care and pregnancy related diagnoses second and third. The four physicians were compared to each other for variables including age/sex profile, discharge diagnoses, length of stay, consultations requested, and admission ratio per ambulatory encounter. In spite of their differences in training and length of time in practice, the four physicians were found to be similar to one another on most of these dimensions.

The descriptive analysis of the office practice of family physicians has appropriately constituted the first disciplinary thrust of family practice research.¹⁻³ More recently, attention has been given to a descriptive analysis of the hospital work

of family physicians.⁴⁻⁹ A recent editorial in *The Journal of Family Practice* provides an excellent brief review of this literature.¹⁰

The study reported here had its inception in the educational principle that the "training setting should approximate the application setting," or, in other words, that a resident's hospital based training should provide supervised exposure to the range of clinical problems expected in the practice setting in a manner similar to the manner in which these problems will be encountered in practice. The heavy emphasis given inpatient training during residency programs underscores the need to

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carefully document and characterize the hospital work typical of family practice to more accurately assess the degree of educational relevance of residency inpatient rotations.

This study examines the hospital admissions generated from a four-man group practice in north central Massachusetts. The analysis included number of admissions per year, discharge diagnoses, admissions per ambulatory encounter, age and sex distribution, and length of stay. The admissions of each physician are compared to one another and to similar reports currently in the literature.

The Setting

Fitchburg Family Practice is located in Fitchburg, Massachusetts, a community of about 45,000 located in the central part of the state near the New Hampshire border. Boston is about 45 miles distant. The Burbank Hospital is a 242-bed community hospital, the only hospital in the city. There were 52 physicians on the active medical staff during the study year including seven family physicians (all American Board of Family Practice certified), seven internists (two general, two hematologists, one gastroenterologist, one neurologist, and one dermatologist), one psychiatrist, four general surgeons, two vascular surgeons, one thoracic surgeon, one neurosurgeon, two otolaryngologists, six orthopedic surgeons, two ophthalmologists, three anesthesiologists, three pediatricians, three radiologists, three pathologists, three obstetricians/gynecologists, and four full-time emergency room physicians. The service area population is 75,000 in 13 townships covering an approximate geographic area of 44 square miles. Fitchburg is the largest city in the area which includes rural, agricultural, and recreational land. Nearest hospitals are in the towns of Leominster (four miles, 157 beds), Gardner (seven miles, 153 beds), and Ayer (twelve miles, 92 beds). The area's economy is based on paper mills and factories.

At the beginning of the study year (April 1, 1977 through March 31, 1978), the third author (Physi-

cian 2 in the study), had been in practice in Fitchburg for over 26 years, one partner (Physician 3) was nearing the end of his fourth year in practice following completion of his family practice residency, and two partners (Physicians 1 and 4) were nearing the end of their first year in practice following family practice residencies.

Approximately 20,000 active (at least one member of the family seen within the last two years) patients are enrolled in the practice. Ambulatory encounter data have been collected for over two years by a computerized system in the Department of Family and Community Medicine at the University of Massachusetts Medical Center, in Worcester, 25 miles distant, in anticipation of the group's becoming a teaching practice for the university based residency program in July 1979. All four physicians have an active obstetrical practice. All are certified by the American Board of Family Practice. Physician 1 is a 1976 graduate of the family practice residency at Santa Monica Hospital Medical Center; Physician 2, the senior partner, served a rotating internship at Maine General Hospital in Portland and received further training in obstetrics and gynecology while serving in the military, 1947 to 1951; Physician 3 completed the University of Miami Family Practice Residency in 1972; and Physician 4 completed the Blackstone, Virginia, program of the Medical College of Virginia in 1976.

Methods

Ninety-eight percent (997) of the admissions for which the group had major responsibility for hospital care were made to the Burbank Hospital. The 24 admissions to Leominster Hospital were not studied, but were probably obstetric patients. Primary data were obtained from the Medical Records Department of the Burbank Hospital in the form of computer printouts from the Utilization Information Service, a private corporation which supplies Massachusetts hospitals with utilization data. Patient identifying information had been covered. The data were obtained for one calendar year (April 1977 through March 1978) to account for any seasonal variation. Each discharge was represented by a single line on the

print-out and provided the following kinds of information: code number from the International Classification of Diseases Adapted for Hospital use, eighth revision (H-ICDA-8) for primary and secondary (up to three) discharge diagnoses (only 34.2 percent of these admissions had any secondary diagnoses recorded), age, sex, admission status, discharge status, number of consultations, surgical procedures, and length of stay. The original source of these data is the physician of record's dictated discharge summary, from which hospital medical records personnel abstract the information for entry into the computer. A small sample (15 to 20 admissions) was compared to patient charts and the data found to be accurate. Data for the variables of interest were aggregated for each physician, and the H-ICDA code used to determine the specific discharge diagnosis.

The number of patients accounting for these 997 admissions was 876, so 121 admissions were multiple for some patients. Surgical patients did not appear in these data as these patients were discharged under the surgeon's name, although the family physician may have cared for some of these patients for a day or two before the surgical referral. The number of surgical admissions generated from the practice was also of interest although descriptive data were not available as these patients were discharged by the surgeon. Separate hospital data did allow determination of the total number of surgical referrals for each physician.

Ambulatory data used to compute "admission ratio" (admissions per ambulatory encounter) and the total number of different patients hospitalized during the year came from the computer based information system of the University of Massachusetts Department of Family and Community Medicine.¹¹ Data used to compare Fitchburg Family Practice to Burbank Hospital as a whole, came from other summary reports of the Utilization Information Service, made available by the Burbank Hospital.

Results

Fitchburg Family Practice assumed primary responsibility for a total of 1,021 hospital admissions

during the study year, for an average of 255 admissions per physician. The 997 admissions to the primary hospital constitute 98 percent of the total and were the discharges (admissions) studied in detail. These admissions accounted for 11.5 percent of the total admissions to the hospital and for 5,605 patient days, or 8.8 percent of the total patient days for Burbank Hospital for the study year.*

The obstetrical practice generated 38 percent of these admissions, 21 percent newborns, and 17 percent deliveries. Fifteen more obstetric patients required delivery by cesarean section, and were among those patients referred to obstetricians. The cesarean section rate for the obstetrical practice was eight percent. Pregnancy related admissions included the 169 deliveries, plus other obstetric problems requiring hospitalization (eg, toxemia, spontaneous abortion) for a total admissions of 206, or 20 percent. Pediatric admissions, excluding newborns, comprised another 21 percent.

The most frequent primary discharge diagnoses are given in Table 1. The top 15 diagnoses account for just over half the diagnoses and 67 specific diagnoses were listed only once. To describe the full range of clinical problems encountered in these admissions, both primary and secondary discharge diagnoses were counted for each major H-ICDA category. This distribution is shown in Table 2. Spearman Rank Order Correlation Coefficients were calculated and these distributions were found to be highly correlated with coefficients ranging from 0.80 to 0.90.**

Length of stay (LOS) ranged from 1 to 95 days with an average of 5.6 days. Length of stay was also examined by specific diagnosis and compared to the average for the hospital as a whole (Table 3). In all cases, Fitchburg Family Practice had a

*These four physicians constituted 9.3 percent of the "admitting" (excludes pathologists, radiologists, and anesthesiologists) medical staff during the study year

**When this same analysis was performed using primary discharge diagnosis only, rank order correlation coefficients were as high as 0.95

Table 1. Most Frequent Specific Primary Discharge Diagnoses

Rank	Diagnosis	Number
1	Single born without mention of immaturity	202
2	Delivery without mention of complications	97
3	Delivery with laceration of perineum	38
4	Diabetes	25
5	Pneumonia, unspecified	21
6	Phlebitis/thrombophlebitis	19
7	Delivery with other complications	18
8	Acute myocardial infarction	17
9	Symptomatic heart disease	17
10	Symptoms referable to abdomen and lower GI tract	16
11	Acute bronchitis and bronchiolitis	14
12	Delivery complicated by retained placenta	14
13	Other acute/subacute forms of ischemic heart disease	14
14	Other general symptoms	14
15	Symptoms referable to respiratory system	13
Total		539*

*54 percent of the 997 admissions studied

shorter length of stay, although the form of the data did not allow statistical analysis.*

Consultations were requested for 13.7 percent of the 997 admissions. Diagnoses most frequently requiring a consultation are shown in Table 4. These represent instances where the family physician formally requested a consultation and received a written report, but retained primary management responsibility of the patient. If the consultation resulted in surgery, the patient was discharged under the surgeon's name and does not

appear in these data. The number of surgical referrals (via either admission by the family physician and discharge by the surgeon or direct referral from the office practice and admission by the surgeon) for the practice for the same year was 198, for an average of 50 per physician.

The practice generated one admission for every 21 ambulatory encounters or one admission in 18 encounters if surgical referrals are included.

Figure 1 shows the age/sex profiles of the hospitalized patients, compared to the age/sex profiles of the ambulatory encounters for the same period. These data for each physician were compared using the chi-square statistic; no significant differences were found.

Table 5 compares the four physicians to one another with respect to a number of descriptive variables. On almost all comparisons, the four physicians are similar. Exceptions are surgical referrals and admission ratio (admissions per ambulatory encounter), where Physician 4 differs nota-

*The fact that the four physicians in this study are also included in the hospital's average would tend to decrease this difference, making the observations more significant

Table 2. Distribution of Primary and Secondary Discharge Diagnoses into Major H-ICDA Categories

H-ICDA Category	Physician 1		Physician 2		Physician 3		Physician 4		Fitchburg Family Practice	
	Number	Rank*	Number	Rank*	Number	Rank*	Number	Rank*	Number	Rank*
1. Infections	10	12	20	9	9	11	5	13	44	11T
2. Neoplasms	9	13T	19	10	2	17	13	7	43	13
3. Endocrine	21	7	29	8	40	5	9	9	99	8
4. Hematology	2	16T	3	16T	7	12T	3	16	15	15
5. Mental Disorders	17	8T	14	13	6	14	7	11	44	11T
6. Central Nervous	17	8T	13	14	7	12T	4	14T	41	14
7. Cardiovascular	54	1	95	1	82	1	42	3	273	1
8. Respiratory	39	4	35	7	43	4	10	8	127	5
9. Gastrointestinal	24	6	44	5	32	7	19	6	119	6
10. Genitourinary	9	13T	15	11T	14	10	8	10	46	10
11. Pregnancy	38	5	57	2	68	2	43	2	206	3
12. Skin	4	15	4	15	4	15	1	17T	13	16
13. Orthopedic	15	10T	15	11T	19	9	4	14T	53	9
14. Congenital	2	16T	3	16T	0	18	1	17T	6	18
15. Perinatal	2	16T	0	18	3	16	6	12	11	17
16. Symptoms	40	3	43	6	35	6	29	4	147	4
17. Injury	15	10T	50	4	23	8	26	5	114	7
18. Miscellaneous**	51	2	53	3	66	3	44	1	214	2
Total	369	—	512	—	460	—	274	—	1615	—
Total Admissions	997									
Total Diagnoses	1,615									
Diagnoses per Admission	1.6									

*T indicates tie
 **includes newborn care

Table 3. Length of Stay by Specific Diagnosis

Diagnosis	Fitchburg Family Practice N=997			Burbank Hospital N=8,648		
	Number of Days	Number of Patients	Average	Number of Days	Number of Patients	Average
Newborn care	666	207	3.22	2,899	854	3.39
Vaginal delivery	519	169	3.07	2,951	860	3.43
Pneumonia	152	24	6.33	1,023	111	9.22
Chronic obstructive lung disease	123	15	8.20	1,072	81	13.23
Congestive heart failure	125	18	6.94	1,729	173	9.99
Diabetes	187	25	7.48	1,078	99	10.89
Ischemic heart disease	376	39	9.64	3,687	321	11.49

Number of Consultations	Diagnosis
7	Multiple sclerosis*
6	Diabetes mellitus
6	Acute myocardial infarction
6	Displacement of intervertebral disc
5	Malignant neoplasm of salivary glands
5	Malignant neoplasm without specification of site
5	Symptoms referable to nervous system and special senses
5	Newborn care
4	Malignant neoplasm of prostate
4	Migraine
4	Symptomatic heart disease
4	Phlebitis/thrombophlebitis
61**	

*2 patients, multiple hospitalizations
 **represents 37 percent of total consultations

bly from the other three. When admission ratio was compared for specific diagnoses, differences were found with respect to diabetes and pneumonia, as shown in Table 6.

Discussion

The remarkable result of the comparison of the hospital work of the four physicians to each other is the similarity. While the practice is organized as a group with cross coverage and the service population the same, each physician has his own patients and follows his own admissions. Individual differences such as years in practice, training, and personal clinical interests, might be expected to result in more differences than those observed. Similarity of diagnoses per admission (Table 5) would seem to indicate there are no significant differences between the physicians in their recording practices.

They did differ from one another with respect to number of surgical referrals, admission ratio, and hospitalization of certain specific diagnoses (Table

6). Although not statistically significant, the size and direction of these differences appear real. These differences are in the direction which would be predicted on the basis of the differences in training. Physician 4 trained in the Blackstone Family Practice Center of the Medical College of Virginia Residency Network, a family medical center 40 miles from its primary hospital.¹² In this residency setting, hospitalization is avoided whenever possible. Physician 4 has the lowest ratio of admissions per ambulatory encounter and these results suggest the persistence of practice patterns beyond the residency in a different setting where the hospital is near. Three diagnoses appeared with much less frequency in Physician 4's data than in the other three: diabetes, pneumonia, and dental, (1,1, and 1, respectively). The frequencies of diabetes and pneumonia (data not available for dental) in the ambulatory practice data were similar, suggesting a different management decision pattern for Physician 4 (Table 6). A specific inquiry of this question is planned for the future.

Table 7 was prepared in order to compare the results of this study with others in the literature. Although their study was different in design and

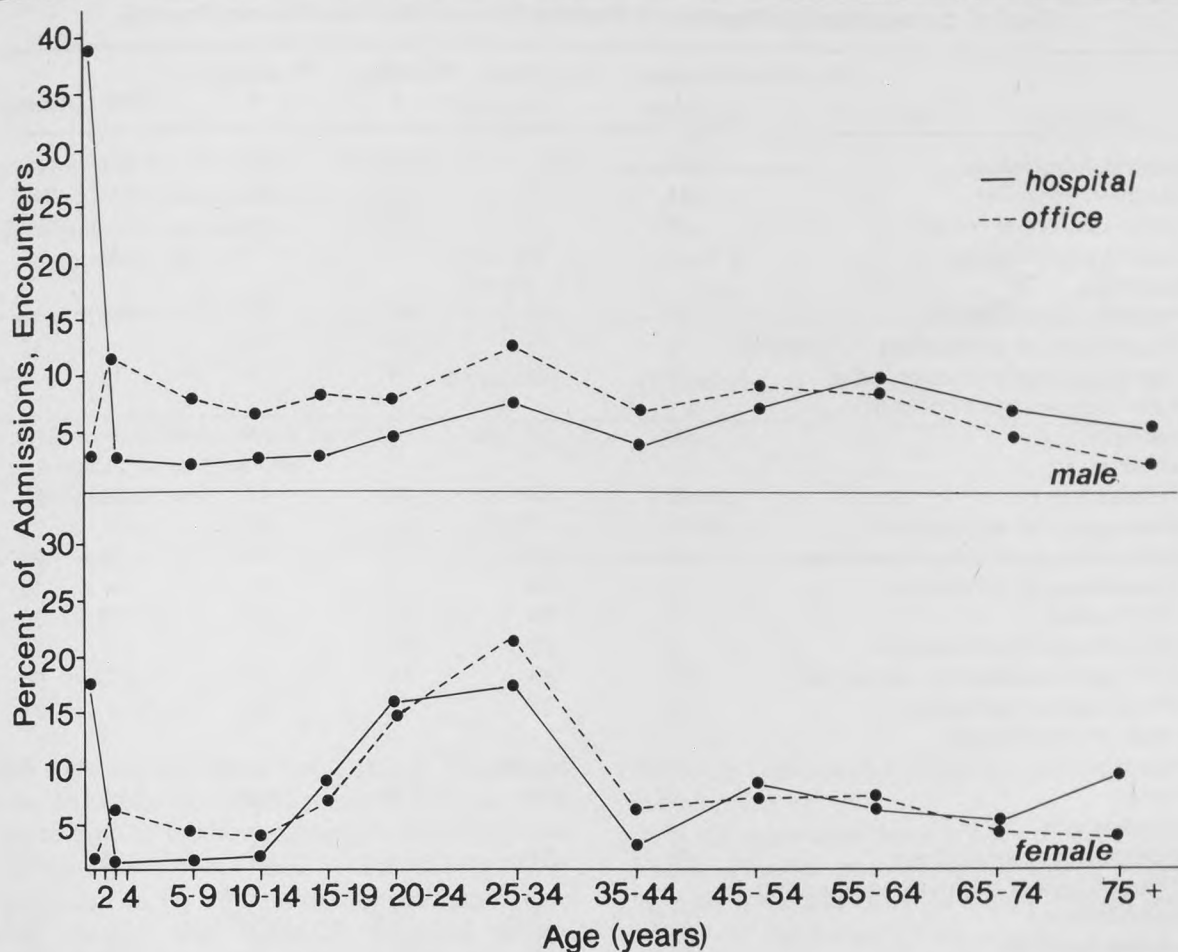


Figure 1. Age-sex profile of hospital admissions compared to office encounters for same period

their data not amenable to display in Table 7, the report by D'Elia et al¹³ found, with a sample of 19 family physicians in a non-metropolitan area of southern Illinois, that 25 percent of the work week was spent in the hospital. Their hospital practice included pediatric, obstetric, general medical, and geriatric care, as well as some surgery and surgical assisting.

Descriptive studies of the hospital practice of family physicians fall into two categories with respect to sampling techniques: (1) random samples from larger populations^{4,5,14} and (2) smaller studies in specified settings where the population and the

sample are identical.⁶⁻⁹ While the latter do not allow inferences to any populations larger than themselves, general conclusions about what family physicians are doing in the hospital can be derived from these accumulated smaller studies, keeping in mind such variables as section of the country, training of physicians, size and kind of hospital, local medical politics, and history.

With these considerations in mind, the present study is consistent with others in the literature with respect to hospital admissions per year, kinds of problems managed, inclusion of obstetrics in the practice, and age/sex profiles of patients, in

Table 5. Comparison by Physician of Hospital Work of Fitchburg Family Practice

	Physician 1	Physician 2	Physician 3	Physician 4	Total	Average
Hospital Admissions	226	312	295	188	1,021	255
Burbank Hospital	224	302	288	183	997	249
Admissions per month	18.7	25.2	24.0	15.3	—	20.8
Leominster Hospital	2	10	7	5	24	6
Obstetrics						
Number of deliveries	27	45	60	37	169	42
Percentage of admissions	12	15	21	15	—	17
Cesarean sections (referred)	5	5	4	1	15	4
Rate (percentage of obstetric patients)	10	10	6	4	—	8
Pediatrics						
Newborns	49	50	66	41	206	52
Percentage of admissions	22	17	23	22	—	21
0-14 years (excluding newborns)	26	30	21	18	95	24
Percentage of admissions	12	10	7	10	—	10
15-21 years	19	35	38	26	118	30
Percentage of admissions	9	12	13	14	—	12
0-21 years (excluding newborns)	45	65	59	44	213	53
Percentage of admissions	20	22	21	24	—	21
Length of Stay (days)						
Average	6.07	5.98	5.31	4.98	—	5.62
Range	1-48	1-95	1-45	1-45	1-95	—
Consultations						
Number of consultations	45	51	35	34	165	41
*Percentage of admissions requiring consultations	17.0	13.6	10.8	14.8	—	13.7
Surgical Referrals	82	70	30	16	198	50
Ambulatory Encounters for Same Period	5,700	5,344	5,740	4,458	21,242	5,310
Admission ratio						
Medicine, pediatric, obstetric only	1/25.2	1/17.1	1/19.5	1/23.7	—	1/20.8
With surgical referrals	1/18.5	1/14.0	1/17.7	1/21.9	—	1/18.0
Geriatric Practice						
Number 65+ years of age	42	52	47	21	162	40.5
Percentage of admissions	18.8	17.2	16.3	11.5	—	16.2
Percentage female	61.6	61.9	60.4	65.0	—	62.0
Deaths in hospital	5	8	5	7	25	6.3
Discharge diagnoses per admission	1.64	1.70	1.60	1.50	—	1.61

*One admission may require more than one consultation

spite of differences in setting variables.

Admission ratio provides a contrast between Fitchburg Family Practice and two other studies where data were available: the National Ambulatory Medical Care Survey (NAMCS)¹⁴ and the

military hospital teaching ward reported by Medley and Halstead.⁷ This first is an elaborate national sample of general/family physician (GFP) practices and reports "a very small proportion (slightly more than one percent) of the GFP's pa-

Table 6. Admission Ratios for Two Specific Diagnoses

	Pneumonia			
	Physician 1	Physician 2	Physician 3	Physician 4
Number of encounters in office	35	66	50	28
Number of admissions	8	9	7	1
Admission ratio	1 in 4.4 22.9%	1 in 7.3 13.6%	1 in 7.1 14%	1 in 28 3.6%
	Diabetes			
	Physician 1	Physician 2	Physician 3	Physician 4
Number of encounters in office	98	128	193	114
Number of admissions	7	9	8	1
Admission ratio	1 in 14 7.1%	1 in 14.2 7.0%	1 in 24.1 4.1%	1 in 114 .9%

tients were admitted to a hospital." In the second study, 661 hospitalizations resulted from a clinic practice (family medical center) reported to have 4,500 visits per month ($4,500 \times 12 \text{ months} \div 661 = 1$ admission in 86 ambulatory encounters). One would assume the NAMCS included general/family physicians who did no hospital work at all, and, thus, the rate would be lower than "typical" for a family physician who chooses to work in the hospital. This assumes some "correct" ratio of hospital admissions to ambulatory encounters, given the existence of certain medical conditions or diagnostic indicators. In this connection, these rates for the settings described in the other published studies would be most helpful. This question must be addressed by clinical decision making or audit studies.

Consultations also deserve comment. Again, few comparisons are available, but all published reports give higher consultation rates than Fitchburg Family Practice. While Table 7 shows the averages for the studies cited, Maguire and Cook report individual physician consultation rates as high as 76.2 percent⁹ and Medley and Halstead as high as 57.9 percent⁷ of patients on certain services. The actual numbers of consultations requested and percent of admissions in which any consultation was requested are displayed in Table

5. Some admissions required more than one consultation.

In the context of these other studies, Fitchburg Family Practice puts an important emphasis on hospital work and assumes a high level of responsibility for the patients they admit.

Conclusion

Hospital care plays an important role in the total practice of this group. Obstetrics plays a major role as does pediatrics. The medical problems managed are highly diverse and include serious medical illness. The admissions from this group constitute a significant proportion of the total admissions to the hospital.

These results support those who argue the legitimacy of the role of the family physician in the acute care hospital.¹⁰ The results of this and other descriptive studies begin to provide a scientific basis for the planning of the inpatient portions of residency curricula in the same fashion as has been suggested for the ambulatory teaching program.¹⁵ Studies comparing the clinical content of residency inpatient rotations with the descriptive

Table 7. Comparison to Other Studies*

Comparison	Fitchburg Family Practice	Fowler and Falk ⁴	Garg et al ⁵	Tarrant ⁶ †††	Medley and Halstead ⁷ †††	Shank ⁸	Maguire and Cook ⁹
Location	Fitchburg, Massachusetts	Victoria, British Columbia	Lucas County, Indiana	Calgary, Alberta	Eisenhower Army Medical Center, Augusta, Georgia	Crawfordsville, Indiana	Harrisburg, Pennsylvania
Time period studied	Apr 1977-Mar 1978	Jan-Jun 1963	1970	1967 and 1971	Feb 1976-Jan 1977	Jul 1976-Jun 1977	Jul 1976-Jun 1977
Number of physicians studied	4	25	185	2	7 faculty 25 residents	1	16
Number of admissions studied	997	2,860	1,609**	654	631	235	914
Size of community	45,000	62,000	***	403,000	—	15,000	68,000
Size of hospital (beds)	242	450/480	***	750†††	643†††	100	556
Percent of total hospital admissions							
In study	11.5	20	2-8	—	—	—	5.9
All GFP for hospital	14	63	28	—	—	—	6.1
Admissions/year/physician							
Range	188-312	120-470	—	151-176	—	—	23-165
Average	255-305	228	129	164	20	235	59
Admission/month/physician	20.8	19	11	14	1.6	19.6	5
Admission/ambulatory encounter	1:21 (4.8%)	—	—	—	1:86 (1.2%)	—	—
Ratio female:male patients	62:38	60:40	—	—	—	60:40	—
Percent over 65 years of age	16	17.5	26	—	—	27	29.2
Pediatrics (percentage of admissions)							
Newborn only	21	††††	—	—	19	22	†††††
All (0-21 years)	42	22	21	—	29	29	24.6
Deliveries/year/physician	42	22	—	23	3.4††	26	—
Diagnoses per admission	1.6	—	—	—	—	2.2	—
Average consultation rate (percentage of admissions)	14	43	—	—	33	—	51.4

Comparison	Fitchburg Family Practice	Fowler and Falk ⁴	Garg et al ⁵	Tarrant ⁶ ††††	Medley and Halstead ⁷ †††	Shank ⁸	Maguire and Cook ⁹
Average length of stay (days)	5.6	—	8.9	12.3	—	—	9.26
Most frequent diagnostic category (H-ICDA)	CVS Misc Pregnancy	Pregnancy Respiratory Injury	****	Pregnancy Misc Injury	Misc Pregnancy CVS	CVS, Respiratory Misc	CVS Misc Perinatal
Most frequent specific diagnoses	Newborn care Delivery Diabetes	Newborn care Delivery	****	Newborn care Delivery	Newborn/ Delivery Chest pain Acute MI	Newborn/ Delivery CHF Diabetes	AS Heart Disease Perinatal Morbidity Newborn/Delivery

*Some data from sources other than citation
 **This is 5 percent random sample, so population studied is 32,180
 ***All hospitals (9) in Lucas County, Indiana
 ****The patients of family physicians were fairly evenly divided among a variety of diagnostic categories." (p 391)
 †Includes newborn care
 ††Total deliveries for service=109
 †††Teaching hospital
 ††††0-4 years, 22 percent
 †††††0-1 year, 24.6 percent

information available for practice settings should be undertaken in order to investigate the relevance of current patterns of residency training, and to examine the assumption that vigorous and lengthy inpatient training effectively prepares family physicians for practice.

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