

## Content of the Model Teaching Unit Ambulatory Care Training and Continuity of Care in Six Family Practice Residency Programs

Kathleen E. Ellsbury, MD, MSPH, Ronald Schneeweiss, MB, ChB, Daniel E. Montano, PhD, Philip O. Cleveland, MD, John B. Coombs, MD, Sam C. Eggertsen, MD, Richard H. Layton, MD, Joseph N. Scardapane, MD, Michael J. Wanderer, MD, and Edmond J. Gore, PhD  
Seattle, Spokane, and Tacoma, Washington

*This article summarizes the practice content and continuity for 35 senior residents in six family medicine residency model teaching units utilizing a computerized information management system. Comparisons are drawn with the content of family practices in the National Ambulatory Medical Care Survey (NAMCS), showing that family medicine third-year residents provide a large proportion of pregnancy care and general medical examinations and treat a smaller number of chronic illness patients compared with family physicians in practice. Third-year residents performed few surgical procedures in the model teaching units. Continuity of care, though espoused by family medicine residencies in principle, was deficient in the model teaching units studied. Intensive training to compensate for these deficiencies is recommended.*

The Residency Review Committee (RRC) for Family Medicine requires a longitudinal ambulatory experience in family medicine residencies. Accredited residencies must have a model teaching unit meeting certain RRC guidelines.<sup>1</sup> The model teaching unit, also known as the family practice center or family medical center, is usually managed by the residency program as an office practice located within or near the hospital sponsoring the family practice residency. Typically, the number of resident clinic sessions each week in the model teaching unit increases from one or two in the first year to four or five in the third year of residency. Residents also work under supervision in ambulatory settings outside the model teaching unit learning elements of pediatric, medical, and surgical subspecialties. In theory the model teaching unit models a real-life, continuity-of-care family practice experience.

Because more than 75 percent of the family physician's time is spent in the office setting,<sup>2</sup> it is important that residents become proficient in the management of a va-

riety of ambulatory problems. The literature does not address this issue comprehensively, though some authors have described the use of practice profiles in evaluating aspects of the residents' practices.<sup>3-5</sup>

How does the content of the model teaching unit residency experience compare with that of nonresidency family practice settings? How much continuity of care exists in the model teaching unit setting? These two questions are addressed by describing the aggregate ambulatory office experience of third-year residents in the model teaching units of six University of Washington affiliated family practice residency programs.

### METHODS

The annual aggregate model teaching unit experience of the 35 third-year residents in six of the University of Washington affiliated residency programs was studied for the period July 1, 1985, to June 30, 1986. These residencies include one university and five community hospital-based programs. Third-year resident practices were selected for study, because they have the benefit of two to three years' worth of continuity of care and practice development.

Submitted, revised, June 24, 1987.

From the University of Washington Affiliated Family Practice Residency Network, Seattle, Washington. Requests for reprints should be addressed to Dr. Kathleen Ellsbury, Department of Family Medicine RF-30, University of Washington, Seattle, WA 98195.

**TABLE 1. THIRD-YEAR FAMILY MEDICINE RESIDENT EXPERIENCE IN THE AMBULATORY MODEL TEACHING UNIT (JULY 1985–JUNE 1986) BY NUMBER OF PATIENT VISITS AND PATIENT AGE**

Program	Number of Residents (n = 35)	Mean Number of Visits per Resident	Mean Patient Age (years)	Percent of Patients Aged Over 65 Years	Percent of Patients Aged Under 5 Years	Mean Number of Obstetric Visits per Resident
1	5	1,174	28.9	6	18	296
2	4	1,080	22.4	4	25	257
3	5	1,066	30.6	10	15	125
4	9	990	28.7	4	16	88
5	5	811	27.1	9	18	56
6	6	744	33.1	10	11	73

The data for the study were obtained from the Network Information Management System (NIMS). This database is derived from the computerized billing systems utilized by the residencies. The billing data are transferred to the network and processed with a customized program on an IBM-AT microcomputer. The customized software produces a series of reports describing and comparing each resident's ambulatory experiences with those of his or her resident peer group. These reports include the number and age distribution of patient visits, diagnostic content using the diagnosis clusters developed by Schneeweiss et al,<sup>6,7</sup> and transactions and procedures coded with the American Medical Association CPT-4 classification<sup>8</sup> and clustered using a method developed by Schneeweiss.\* Office visits to the model teaching unit are identified separately from hospital, emergency room, nursing home, and home visits. The number and age distribution of patient visits, diagnostic content, procedures performed, and a measure of continuity of care were analyzed.

The diagnostic content of the aggregate third-year resident ambulatory practice in the model teaching unit was compared with the 1980 and 1981 National Ambulatory Medical Care Survey data (NAMCS) for family physicians.\*\* The top 15 diagnosis clusters for NAMCS were divided into five general diagnostic categories: acute diseases (upper and lower respiratory tract illness, lacerations, contusions and abrasions, acute strains and sprains, otitis media, and urinary tract infections), chronic diseases (hypertension, degenerative joint disease, diabetes mellitus, obesity, ischemic heart disease, peptic diseases), pregnancy care, general medical examination (including well-child checkups, Papanicolaou smears, etc), and depression or anxiety.

Minor surgical procedures were grouped into four major categories: skin and subcutaneous tissue (incisions and excisions), trauma (casting and lacerations), gynecologic,

and other surgical procedures. These categories include 239 CPT-4 codes, although not all of them are utilized by each of the six model teaching units studied. Clustering the procedures compensates for the variations in the selection of a particular CPT-4 code to describe a similar procedure at the different sites. Aggregating the data for all the third-year residents in a given site facilitates intersite comparisons.

A special analysis was performed to determine the degree of continuity of care provided by residents in the model teaching units. The analysis was based on a study of all patients seen at least once by a third-year resident, with particular attention paid to follow-up visits with the same provider. Patients with four visits were selected to illustrate the point under discussion, as these would be more likely to comprise patients with chronic diseases as well as acute illness requiring follow-up visits.

## RESULTS

The mean annual number of patient visits for every resident at the six programs varied from 744 to 1,174. Within each residency practice the individual residents had similar visit numbers with only minor deviations from the group mean. Third-year residents in all programs were permitted between eight and ten weeks away for vacation, rotations away from the model teaching unit, and conferences.

The mean patient age varied from 22.4 to 33.1 years, depending on the program (Table 1). All six model teaching units cared for a relatively young population with fewer chronic problems compared with the NAMCS patient population. Rosenblatt et al<sup>2</sup> reported that the mean age of patients seen by US family physicians and general practitioners was 38.5 years. Physicians aged under 35 years in that study saw a younger patient population, with a mean age of 30.6 years. Patients aged over 65 years represented 16.9 percent of patients seen by all family physicians and general practitioners and 9.2 percent of the practice of physicians aged less than 35 years. In the

\* Available from Dr. Schneeweiss on request.

\*\* Available from National Center for Health Statistics (Hyattsville, Md), Office of Health Research Statistics and Technology.

**TABLE 2. DIAGNOSTIC CONTENT OF THE THIRD-YEAR RESIDENTS' AMBULATORY PRACTICE IN SIX MODEL TEACHING UNITS (JULY 1985-JUNE 1986) COMPARED WITH 15 MOST COMMON DIAGNOSIS CLUSTERS RECORDED BY FAMILY PHYSICIANS (NATIONAL AMBULATORY MEDICAL CARE SURVEY, 1980 AND 1981)**

Diagnosis Cluster	Percent of Recorded Diagnoses		Mean Number per Resident per Year			
	Family Physicians NAMCS	Residency Model Teaching Units Range	Patients		Visits	
			No.	Range	No.	Range
1. Hypertension	9.0	1.7-4.3	18	11-28	34	19-60
2. Acute upper respiratory tract illness	7.9	3.7-6.9	52	39-63	58	43-68
3. General medical examination	5.9	5.0-20.0	61	41-88	89	58-134
4. Degenerative joint disease	3.0	0.3-1.1	5	3-8	7	3-15
5. Acute lower respiratory tract illness	2.9	1.1-2.7	18	9-28	22	10-40
6. Nonpsychotic depression/anxiety	2.9	0.4-4.6	13	2-20	27	3-43
7. Lacerations/contusions/abrasions	2.8	1.2-2.0	16	14-21	17	16-23
8. Diabetes mellitus	2.9	0.9-3.2	7	3-13	20	10-44
9. Obesity	2.8	0.1-0.7	2	1-3	2	1-3
10. Acute strain/sprains	2.8	1.2-1.9	16	11-21	14	9-19
11. Ischemic heart disease	2.6	0.2-1.0	3	2-5	7	2-11
12. Pregnancy care	2.4	7.0-21.5	43	30-82	132	56-296
13. Otitis media	1.7	2.2-5.3	30	24-42	41	30-66
14. Peptic diseases	1.7	0.5-1.1	6	5-8	8	6-11
15. Urinary tract infection	1.6	1.5-2.1	16	12-20	20	13-26

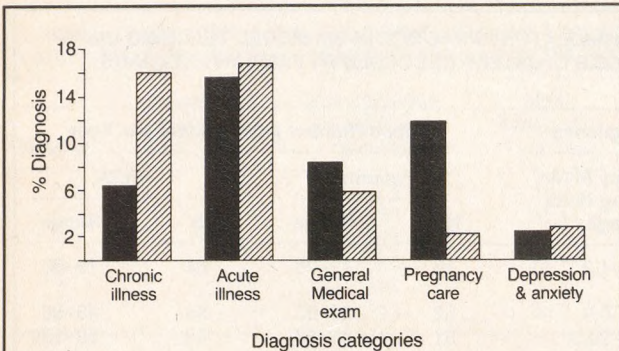
US 1980 census 11.3 percent of the population was aged over 65 years.<sup>9</sup> In programs 1, 2, and 4 in this network, visits by patients over the age of 65 years made up only 4 to 6 percent of all patient visits (Table 1), with a corresponding reduction in the relative proportion of chronic diseases.

The relative frequency with which the NAMCS 15 most common diagnosis clusters<sup>10</sup> are recorded by the residents is presented in Table 2. Chronic diseases, such as hypertension, degenerative joint disease, diabetes mellitus, and ischemic heart disease, are less common than in NAMCS practices, though program 6 recorded more visits for diabetes mellitus. The higher incidence probably reflects the existence of a diabetes research project in that program. The number of individual patients with chronic diseases managed by residents is quite low. In the model teaching units studied, the typical family medicine resident in the third year of residency encountered 18 patients with hypertension, 7 with diabetes, 5 with degenerative joint disease, and 3 with ischemic heart disease. Visits for acute conditions and health maintenance, however, occurred more frequently than in NAMCS practices, with 61 patients presenting for general medical examinations, 52 with upper respiratory tract illnesses, and 30 with otitis media. Obstetric care in the residencies generated the largest number of visits. In the six network programs third-year residents saw an average of 43 obstetric patients for a total of 132 obstetric visits for each resident.

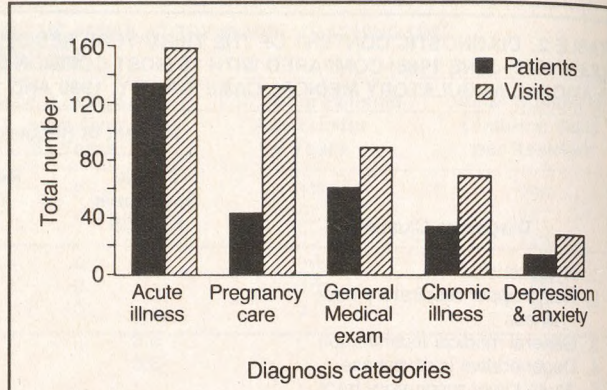
The proportion of diagnoses described by each of the five categories is shown in Figure 1. Model teaching unit practices recorded a higher proportion of medical examinations and pregnancy care, a lower proportion of chronic illness, and a similar proportion of acute illness and depression or anxiety compared with NAMCS practices.

The number of patients and the number of office visits for those five general diagnostic categories are shown in Figure 2. Acute illness visits were recorded most frequently, followed by pregnancy care, general medical examinations, and depression or anxiety. The number of visits per patient was highest in the pregnancy care category.

The development of ambulatory procedure skills is another important goal of the model teaching unit. These skills include minor skin and subcutaneous tissue surgery, trauma management, office gynecology, and other minor surgeries. Analysis of the number of ambulatory procedures recorded by the third-year residents showed a mean of 38 office procedures with a range of 25 to 53 for each resident, depending on the program. The majority of the procedures were in the skin and subcutaneous tissue category, with a mean of 19 procedures for each resident, accounting for 50 percent of all office procedures recorded (Table 3). Program 5 conducted a special vasectomy clinic, which accounted for the relatively larger number of procedures in that model teaching unit, and several programs



**Figure 1. Aggregate diagnostic content of third-year family practice resident experience in model teaching unit. Black bar represents third-year residents, hatched bar represents National Ambulatory Medical Care Survey data for family physicians**



**Figure 2. Number of patients and visits for selected diagnostic categories in third-year family practice resident practices in model teaching units**

offer special training outside the model teaching unit in skills such as flexible sigmoidoscopy.

Continuity of care as reflected by the likelihood of a patient seeing the same third-year resident on four follow-up visits is shown in Table 4. The proportion of patients with four visits who saw one or at most two providers ranged from 44 to 81 percent among the six programs when obstetric visits were included. Continuity decreased somewhat when obstetric visits were excluded. Patients with seven or more visits comprised 13 to 26 percent of all patient visits in the six residency programs. These patients saw one or at the most three providers on 39 to 61 percent of their visits to these six practices. Continuity of care decreases proportionately for patients with an increasing number of visits.

**DISCUSSION**

As a center for teaching the principles and practice of family medicine and as a home base for the residents and faculty, the importance of the model teaching unit goes beyond the specifics of the content of any given resident's experience in that setting.

This study, based on the experience of 35 third-year residents in six family medicine programs, reflects the variation in practice content and volume in model teaching units in the Pacific Northwest.

It should be noted that the various elements of the source billing data have different degrees of reliability. Patient identification, date of visit, number of patient visits, provider, transactions, and procedures (coded with CPT-4) have a high degree of reliability, as they are recorded independently of the physician and are nearly al-

ways recorded automatically by office staff. The diagnoses (coded with ICD-9-CM<sup>10</sup> or ICHPPC-2<sup>11</sup>) are less reliable because of incomplete or inaccurate recording by physicians and because patients often visit physicians for numerous complaints, not all of which are recorded.<sup>12,13</sup> Psychiatric diagnoses, for example, may be underreported. Internal audits of four programs showed a 6 to 11 percent error rate in coding, depending on the site. Moreover, some diagnoses might not be entered into the computer systems, which often require only one diagnosis for billing. In the network the average number of diagnoses per visit recorded by residents varies from 1.1 to 1.4. Other studies have shown figures of 1.4 to 1.5 for family physicians.<sup>12-15</sup> Aggregating the data for the entire third-year resident peer group helps to compensate for these deficiencies and permits the description of the relative prevalence of the common problems recorded in the ambulatory model teaching unit setting.

The younger mean age of patients in this study may reflect only regional characteristics. Medical markets may differ significantly in areas where obstetrics is less common in family practice or where large numbers of retirees reside, for example.

The family physicians in the NAMCS study reported a mean of 129 outpatient encounters each week. This encounter rate can be extrapolated to an estimated 5,900 encounters each year. The third-year residents' year of practice experience in the model teaching unit (four half-day clinic sessions per week) is therefore equivalent to about 1.5 to 2 months of a full-time family physician's practice. Previous research has not yet shown how many patients a resident must see to master the skills and procedures necessary to deal with common ambulatory problems. The total number of surgical procedures per-

**TABLE 3. MEAN NUMBER OF MINOR OFFICE SURGICAL PROCEDURES PERFORMED IN AMBULATORY MODEL TEACHING UNIT BY THIRD-YEAR FAMILY MEDICINE RESIDENTS (JULY 1985-JUNE 1986)**

Program	Mean Number of Ambulatory Procedures Per Resident				Total
	Skin and Subcutaneous Tissue	Trauma	Gynecology	Other	
1	11	5	1	8	25
2	18	6	4	17	45
3	19	4	2	7	32
4	20	4	3	8	35
5	33	1	4	15	53
6	11	2	12	11	36
Mean total	19	4	4	11	38

**TABLE 4. CONTINUITY OF CARE FOR PATIENTS WITH FOUR VISITS SEEN AT LEAST ONCE BY A THIRD-YEAR RESIDENT (JULY 1985-JUNE 1986)**

Program	Total Visits for Patients Seen at Least Once by Third-Year Resident	Percent of Patients With One Visit	Patients with Four Visits		
			Percent of All Visits	Percent Seeing One or Two Providers*	Percent Seeing One or Two Providers**
1	2,031	26	8	51	48
2	1,441	24	9	81	79
3	2,509	39	7	60	60
4	2,407	28	10	58	57
5	2,433	31	9	67	63
6	2,107	28	9	44	40

\* Includes obstetric patients  
 \*\* Excludes obstetric patients

formed in the model teaching unit varied a great deal and probably reflects faculty interests as much as availability of cases.

Adding encounters may not necessarily augment learning. If another half-day of clinic were added to the third-year residents' schedule, theoretically they would each encounter 22 more visits for health maintenance and 14 more visits for upper respiratory tract illnesses but only 8 more cases of hypertension and 1 more case of ischemic heart disease. On the other hand, the most recent network graduate follow-up survey conducted in 1985 confirmed the findings of the 1978 survey,<sup>16</sup> which showed that graduates of all programs generally feel well prepared for their practice, though more than 50 percent of recent graduates felt underprepared in the areas of management of pediatric behavioral disorders and learning disabilities in children, functional assessment of the elderly, and marital and sex therapy. Significant experience in chronic disease probably occurs in settings outside the model

teaching unit, given that graduates feel well prepared in the management of chronic diseases.

Continuity of care is an elusive concept, difficult to achieve or even quantify in residency clinics. The various measures of continuity of care all have deficiencies,<sup>17-19</sup> and even the most recently described<sup>20</sup> requires the accurate recording of the assigned primary physician. In this residency network only two of six programs even attempt to include the assigned physician in the computer billing system, and these two find great difficulty in maintaining accurate data given the turnover of physicians in the residency setting. The variations in continuity among programs using patients with four visits as an example, are displayed in Table 4; there is little change in continuity figures when obstetric visits are excluded. Only one of the programs (program 2) achieved a high level of continuity, although all the programs subscribe to the concept in principle. Many programs have attempted to improve continuity by using a pairing system or creating smaller

practice groups within the model teaching unit, but the number of providers for each patient remains high, especially for patients with frequent visits.

Given the assumption that optimally a patient with multiple visits would see the same provider as often as possible, it is clear that the residency structure has a problem. Twenty-eight to 49 percent of patients seen by third-year residents had four or more visits to the six residency practices in the one-year period of the study. The number of providers seen increased proportionately with the number of visits. Excluding obstetric visits did not significantly alter the continuity figures, so other factors must explain the variation in continuity of care among programs—for example, commitment to continuity, size of community, or characteristics of the population served. There are no comparable figures available for physicians in full-time practice, nor are ideal figures postulated. Possibly the structure of the family practice model teaching unit experience does not foster continuity of care in the ambulatory setting. Perhaps alternative models of the ambulatory family medicine experience should be tested if continuity of care is indeed important.

## CONCLUSIONS

From this study of six model teaching units in the northwestern United States, the following conclusions can be drawn:

1. The model teaching unit as a framework for family practice education in ambulatory care has both strengths and weaknesses, as illustrated by aggregate computer-analyzed data from third-year resident practices.
2. The patient population in model teaching units differs from that seen by physicians in private practice, with those in the model teaching unit being younger, having fewer chronic diseases, and utilizing more pregnancy care and acute care.
3. The model teaching unit affords limited opportunities to learn procedural skills unless special teaching arrangements are made.
4. Continuity of care may not be achieved easily in model teaching unit settings, given multiple training sites and absences of residents. Such measures as pairing or grouping of providers may reduce the impact of this problem.
5. Increased time in the model teaching unit may be an inefficient way to increase resident learning. Alternative models should be explored, such as short, intensive courses, concentrated outpatient experiences, workshops,

and extended outpatient experiences with chronically ill patients.

## References

1. Accreditation Council for Graduate Medical Education: Special Requirements for Residency Training in Family Practice. AAFP reprint 132-B. Kansas City, Mo, American Academy of Family Practice, 1983
2. Rosenblatt RA, Cherkin DC, Schneeweiss R, et al: The content of family practice: Current status and future trends. *J Fam Pract* 1982; 15:681-722
3. Froom J: Assessment of quality of care by profiles of physicians morbidity data. *J Fam Pract* 1976; 3:301-303
4. Given CW, Simoni L, Gallin RS, et al: The use of computer generated patient profiles to evaluate resident performance in patient care. *J Fam Pract* 1977; 5:831-840
5. Boisseau V, Froom J: Practice profiles in evaluating the clinical experience of family medicine trainees. *J Fam Pract* 1978; 6:801-805
6. Schneeweiss R, Rosenblatt RA, Cherkin DC, et al: Diagnosis clusters: A new tool for analyzing the content of ambulatory medical care. *Med Care* 1983; 21:105-122
7. Schneeweiss R, Cherkin DC, Hart LG, et al: Diagnosis clusters adapted for ICD-9-CM and ICHPPC-2. *J Fam Pract* 1986; 22:69-72
8. Physicians' Current Procedural Terminology, ed 4 (CPT-4). Chicago, American Medical Association, 1986
9. 1980 Census. Bureau of the Census, City and County Data Book 1983. Government Printing Office, 1983
10. International Classification of Diseases, Ninth Revision. Clinical Modification (ICD-9-CM). Report of the Commission on Professional and Hospital Activities. Ann Arbor, Mich, Edward Bros, 1978
11. ICHPPC-2: International classification of health problems in primary care. Second report of the Classification Committee of the World Organization of National Colleges, Academies and Academic Associations of General Practitioners/Family Physicians. New York. Oxford University Press, 1979
12. Bentsen BG: The accuracy of recording patient problems in family practice. *J Med Educ* 1976; 51:311-316
13. Gehlbach HS: Comparing methods of data collection in academic ambulatory practice. *J Med Educ* 1979; 54:730-732
14. Braunstein ML, Schuman SH, Curry HB: An on-line clinical information system in family practice. *J Fam Pract* 1977; 5:617-625
15. Schneeweiss R, Cherkin DC, Hart LG: The effect of including secondary diagnoses on the description of the diagnostic content of family practice. *Med Care* 1984; 22:1058-1063
16. Geyman JP, Cherkin DC, Deisher JB, Gordon MJ: Graduate follow-up in the University of Washington family practice residency network. *J Fam Pract* 1980; 5:743-752
17. Curtis P, Rogers J: Continuity of care in a family practice residency program. *J Fam Pract* 1979; 8:975-980
18. Patten RC, Friberg R: Measuring continuity of care in a family practice residency program. *J Fam Pract* 1980; 11:67-71
19. Godkin MA, Rice CA: A measure of continuity of care for physicians in practice. *Fam Med* 1984; 16:136-140
20. Magill MK, Senf J: A new method for measuring continuity of care in family practice residencies. *J Fam Pract* 1987; 24:165-168