

Evaluating Primary Ambulatory Care with a Health Information System

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This paper describes one method by which data from a computer based health information system are used to screen the ambulatory care experiences of family practice residents. The steps in the evaluation process are discussed. Data collection techniques and definition of the reference population against which comparisons among the residents are made are also explained. The evaluation process is based on initial observations of summaries representing residents' practices and proceeds to answer progressively more specific questions about the resident-patient encounters. This approach is acceptable to faculty for several reasons: (1) data are timely and require minimal extra effort for collection, (2) resident discrepancies are easily identified, (3) data summaries are concise and easy to interpret, (4) cost effectiveness of resident performance can be evaluated, and (5) data are organized around a patient and the encounters he or she has had with all residents providing care.

Health information systems in primary ambulatory care settings have been designed and employed to make planning and management decisions¹⁻⁶ and to describe types of patients and problems seen in ambulatory care.^{3,7-9} While some exceptions do exist,^{4,10-14} the potential uses of limited data from health information systems to examine the quality of individual physicians' performances have largely remained unexplored in primary ambulatory care.^{4,15-17}

Several factors may explain why ambulatory care data systems have not been so used. First, no outside agencies have demanded a system of monitoring ambulatory care and, as a result, no tradition of quality assessment has emerged.¹⁸ Secondly, because a large number of presenting problems remain ill defined without clear diagnos-

tic labels, it is difficult to apply explicit criteria to evaluate primary care.^{16,19,20} Thirdly, no strategies have been developed or tested to compare the reliability or accuracy of judgments made from limited data contained in a health information system with judgments made based on the complete medical record.^{9,15,21}

This paper demonstrates one method of using a health information system for screening the ambulatory care experiences of family practice residents. The approach has emerged after several years of working with faculty from family practice residency programs. This procedure inspects the content of each resident's practice by comparing it to the content of the entire ambulatory care center along the following dimensions: age and sex distributions of patient visits, diagnoses recorded, and laboratory and x-ray procedures ordered.

While the health information system can be used to address a number of questions related to resident performance, for purposes of illustration, the focus will be on screening for the overuse of

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Table 1. Resident Outpatient Summaries in a Family Practice Residency Center, July 1976 to June 1978

Year of Residency	MD Letters	Patient Visits	Patients	Average Charge Per Visit	Percent Did Not Show	Diagnoses Per Visit	Laboratory Tests per Visit
3rd Year	L	1265	545	17.81	20	1.52	1.23
3rd Year	M	2024	532	16.26	16	1.81	.90
3rd Year	N	1391	549	16.41	18	1.37	.91
3rd Year	O	1011	462	18.39	17	1.30	1.07
2nd Year	Z	811	364	22.64	19	1.51	1.25
2nd Year	B	1001	289	17.40	14	1.53	1.18
2nd Year	A	730	412	22.33	19	1.58	1.24
2nd Year	C	843	380	18.74	19	1.53	.96
2nd Year	D	1040	365	19.58	22	1.63	1.16
2nd Year	E	688	325	19.17	20	1.60	1.01
2nd Year	F	691	318	18.87	16	1.65	.91
2nd Year	G	779	290	22.50	19	2.05	1.25
2nd Year	H	911	323	17.08	18	1.31	.87
2nd Year	I	934	437	18.21	24	1.87	1.17
1st Year	P	225	128	16.24	18	1.36	1.02
1st Year	Q	138	83	24.81	22	1.52	1.71
1st Year	R	126	72	21.49	20	1.60	1.11
1st Year	S	102	63	22.73	18	1.35	1.41
1st Year	T	114	82	21.89	15	1.48	1.25
1st Year	U	103	66	23.80	22	1.76	1.36
1st Year	V	131	90	22.77	21	1.82	1.50
1st Year	W	111	67	24.30	27	1.64	1.55
1st Year	X	129	78	26.30	22	1.75	2.11
1st Year	Y	147	85	20.90	14	1.65	1.39
1st Year	K	125	80	19.95	17	1.46	.81
Center Totals		46,176	10,179	17.36	18	1.52	1.03

diagnostic tests. This issue was selected because it occurs frequently among inexperienced physicians and because many of these procedures are invasive, potentially dangerous to the patient, and result in unnecessarily high health care costs.

Data Collection

Data for this ambulatory health information system are collected through the use of a multiple copy billing-encounter form. The form is divided into two sections. One section contains spaces in which to record all the patient and visit related information necessary to prepare a statement of services and charges. The second section of the form contains "non-billable" information. A previous paper described the form in detail.²² This particular health information system is stored and maintained separately from the billing process.

Patient demographic information (medical re-

cord number, birth date, sex, and zip code) is entered into the health information system with updates occurring as necessary. At each visit the following visit-specific information is captured, coded, and entered:

1. Visit date, medical record number, and provider codes
2. Visit type: initial, routine, prenatal, emergency, did not show, and others as identified by the site
3. Diagnostic procedures, laboratory tests, and x-ray films either performed on site or ordered but performed elsewhere
4. Major active problems (diagnoses) identified at each visit
5. Class of medications prescribed (treatments)
6. Charges at this visit and sources of coverage
7. Patient disposition and the number of days until the next provider-requested return visit.

Residents are inconsistent in their recording of those items not essential for billing (medications, patient disposition, and number of days until next follow-up visit). Disposition and days until next visit are completed on over 90 percent of the visits. Treatments, however, are recorded on slightly less than 50 percent of the visits. The poor compliance with recording treatments is apparently due to the crude classification scheme and the difficulties residents have relating specific medications to this scheme.

Definition of Reference Population

The inspection of each resident's practice for anomalies is based upon comparisons with the combined practices of all residents seeing patients in the ambulatory care unit. The unit is a hospital-based outpatient center that provides care on a fee-for-service basis to patients in the surrounding community. While it might be desirable to define an "ideal" population of physician-patient encounters as a comparative base, the authors have chosen to use the ambulatory practice of the center as a whole for the following reasons:

1. No such ideal practice was available and none could be found in the literature
2. The center is large, with more than 30 residents as well as faculty seeing patients
3. Over any two- or three-year span the center staff as a whole sees approximately the same age-sex pattern and diagnosis pattern as other published studies⁷
4. There are no subspecialists in the practice and new patients are assigned to resident physicians in as random a manner as possible in a human environment with no rigid controls
5. It is more realistic to compare residents with their peers than with more clinically experienced physicians or with those who may be serving populations with different needs.

The occurrences of diagnoses and laboratory studies and the distribution of visits by age and sex for the center as a whole are used as a reference against which to screen the experiences of each resident.

Comparing a Resident's Practice with That of the Center Reference Population

During the first year, family practice residents spend one half-day per week in the ambulatory care center. In the second year this is extended to

three half-days per week and, finally, to four half-days per week during the third year.

Resident-to-center comparisons are customarily produced for all residents at the end of the first year and then at six-month intervals for the following two years of the program. Experience indicates that a resident should have accomplished approximately 200 visits before this approach can meaningfully detect discrepancies in a resident's practice.

Four tables are prepared to compare each resident with the center population. Table 1 describes each resident's outpatient summaries including number of visits and number of patients seen by each resident, charges per visit, percent of patients that did not show, and the average number of diagnoses and laboratory studies recorded at each visit. The bottom row provides the same data for the center as a whole. Tables 2 and 3, respectively, identify for resident A the distributions of diagnoses and problems recorded, and the laboratory studies ordered. Table 4 identifies the number of visits by age and sex for resident A.

For diagnoses and laboratory studies the 30 items most prevalent in each resident's practice are listed in descending order and the ranking of that item in the center as a whole is indicated. The Doctor to Center Ratio* column is a comparison of the Visits Per** for each resident with the Visits Per in the center as a whole. A ratio of 100 is par and a ratio of 200 means a frequency twice that of the center.

In Tables 2 and 3, a Doctor to Center ratio of less than 50, or more than 200, is double starred (***) to the right to aid in review. Problems or procedures not contained in a resident's top 30 diagnoses or laboratory studies are listed on the lower part of the table when they are discrepant by a

*Doctor to Center Ratio

On resident-specific tables this is the Doctor to Center ratio. For the age-sex tables it is simply the percent in a resident's age-sex cell divided by the percentage in the center age-sex cell multiplied by 100.

For the diagnosis and procedure tables, it is the Visits Per for the center divided by the Visits Per for the resident for the particular code, multiplied by 100. It is a measure of how frequently a code is recorded by a resident compared to how frequently the code is recorded in the center as a whole. A D/C of 100 means that rate is the same for the resident and the center. A D/C of 50 means the resident records the code only half as often as the center.

**Visits Per

This number represents, on the average, how many Visits it takes to generate one recording of a specific code.

Table 2. Distribution of Recorded Diagnoses By Resident A at a Family Practice Residency Center, July 1976 to June 1978

Rank	List "A" Code***	Visit Count	Patient Count	Percent	Center Rank	Doctor To Center Ratio	Visits Per	Text
1	347	110	24	9.61	2	169	7	For Antepartum Observation
2	341	76	63	6.64	4	154	10	Genl Med Exam
3	155	62	45	5.41	1	95	12	Ac URI ex Strep
4	129	46	18	4.02	3	108	16	Hypertensive Dis
5	408	47	23	4.10	5	96	15	For Vaccination
6	204	35	20	3.06	8	150	21	Urinary Disease
7	067	35	15	3.06	6	109	21	Diabetes Uncomplicated
8	255	27	15	2.36	7	106	27	Dis Skin Subcu Tissue
9	289	24	17	2.10	15	152	30	Symptoms GI Tract
10	285	23	18	2.01	14	143	32	Symptoms CV System
11	074	22	12	1.92	12	130	33	Obesity Nonendocrine
12	356	18	17	1.57	11	92	40	For Med & Surg Aftercare
13	257	17	11	1.48	*32	191	43	Osteoarthritis
14	316	15	12	1.31	23	140	48	Musculoskeletal Injury
15	219	14	9	1.22	30	149	52	Disorders Menstruation
16	122	13	10	1.14	9	62	56	Otitis Media
17	015	13	11	1.14	22	118	56	Mycoses
18	093	13	8	1.14	19	115	56	Anxiety Neurosis
19	094	13	6	1.14	13	80	56	Depressive Neurosis
20	216	13	12	1.14	18	109	56	Dis Vul Vag Uter ex Cerv
21	342	12	10	1.05	20	106	61	Lab only and Spcl Exam
22	292	12	8	1.05	*53	260**	61	Symp Female Genitalia
23	075	12	6	1.05	*54	261**	61	Metabolic Disorders
24	293	12	8	1.05	42	247**	61	Headache
25	011	11	4	.96	*35	147	66	Viral Warts
26	127	11	7	.96	*79	340**	66	Rheumatic Ht Disease
27	004	10	8	.87	*33	115	73	Strep Sore Throat
28	167	10	7	.87	10	49**	73	Misc Disease of URS
29	314	10	7	.87	*36	139	73	Injury Sacroiliac Region
30	161	9	6	.79	*38	130	81	Asthma
Codes with Three Times Deviation								
38	424	8	5	.70	90	305	91	Malaise and Fatigue
60	187	5	3	.44	155	505	145	Analy Fissure Fistula Abs
65	222	4	2	.35	197	748	182	Threatened Abortion
67	034	4	1	.35	162	454	182	Mal Neop of Prostate
75	259	3	1	.26	159	329	242	Dif Dis Connect Tissue
83	132	3	3	.26	16	19	242	Ischemic Ht Dis
87	069	2	2	.17	279	1817	363	Complicated Diabetes
90	310	2	2	.17	195	363	363	Fract of Other Bones
94	330	2	2	.17	31	22	363	Superficial Injury
101	059	2	1	.17	300	3180	363	B Neop of Urinary Organ
104	121	2	2	.17	185	310	363	Misc Disease of Eye
114	217	2	1	.17	188	318	363	Uterovaginal Prolapse
116	269	1	1	.09	62	24	726	Bursitis and Synovitis
126	133	1	1	.09	51	21	726	Arrhythmia-SL-Conduction
133	071	1	1	.09	75	29	726	Endocrine ex Thyr Diabet
134	215	1	1	.09	81	31	726	Inf Dis Cervix Uter
135	315	1	1	.09	59	23	726	Musculoskel Inj of Back
138	324	1	1	.09	73	29	726	Laceration Upper Limb
158	409	1	1	.09	24	10	726	For Vaccination NEC
162	416	1	1	.09	76	30	726	Sympt Skin/Subcut Tissue

*Diagnoses whose frequencies appear in Doctor's top 30 listing, but rank greater than 30 for the center
 **Doctor to center ratio showing a deviation more than twice the expected or less than half the expected
 ***Based on the H-ICDA-II "List A" scheme as developed by the Commission on Professional and Hospital Activities, Ann Arbor, Michigan, 1973, with modifications for primary care designed by project staff, including additional codes based on H-ICDA-II "Y" codes describing non-medical reasons for contact with an ambulatory care center

Table 3. Distribution of Laboratory Studies For Resident A at a Family Practice Residency Center, July 1976 to June 1978

Rank	Code	Visit Count	Patient Count	Percent	Center Rank	Doctor To Center Ratio	Visits Per	Text
1	8361	68	62	9.90	1	90	10	CBC
2	8920	64	57	9.32	2	118	11	PAP Test
3	8700	40	37	5.82	3	114	17	Urinalysis
4	9719	31	27	4.51	6	104	22	Immunization
5	4604	28	27	4.08	18	268**	25	Pelvic Exam
6	8001	25	19	3.64	9	101	28	Chem Profile
7	1003	22	21	3.20	5	73	31	Cult Throat
8	1007	22	21	3.20	23	294**	31	Cult GC
9	7101	17	17	2.47	8	68	40	X-Ray Chest
10	8320	17	7	2.47	4	54	40	Glucose Fasting Blood Sugar
11	1004	16	15	2.33	7	60	43	Cult Urine
12	9370	16	14	2.33	12	107	43	EKG
13	7337	16	16	2.33	*24	548**	43	X-Ray GI Series
14	0216	15	15	2.18	20	162	46	Suture Removal
15	8368	14	11	2.04	*31	290**	49	HCT
16	8775	13	13	1.89	13	97	53	Urine-Preg-HCG
17	8366	13	11	1.89	*32	278**	53	Hemoglobin
18	8997	12	12	1.75	27	220**	57	Ob Lab
19	8883	12	11	1.75	21	130	57	Culture Any
20	8527	12	12	1.75	28	221**	57	Rubella Titr
21	8134	11	11	1.60	16	101	63	Serum Electytes
22	9729	11	7	1.60	10	45**	63	Injection NEC
23	8301	10	8	1.46	15	82	69	Potassium
24	8556	10	10	1.46	17	95	69	TB Tine
25	1019	9	8	1.31	*37	264**	76	B/P
26	1001	9	9	1.31	11	58	76	Cult Cervix
27	8214	9	5	1.31	*73	746**	76	Estriol Preg
28	8467	7	2	1.02	*126	1740**	98	Anti Titer Rh
29	7449	7	7	1.02	*43	260**	98	Echo Pelvis
30	8534	7	7	1.02	14	57	98	VDRL
Codes with Three Times Deviation								
34	8440	4	4	.58	84	419	172	Retic Count
39	8242	4	4	.58	79	368	172	Iron Serum
40	8246	4	4	.58	75	344	172	Iron Binding
52	8897	2	2	.29	149	706	344	Culture, Anaerbc
54	7565	2	2	.29	102	305	344	Mammogram-Unilat
65	8434	1	1	.15	22	12	688	Prothrombin-PT
Clinic Top Thirty Not in Doctor List								
Code	Clinic Rank							
8227	21							
*Laboratory studies whose frequencies appear in Doctor's top 30 listing, but rank greater than 30 for the center								
**Doctor/Center ratio showing a deviation more than twice or less than half the expected								

Table 4. Visits By Age and Sex For Resident A at a Family Practice Residency Center, July 1976 to June 1978

Patient Sex		Patient Age								Total
		Less Than 1 Year	1-4 Years	5-14 Years	15-24 Years	25-44 Years	45-64 Years	65-74 Years	75 Years And Older	
Male	Visits	27	35	40	37	31	46	26	21	266
	Doctor/Center Ratio	54	104	109	80	34*	88	70	67	74
Female	Visits	34	30	52	122	98	49	41	38	464
	Doctor/Center Ratio	130	78	181*	127	99	71	146	153*	114
Total	Visits	61	65	92	159	129	95	67	62	730
	Doctor/Center Ratio	90	92	145	117	80	78	118	124	

*Doctor/Center ratio showing a deviation of more than 50 percent

factor of three, ie, a Doctor to Center ratio less than 33 (indicating that the item occurs at least three times less frequently in the practice of the resident than of the center), or more than 300 (indicating that the item occurs at least three times more frequently in the resident's practice than in the center as a whole). Diagnoses recorded or laboratory studies ordered one time only are listed if the Doctor to Center ratio is less than 33. Items common in the center, ie, in the top 30, but not noted at all by the resident are listed at the bottom of the table. Items common for the resident (in the top 30) but not common for the center (not in the top 30) are indicated with (*) to the left of the Center Rank column.

Table 4 shows the visits by age and sex for resident A with the Doctor to Center ratio being calculated and starred if there are differences of more than 50 percent between the resident's practice and the center as a whole.

Screening a Resident's Practice

Every six months faculty and residents are presented with an outpatient summary, sex and age distributions, and procedure and diagnostic listings for each resident. In a systematic way, the reviewer can screen each resident's practice with the information provided.

Each reviewer has his own special interest and concerns; however, the following general questions are kept in mind:

1. How does the resident compare with his or her peers?

2. How does the present information compare with previous data for this resident?

3. Does the age-sex pattern of the individual resident's practice need adjustment?

4. Is the resident gaining experience in managing common chronic problems and in dealing with common acute problems?

5. What factors may explain any cost variation noted among residents?

6. Is the resident with a low percentage of diagnostic studies not recording the information, or is the resident simply not ordering these items?

7. If the resident has a low percentage of diagnostic studies, does he or she under-utilize modes of care, or is everyone else over-utilizing them?

For purposes of demonstration, the authors will focus on one rather typical resident, concentrating on potential over-use of invasive or expensive procedures. Other questions can be addressed in a similar fashion.

On inspection of Table 1, it appears that the resident physicians in this practice are recording, on the average, 1.5 diagnoses, and one laboratory procedure per visit. These data compare favorably with other studies and suggest a reasonable level of completing the Encounter Form.²³⁻²⁵

In examining the outpatient summaries (Table 1) of Doctor A, a second year resident, one notes that his average cost per visit is higher than the norm. Also, a relatively larger number of patients were seen while the number of patient visits were relatively average in comparison with his peers. This suggests that patients do not return to him as frequently as patients return to other residents. Other values displayed for Doctor A on Table 1 fall within the average range for the center as a whole.

Looking at the age-sex distribution for this resident, it was noted that the resident is seeing a high proportion of older patients; for instance, females 65 years and older are seen 1.5 times more than is average for the center as a whole. In general, older patients require more health services and this may explain the higher average cost per visit.

The accumulated diagnostic listings for this resident, since starting in the program, indicate a larger than average obstetric practice. Yet, ranking of the top 20 diseases seen by this resident are similar to the ranking for the center as a whole. A major exception to this would be osteoarthritis, which is ranked 13th by this resident and 32nd in the center as a whole. However, this is not unusual when taken in the context of the older population seen by this resident.

Looking at the procedures and laboratory listings in Table 3, one immediately sees a reflection of resident A's high obstetric practice with pelvic examinations, gonorrhea cultures, hematocrit readings, rubella assessments, Rh titers, and pregnancy estriols all being markedly outside the norm for the center. However, the high number of gastrointestinal x-ray studies ordered, particularly when one reviews the diagnosis listings that indicate no significant upper gastrointestinal diseases, is unexpected and cannot be explained. (Code 289- Symptoms of the Gastrointestinal Tract does not include any radiologically identifiable disease entities.) Therefore, one is immediately concerned about the use of this relatively expensive and invasive test. Perhaps, this may account for the higher average cost per visit to this resident.

To pursue this question further, the reviewer requested profiles of care to be printed for those patients who had an upper gastrointestinal series ordered by Resident A. This step in the screening process shifts the focus from a review of distribution of laboratory studies and diagnoses to an analysis of the care provided to those patients who received upper gastrointestinal series ordered by Resident A.

In summary, using Tables 1 to 4, a reviewer can first compare each resident's experience with those in the practice as a whole. Secondly, the reviewer can compare each resident's pattern of recording diagnoses with the ordering of laboratory tests, while taking into account the distribution of visits by age and sex.

Once an evaluator becomes experienced in

reading and interpreting these tables, the questions to be pursued further can be determined in about 20 minutes per resident each six months. Most residents' performances do not require the next step in the review process (review of the profiles of care) and a short meeting with each resident to review the tables is all that is required.

Review Using the Computer Generated Patient Profile

The previous analysis was performed by aggregating visit level data. The data, however, are stored in the computer in such a way that all visits to the center by a patient can be accessed simultaneously and a patient profile can be produced. This profile is a crude computer abstract of the medical record. It contains, in chronological order by visit, the actions taken by each resident seeing the patient in question. The profile does not contain findings from history and physical examination or the results of laboratory studies.²⁶

In the example, the reviewer requested that profiles be produced for all patients who had an upper gastrointestinal x-ray series ordered by Resident A. Table 5 is a sample profile reflecting one of the 16 patients who had an upper gastrointestinal series ordered. Note that all visits made to all physicians are listed, not just those to Resident A. The physician seeing the patient at any specific visit is identified by a code letter listed under the column headed MD. Thus, the physician responsible for ordering the upper gastrointestinal series is readily identified. The profile allows the reviewer access to all of the visits made by the patient in question, thereby enabling an assessment of the total care provided to that patient.

Reading patient profile No. 0906182 reveals a 34-year-old female on her first visit to the Family Health Center in October 1977, presenting with excessive menstruation and indications of depression. She had a complete blood count, Pap smear, and cervical culture performed at that time and was either started or continued on an estrogen-progesterone preparation. Her return visit two days later included the ordering of a pelvic ultrasound in the work-up of the excessive bleeding. The patient was also considered to have an adjustment reaction to adult life. The patient did not make an appointment to return in two weeks as the resident requested, nor did she appear for an ap-

Table 5. Patient Profile July 1976 to June 1978

Chart No. 906182, Female Born 02/43										
Visit Data	Reason for Visit	MD	RN	Dispo- sition	Days To Return	Fee	Standard Procedures	Other Lab/X-Ray	Treatment	HICDA Diagnoses
10/25/77		R	57	Ret V	30	53	Initial Visit CBC	Pap Test Cult Cervix	Estrogen/Prog	6262-Excessive Menstruation 3105-Depressive Neuroses
10/27/77		R	57	Ret V	14	12		Echo Pelvis	Estrogen/Prog	3173-Adjust React Adult Life 6262-Excessive Menstruation
02/05/78		A	0	Did not show						
05/23/78	Rout Chk	A	462			12		GI Series		0092-Gastroenteritis,Colitis 7800-Abdominal Pain
06/01/78	Ac Fwp	A	234	Ret V	30	12				7061-Acne 7836-Polyuria,Frequency
06/31/78		A	0	Did not show						

Reason for Visit Ac Fwp-Acute Follow-up Ac Prob-Acute Problem Chr Prob-Chronic Problem Fam Plan-Family Planning Rout Chk-Routine Check
Disposition Ret V-Return Visit

pointment she had made for February 5, 1978. She was again seen on May 23, 1978, with a new series of symptoms that included abdominal pain for which a gastrointestinal series was ordered. No definitive treatment was recorded. There is no reference in this visit's diagnostic listing to the previous problems dealt with, nor is there reference in the follow-up visit on June 1, 1978, to the gastrointestinal problems.

The overall impression formed by this patient profile is that, in a short period of time, this 34-year-old patient has presented with a multitude of different organ symptoms, none of which seemed to materialize into any definitive diagnosis. The underlying suspicion is that there are psychosocial depressive and personality factors that may well be the etiology of the patient's problems. If the gastrointestinal series was done, it was most likely negative because of the fact that follow-up visits did not record gastrointestinal disease. One wonders if, in fact, the resident was just simply responding to symptoms with tests and not acting on the psychosocial depressive and personality problems of the patient.

Review of the remaining 15 profiles indicated numerous tests ordered that seldom seemed to make an impact on the diagnosis. Each of the patients represented by the 15 profiles had had an upper gastrointestinal series ordered by Resident

A, while in only two cases did the test results appear to be positive.

Selective Chart Review

The overall opinion formed from the profiles must be further confirmed by selective chart review. Patient profiles, however, provided an indicator to the charts where care is probably inappropriate.

In this case, four charts where inappropriate management was indicated were reviewed, including the chart of the profile already presented. The chart of profile No. 0906182 confirmed the overall opinion formed from the profile. Excessive menstruation seemed to be due to breakthrough bleeding on the pill. The pelvic ultrasound was negative and the symptoms resolved on their own after a change of oral contraceptive. The upper gastrointestinal series was negative and there was no recording at the visit of June 1, 1978, to suggest that the abdominal pain was a continuing problem. Review of the dictation for May 23, 1978, suggested there was minimal evidence to indicate the necessity for an upper gastrointestinal series at that time and symptomatic treatment might have been more appropriate. More significant, however, was the lack of psychosocial history or mental status examination. Nor was there recording of the patient's alcohol and drug usage.

Overall assessment of this resident's practice indicates favorable comparison with peers, a higher number than normal of obstetric patients, and a higher than normal number of older patients. The only major discrepancy with the center as a whole was the high average cost per visit in the presence of an average number of laboratory procedures per visit. Closer scrutiny of the diagnostic and procedure listings indicated that the upper gastrointestinal series was much more frequently ordered by this resident, with no indication of a high yield, thus suggesting that this procedure may well have been over-utilized and a major contributor to the greater than average cost per visit. After review of 16 profiles and 4 charts, this impression was confirmed and it was apparent that the resident failed to employ appropriate clinical judgment in deciding when expensive laboratory studies were appropriate. It was also revealed that the resident was resistant to, or unaware of, psychological and emotional factors that may present as somatic complaints. Alcoholism was not being followed up when it was clearly a consideration.

Completion of this process requires clear communication with the resident regarding the findings and suggestions for changes in the resident's behavior. In this case, the resident was requested to present a conference on peptic ulcer disease within the following month. The resident also agreed to video-tape three patient/physician interviews for assessment by the faculty.

Comment

A method of reviewing resident physicians' ambulatory care experiences has been described. This method of inspecting residents' experiences is based on the assumption that each resident's practice is a random sample of the center population. If a resident's distribution of patient visits by age and sex, diagnoses, laboratory studies, and costs of care are more than twice as high or less than one half that of the center as a whole, the observation is starred. A reviewer who observes such a variation must then attempt to find other data to explain the discrepancy. If no explanation emerges, a reviewer can request profiles of the care provided to patients by the resident whose data are discrepant. Where this does not resolve the issue, the reviewer may wish to audit the medical records of those patients receiving care from the resident in question.

This approach to reviewing family practice resident's ambulatory care experiences appears to have several advantages over more traditional reviews of medical records. First, the data are timely, reasonably accurate—our accuracy checks for diagnoses and laboratory studies reveal over 90 percent agreement between the encounter form and the medical record—and require minimal extra effort for collection.

Secondly, the data are organized in such a way that reviewers can quickly spot discrepancies between one resident and the practices of all residents. Thirdly, inconsistencies within each resident's practice can also be identified. These inconsistencies center around: (1) unexplained use of diagnostic studies, (2) indiscriminate use of a larger number of diagnostic studies, and (3) over-diagnosis of problems that, based on the age-sex distributions of the practice, would be unlikely to occur.

By the beginning of the second year, faculty have had sufficient time to develop opinions of residents' strengths and weaknesses. Thus, when faculty review data from this system, they are often able to find "hard" evidence to corroborate their suspicions regarding the observed inconsistencies in residents' performances or, to explain why certain discrepancies in residents' experiences have occurred. Residents are sometimes startled to learn that they have had little or no experience in diagnosing or managing certain frequently occurring problems or, that they have been over-using certain diagnostic tests. These findings are presented to residents in the form of questions about their practice. As a result, residents appear not to be threatened by the system but regard it as a useful tool for assisting them in the evaluation of their own performance.

Thus, this approach appears to have met faculty and resident requirements for a system of review that: (1) was quick to read and interpret, (2) permitted reviewers to interpret the system in a stepwise manner, ie, to ask questions and to receive data that address those questions without "wading" through stacks of paper, (3) was capable of focusing on the cost effectiveness of performance, and (4) organized information around patients and the performance of all providers seeing each patient.

At this time, the authors are only beginning to conduct studies of the sensitivity and specificity of

this approach. A major question to be addressed concerns the residents who are neither discrepant from the practice norms nor inconsistent in their ordering of diagnostic studies and recording of diagnoses, but who may be performing inadequately. At this time, these residents may not be identified through initial screening procedures. These residents are best identified through a review of profiles describing their care for patients who have frequently occurring problems, such as hypertension, diabetes, or urinary tract infections. To this end the authors have initiated a study among faculty in the six sites using this system in order to compare judgments of care based on the patient profiles with those made using the medical record. The findings should help to specify those judgments that can be made equally well from either source.

Further, discrepancies between a resident and the practice as a whole are more likely to occur when a resident has a total of less than 200 patient visits or when the diagnoses or laboratory studies occur infrequently in the practice. For example, one resident was questioned because of the number of times lupus erythematosus was diagnosed by him in relation to the practice as a whole. Through a review of the profile it became obvious that all patients in the center with this diagnosis were being seen by this resident.

Despite these limitations associated with small numbers, however, this method is quite useful for examining resident experiences and performance with respect to the top 20 diagnoses and laboratory studies. Since the 20 most frequent diagnoses and laboratory studies account for over 50 percent of the ambulatory care visits, it is important to ensure residents' competence in these areas. Thus, this approach does help faculty and residents to assess performance and to focus their efforts toward improving the quality of patient care.

Acknowledgement

Work on the Health Information System was conducted by the Department of Community Health Science, Michigan State University, under a subcontract with the Michigan Department of Public Health, pursuant to a grant awarded by the W.K. Kellogg Foundation.

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