The Use of Computer Generated Patient Profiles To Evaluate Resident Performance in Patient Care

Charles W. Given, PhD, Lewis Simoni, MD,
Rita S. Gallin, MA, and Robert J. Sprafka, PhD
East Lansing and Flint, Michigan

This paper describes the way in which data from a computer-based health information system are used to review the service experiences of family practice residents. First, it discusses the development of the patient profiles that provide a chronological account of a patient's visits, their purposes, diagnoses, laboratory procedures, treatments, and outcomes. Then, through four cases, it describes the way in which these computer-generated displays are used by faculty to conduct concurrent reviews of residents' performances, to select medical records for review, and to initiate feedback and instruction to residents as they care for their patients.

Effective and efficient methods for reviewing the service experiences of residents are a necessary component of any training program. Such reviews not only help to insure that high quality care is provided by physicians in training, but they also provide an opportunity for faculty to instruct residents in areas in which deficiencies are observed. Traditional techniques for reviewing care, however, have two shortcomings: (1) they are time-consuming; and (2) on occasion, they pass over deficiencies associated with a particular resident's performance or with the range of clinical experiences to which he/she is exposed. Automated techniques are available to identify patients and the services rendered to them. But, these too have shortcomings. On the one hand, advances in these techniques have been focused on technological developments in computer software and not on the review and assessment of patient care.[1-3] On the other hand, computer-based health information systems often have failed to display data in ways that physicians can use to make clinically-related decisions regarding the care of patients.[4-7] The purpose of this paper is: (1) to discuss a set of computer-generated patient profiles which were developed to overcome some of these problems; and (2) to describe the way in which these displays are used by faculty in a Family Practice Center to make decisions regarding the quality and appropriateness of care delivered to patients.

From the Office of Health Services Education and Research, College of Human Medicine, Michigan State University, East Lansing, and St. Joseph Family Health Center, Flint, Michigan. Requests for reprints should be addressed to Dr. Charles W. Given, Office of Health Services Education and Research, College of Human Medicine, Michigan State University, East Lansing, MI 48824.

The Patient Profiles

The patient profiles are derived from a health information system that has been in use in the Family Practice Center since January 1975.[8] Data for this information system are collected through a one-page multiple copy document that is an integrated billing and patient encounter form (Figure 1). The document is attached to the patient chart, completed by the resident at the end of each patient visit, and the data then edited and submitted to computer processing.

The profiles were developed in order to organize these data into a format that would reflect: (1) the adequacy of resident physicians' identification of patient problems or diagnoses; (2) the ways in which these physicians treat and manage the problems identified, including the provisions they make for follow-up care based on the likely course of illnesses; and (3) any deficiencies in residents' performance that indicated a need to conduct a detailed review of patients' medical records with the resident physicians. In meeting these objectives, several problems related to the ways in which physicians use and interpret information displays had to be confronted.

First, tabular presentations that described comparative frequencies of events in numerical terms – such as the number of patients with disease "X" seen by given residents, or the timing and frequency of follow-up visits prescribed by a resident for disease "X" – did not provide enough information to allow faculty to assess the adequacy of a diagnosis or a management strategy for a given patient. Secondly, tabular presentations did not provide a suitable framework in which to display the complex array of data needed to allow faculty to gain insights into these processes. Finally, physicians' training and clinical perspectives made them more experienced with and accustomed to interpreting information on a patient-by-patient basis. (This problem, in fact, began to explain some of the faculty's resistance to tables and their frustration in attempting to derive clinical interpretations from numerical displays of data.)

The patient profiles, therefore, were designed to overcome these problems. They provide a chronological account of patient visits, their purposes, diagnoses, laboratory procedures, and treatment. Also, they provide a measure of patient health status at the time of each visit and a physician estimate of the number of days required to resolve problems for which care is sought. The profiles do not, however, provide data from the patient's history or physical examinations or the results of laboratory tests and/or x-ray procedures. (See Figure 2 for a guide to reading these profiles.)

Faculty can use data from these patient profiles in several ways to make probabilistic estimates of the

adequacy of residents' diagnoses and management of patient problems. The methods possible are not mutually exclusive and different faculty may use different techniques to evaluate data. For example, faculty can employ three distinct strategies to assess the adequacy of resident physicians' identification of patient problems or diagnoses.

First, they can evaluate the diagnostic labels used to describe a patient's problems at consecutive visits. Difficulty in arriving at a differential diagnosis often is reflected in changing diagnoses over a series of visits. Thus, faculty may become suspicious when a general diagnosis such as "male genital disease not elsewhere classified" is followed, first by a diagnosis of leukoplakia of the penis and then, by a diagnosis of male genital disease. Secondly, faculty can assess the degree to which the diagnoses assigned are supported by laboratory tests or diagnostic procedures customarily used to differentiate or define these diseases. A diagnosis of hypertension, for example, in the absence of evidence that blood pressure was recorded, may cause faculty to question the precision or correctness of the diagnosis. Finally, faculty can evaluate the extent to which a diagnosis and the estimated or actual health status recorded are consistent with the course known to describe the disease specified. A diagnosis of upper respiratory tract infection on consecutive visits extending over several months, accompanied by an estimate at each visit that the problem should be resolved in ten days, may raise the faculty's suspicions about the validity of the diagnosis and the degree of clinical skills invested in the diagnostic decision made.

Assessment of the adequacy of residents' management of patient problems is slightly more complex than evaluating the adequacy of their diagnoses. This is so because management is a multidimensional concept involving medications, diet, referrals to specialists, and scheduling of follow-up visits to evaluate the effects of intervention and patient compliance with the prescribed interventions. Not all of these dimensions of the process can be evaluated using the patient profiles but faculty can gain an overall perspective from them on the ways in which residents manage patients.

In general, faculty evaluate residents' care for patients with specific diseases by comparing performance with either their own implicit algorithm or with a set of explicit standards that describe the processes of care used to achieve desirable outcome states. For example, faculty may compare the patient's age, diagnosis, and coexisting morbid conditions with the frequency of prescribed follow-up visits, compliance of the patient in returning for these visits, and the number, type, and frequency of diagnostic procedures ordered to evaluate the progress of the patient.

Based on the data derived from the profiles, faculty are able to make preliminary assessments of the care provided by residents. When deficiencies are observed, they confirm these through a review of the patient record and initiate instruction with the resident about the problems identified. In this way, the patient profiles become a tool that faculty can use for assessing patient care, determining the need for review of the medical record, and providing an educational experience for residents.

In the following section, case examples are presented of the use of the patient profiles as screening tools in assessing the adequacy of residents' diagnoses and management of patient problems. In these examples, an assessment based on an analysis of profile data is followed by a review of data contained in the medical record. Each example concludes with a summary describing the implications of the profile as a screening tool. The four profiles were selected as case examples to demonstrate the flexibility of this technique and its value as a screening tool. Four types of problems are included: (1) a healthy infant in the first year of life; (2) a 48-year-old male with xerotica obliterans; (3) a 15-year-old female with a sebaceous cyst; and (4) a 9-year-old male with juvenile onset diabetes.

Using the Profiles as a Screening Tool

Patient Profile No. 1

Review of Patient Profile

The patient is a male infant born in May 1975. The data base includes all seven visits to the ambulatory care unit (Figure 2). The date of the first visit, however, was not entered on the encounter form, and was printed in the profile as 0-0-0. All of the visits were by appointment and at two of them, the resident requested a return visit: one, at the time of the first visit, for 14 days, and the other, at the time of the third visit, for 60 days. Resident 14 managed all the visits which varied in cost from 0 to 10 dollars.

Four of the seven visits were for health maintenance. At three of these visits – those in August, September, and November, ie, the third, fourth, and sixth months of the infant's life – immunizations were recorded. Three visits were for illness. The first visit for an illness was for an "acute URI" (upper respiratory tract infection) on September 19, 1975; the illness was listed as a short-term problem alterable by therapy with resolution expected in ten days. The next illness-related visit occurred on December 8, 1975; "exanthema subitum" was recorded as the diagnosis and the problem was considered to be self-limiting with resolution expected in ten days. The last visit for an illness was for an "acute URI" on January 14, 1976; this illness was listed as self-limiting with resolution expected in five days. Treatment procedures were recorded for the first and third illness-related visits, and temperature, pulse, height, weight, and blood pressure, ie, "base one," were listed for all visits. No laboratory tests or x-rays were done. The Health Status Index (HSI) for this infant indicated that he was generally asymptomatic except on his last visit when he was "symptomatic and experiencing some discomfort."

Analysis of Profile Data

The Family Practice Center's protocol for immunization requires three doses of DPT vaccine and oral polio vaccine at monthly intervals beginning with the second month of life. In view of the intervening upper respiratory tract infection in the fourth month of life, the reviewer considered the infant's immunization record to indicate adequate care. He assumed that the two upper respiratory tract infections were "different" since one was treated with "cough remedies" and the other with "cold remedies." Moreover, he assumed that: (1) the cough remedies were a prescription drug since the problem for which they were ordered was considered alterable by therapy;

DATE: MONTH DAY YEAR (1 2 3 4 5 6)

CHART: (7 8 9 10 11 12) —

NAME: _____

DR. (14 15) —

NURSE (16 17) —

(18 19 20)

FAMILY HEALTH CENTER
St. Joseph Hospital
202 Kensington Avenue
Flint, Michigan 48502
239-5781

№ 76043

(CARD 1)	CODE		CODE	FHC	OP
☐ 19 Initial visit	90050	☐ 31 Diathermy	96008		
☐ 20 Return visit	90258	☐ 32 EKG	93708		
☐ 21 D.N.S.	99994	☐ 33 Tonometry	93161		
☐ 22 Emerg. 1st Aid		☐ 34 Audiometry	93500		
☐ 23 Burn Care		☐ 35 Pulmonary Func.	94607		
☐ 24 Orthopedics		☐ 36 Injection			
☐ 25 OB Care		☐ 37 Immunization			
☐ 26 Surg - Office		☐ 38 Pap	43430		
☐ 27 Medical Care - IH		☐ 39 Preg. Test	43711		
☐ 28 Surgery - IH		☐ 40 Blood Sugar	41004		
☐ 29 Suture Removal	02162	☐ 41 CBC	40014		
☐ 30 Sigmoidoscopy	34009	☐ 42 Chem Profile	41863		

OTHER:	CODE	FHC	OP
	(43 44 45 46) —		
	(47 48 49 50) —		
	(51 52 53 54) —		
	(55 56 57 58) —		
	(59 60 61 62) —		
	(63 64 65 66) —		
	(67 68 69 70) —		

	PATIENT	INS.
OFF. CALL		
TREAT.		
INJ/IMMUN.		
TEST		
LAB.		
TOTAL		
PAID		
TODAY'S BALANCE		
TOTAL CHARGES (71 72 73)		

DIAGNOSIS: NONE ☐ (14 15 16 17) (18 19 20 21) (22 23 24 25)

TREATMENT/PROCEDURES (26-35)
☐ 11-None
☐ 12-Asp/Inj/Jt
☐ 14-Diet

CAR-VASC-RENAL
☐ 22-Dig. Glycosides
☐ 23-A/arrhythmic
☐ 24-A/anginal
☐ 25-Vasodilator
☐ 26-A/Shock
☐ 27-A/hypertensive
☐ 28-Diuretic

BLOOD AGENTS
☐ 29-A/anemia
☐ 30-A/coagulant
☐ 31-Blood products
☐ 32-Hemostatic

HOMEOSTATIC/NUTR.
☐ 33-A/hyperglycemic
☐ 34-A/hyperlipidemic
☐ 35-Vitamins
☐ 36-Electrolyte replenish

ANALG-NARC.
☐ 37-Local Anesthetic
☐ 38-Analgesic/Narcotic
☐ 39-Analgesic/Non/Narc.
☐ 40-A/Migraine
☐ 41-A/gout
☐ 42-A/rheumatic

CNS/AGENT
☐ 43-Sedative/Hypnc.
☐ 44-A/anxiety
☐ 45-A/psychotic
☐ 46-A/convulsant
☐ 47-A/depressant
☐ 48-Anorexiant
☐ 49-Analeptic
☐ 50-Musc. Relax.

HORMONES
☐ 51-Corticoids
☐ 52-Androgens
☐ 53-Estrogens/Prog
☐ 54-Thyroid
☐ 55-A/Thyroid
☐ 56 A/diuretic

RESPIR-ALLERGY
☐ 57-Cold Remedies
☐ 58-Decongestant
☐ 59-Expectorant/inhal.
☐ 60-Cough Remedies
☐ 61-A/histamine
☐ 62-Bronchodilator

G.I. PREP
☐ 63-A/spasmotic
☐ 64-Antacid
☐ 65-A/diarrhea
☐ 66-A/constipations
☐ 67-Anorectal
☐ 68-Emetic/A/Emetic

TOPICAL AGENTS
☐ 69-Eye prep.
☐ 70-Ear prep.
☐ 71-Vag. prep.
☐ 72-Dermatologic

ANTIMICROBIALS
☐ 73-Antibiotic
☐ 74-A/fungal
☐ 75-A/parasitical
☐ 76-A/viral
☐ 77-A/neoplastic
☐ 78-A/placebo
☐ 79-Adverse Reaction

Nurse/Reason for visit (36-37)
☐ A-Acute Problem
☐ B-Ac Prob Fwp
☐ C-Chronic Prob.
☐ D-Chronic Prob. Fwp
☐ E-Treatment
☐ F-Routine Check
☐ G-Exten. Check
☐ H-Well Baby Visit
☐ I-Pre/Post Nat
☐ J-FamPlan/Coun/Ed
☐ K-Lab Only
☐ L-Other

STATUS (38)
☐ 1-Call-in
☐ 3-Appointment
☐ 4-Emergency

DISPOSITION (39-40)
☐ A-Admitted
☐ B-Ref/Consult.
☐ C-Ref/Oth/Phy.
☐ D-Return visit
☐ E-Other

(41 • 42 . 43)
Number of Days To Next Return Visit

HEALTH STATUS
☐ (44) Prior to illness
☐ (45) Peak of illness
☐ (46) This visit
☐ (47) 3 months

1-Perf usu maj actvty (Wrk, Schl, Play, Retd, Hskpg). Not sympt.
2-Perf usu maj actvty & symptomatic experiences discomfort.
3-Cutdown maj actvty
4-Restrict frm maj actvty
5-Bed disabled
6-At risk
7-Info insuff to make status indes
8-Health status not applicable this visit.

OUTCOME STUDY (Applies to first Dx Only) (Check one)

☐ (48) short term prob. → ☐ (49) Self limiting → ☐☐ (51 52) Days to prior stat
☐ (48) short term prob. → ☐ (50) Altered by Rx → ☐☐ (51 52) Days to prior stat
☐ (53) long term prob. → ☐ (54) Not signif altered by Rx
☐ (53) long term prob. → ☐ (55) Altered by Rx → ☐ (56) Exp status in 3 mos.
☐ (57) Health Maintenance (no disease).

☐ Trauma ☐ Work Rel. ☐ Auto Rel. ☐ EPSDT

OFFICE USE ONLY

Form #1144

Figure 1. Integrated Billing and Patient Encounter Form

and (2) the cold remedies were a palliative, nonprescription medicine since the problem for which they were ordered was considered self-limiting. No treatment was noted for the exanthema subitum that occurred in December and the reviewer assumed that this problem had been resolved prior to the January visit since no further note was made of it.

The profile data demonstrate continuing care by the same physician (resident 14) whose judgmental considerations about outcome were apparently achieved since none of the problems were listed on successive visits. The treatment procedures were pertinent and adequate without being excessive. Based on these data, the reviewer would conclude that care was adequate and appropriate and this patient's chart would not have been selected for review.

Review of Medical Record

The infant, born on May 11, 1976, was initially breast fed by his mother and later transferred to a bottle. His height, weight, and developmental characteristics were adequately charted using a flowsheet pattern. Recorded comments were indicative of the resident's ability to maintain adequate rapport with the mother. Entries in the problem-oriented record were properly constituted, documented, and signed.

The first visit to the unit was made on June 25, 1975 when the child was six weeks old. Immunizations were routine and without incident. The chart indicated that the first upper respiratory tract infection had a three-day cough prelude and that the second, described as a cold and runny nose by the mother, had been confirmed on objective assessment by the resident. At the time of the third illness, diagnosed as exanthema subitum (roseola infantum), the chart contained the notation that the child "has been running a low grade fever with temps up to 100.0F."

Summary

The data from the medical record generally support the conclusions based on the patient profiles. One exception was uncovered, however. Given the data from the record on the patient's temperature at the time of the third illness-related visit, the reviewer questioned the diagnosis of exanthema subitum. Nevertheless, no additional data were available in the record to suggest an incorrect diagnosis and since no further mention of this problem was made in the record, the reviewer assumed that it was resolved. It appears, then, that the inferences made about the appropriateness of care for this patient based on the profiles were supported by data from the medical record.

Patient Profile No. 2

Review of Patient Profile

The patient is a male born in 1928. The profile (Figure 3) contains data for two visits: the first on November 10, 1975 when no return visit was requested and the second on January 15, 1976 when a return visit was requested for 180 days. Resident 15 took care of the patient on both visits. One fee of 8 dollars was listed.

The first visit was for an "acute problem" that was considered a short-term illness, alterable by treatment (listed as "other") within ten days. The second visit was for an "acute problem follow-up." At that visit, the problem was viewed as a long-term one, requiring no treatment and having no impact on the patient. Two diagnoses were listed: the first, "leukoplakia of the penis," and the second, "male genital disease not elsewhere classified." Screening procedures were "base one" plus urinalysis. No laboratory tests or x-rays were done. The Health Status Index indicated that the patient's status was essentially normal except for some discomfort at the peak of illness.

Analysis of Profile Data

The illness of a 48-year-old male was diagnosed as leukoplakia of the penis. The reviewer was troubled, however, by the resident's assessment of this probably premalignant condition as a short-term problem that he expected to be resolved within ten days. Moreover, when two months later the condition was diagnosed as a long-term male genital disease, the reviewer began to suspect that the resident had had trouble arriving at a differential diagnosis and had substituted a second diagnosis for the first. He concluded, therefore, that a review of the medical chart was necessary.

Review of the Medical Record

The record revealed that the patient had been seen in the ambulatory care center since December 1973. On November 10, 1975, he visited the center for a "painless white lesion on the ventral surface of the glans" that was described as an "epithelial-like area, which is white, flat, nonscaly, nontender, and appears to be intradermal." The resident labeled this problem leukoplakia but, unsure of his diagnosis, consulted by telephone with a urologist. The latter agreed to meet both the resident and the patient at the hospital the following morning and at that meeting assured them that the lesion was benign. (A subsequent phone call by the reviewer to the urologist revealed that the diagnosis was xerotica obliterans.)

At the time of the patient's second visit, the resident listed no subjective complaints in the chart. He noted that the "white lesion ventral surface of the penis extended from the urethral meatus to the base of the glans," that it had been seen by a urologist approximately one month earlier, and that there had been no significant change since that time. The resident recorded no recommendation for treatment.

Summary

In this case, the profiled data, that are limited only to data collected during a visit to the ambulatory care unit, omitted a key in-hospital encounter between the resident, the patient, and a specialist. The subsequent review of the chart nevertheless points up the usefulness of the profile as a screening tool. On the basis of the data and the diagnosis of leukoplakia included in the profile, the reviewer selected this patient's record for review. Had this review indicated that the patient indeed had leukoplakia, the reviewer would have examined him. Instead, he asked the resident to refine his skills for differentiating leukoplakia from xerotica obliterans and reinstructed him on the way in which to record the resolution of a previously listed diagnosis. In discussion the resident indicated that he had forgotten the exact name of the diagnosis given him by the urologist. This case, then, not only illustrates the use of the patient profiles as a tool to provide an educa-

CHART = MONTH/YEAR OF BIRTH= 5/1975 COMPLETE(DATA BASE INCLUDES FIRST VISIT)

VISIT DATE	STS	D1	D2	RTN	MTL	SEX	MD	R1	R2	FEE	HSI	OUTCOME	SCREENING PROCEDURE(S)	LAB TEST(S) X-RAY	TREATMENT PROCEDURE(S)	VST	RES	HICDA	DIAGNOSIS(ES)
0/ 0/ 0	3			14	S	M	14	H		0	0000	HM	14-BASE ONE		11-NONE REQUIRED				
8/ 5/75	3			0	X	M	14	A		8	0000	HM	14-BASE ONE		16-IMMUNIZATION				
9/ 8/75	3			60	X	M	14	H		8	0000	HM	14-BASE ONE		16-IMMUNIZATION				
9/19/75	3	E		0	X	M	14	A		8	1111	SA10	14-BASE ONE		60-COUGH REMEDIES			4650-1-	-ACUTE URI NOS
11/17/75	3			0	X	M	14	F		2	0000	HM	14-BASE ONE		16-IMMUNIZATION				
12/ 8/75	3			0	X	M	14	A		8	1111	SS10	14-BASE ONE		11-NONE REQUIRED			0571-0-	-EXANTHEMA SUBITUM
1/14/76	3			0	X	M	4	A		10	1221	SS05	14-BASE ONE		57-COLD REMEDIES			4650-1-	-ACUTE URI NOS

- Visit Date
- Status of Each Visit
- Disposition
- Number of Days to Return Visit
- Marital Status
- Sex
- Physician who saw Patient
- Reason for Visit
- Visit Charge
- Health Status Index
- Estimated Days to Achieve Previous Status
- Screening and Laboratory and X-ray Procedures
- Treatment Categories
- H-ICDA Code for each Disease
- Number of Previous Visits to the Center for that Disease
- Names of Diseases

Figure 2. Patient Profile No. 1

tional experience for residents but it also demonstrates the use of the profile as a tool to determine the need for review of the medical record. That is, when the profile indicates that an original diagnosis with one estimated outcome was changed on a subsequent visit to another with a reestimated outcome, the cautious reviewer will initiate a review of the record.

Patient Profile No. 3

Review of Patient Profile

The patient is a single female born in January 1962, with five visits recorded in this data profile, four by appointment and one by other means (Figure 4). Two return visits were requested: one, at the time of the third visit, for seven days, and the other, at the time of the fifth visit, for 30 days. Resident 5 managed one visit and resident 15 saw the patient on the four other visits. The fees for these visits ranged from 8 to 14 dollars.

The first two visits, in June and August 1975, were for acute problems which were diagnosed as "lipoma" and "sebaceous cyst." The third visit on October 14, 1975 also was for an acute problem, pneumonia, and the fourth, on October 22, 1975, was a follow-up visit for this problem. The problem was considered alterable by therapy with resolution expected in 14 days. The last visit on January 15, 1976 was for "epistaxis," a problem that was considered short-term and alterable by treatment within 30 days.

Treatment procedures were recorded for the third, fourth, and fifth visits: antibiotics and "other." Screening procedures included "base one" at all visits, urinalysis at the first, second, and fifth visits, and a complete blood count on the third and the fifth visit. The Health Status Index indicated that the patient's status was essentially normal except for some discomfort on the October 22nd and January 15th visits.

Analysis of the Profile Data

A young girl's problem is diagnosed as a lipoma by one resident and, slightly over a month later, a sebaceous cyst by another. The reviewer immediately was alerted to the possibility that the same lesion had been diagnosed differently by two separate observers. The initial diagnosis of pneumonia on October 14, 1975 had not been confirmed by a chest x-ray. Nevertheless, the other procedures and treatment appeared pertinent and adequate without being excessive. The episode of "epistaxis" appeared to be adequately managed in view of the hematological procedures. The reviewer concluded that a review of the medical record was necessary to determine whether or not the lesions diagnosed at the first and second visits were of the same site. Moreover, he believed that actual patient contact would be necessary to determine which diagnosis was correct.

Review of the Medical Record

At the June 27, 1975 visit, resident 5 noted that the patient was a 13-year-old female of Italian descent who had "felt the small lump on her back for three years." His objective assessment was that the lump, over the right scapula, was a "hard nodular mass, slightly less than 1 cm in diameter." He noted that "the mass appears to be adherent to the skin, but is freely movable from the subcutaneous tissue" and that "there is no inflammation or tenderness on palpation." He diagnosed the lesion as a "lipoma on back" and recorded his plan to "watch for growth or pain" and have the patient "return in one month." At the time of this return visit on August 14, 1975, resident 15 recorded that the patient had no subjective complaints. His objective assessment was that the "cyst is unchanged on back" and diagnosed the lesion as a "sebaceous cyst." He noted that the patient was to return whenever necessary and prescribed no treatment. (For purposes of completeness, the mass overlying the right scapula was reviewed by faculty and termed to be a "sebaceous cyst.")

Resident 15 next saw the patient on October 14, 1975 when he recorded that she had a nonproductive cough, runny nose, and fever for four days, no chills, and anterior chest pain on deep inspiration. Based on findings from a chest x-ray taken in the Emergency Department, resident 15 diagnosed her problem as "probably pneumonia," indicated that he believed the condition was a mycoplasmal pneumonia, and prescribed erythromycin. At the time of the patient's return visit, the resident declared the pneumonia resolved and recorded that therapy was to continue for one more week. The treatment of this patient appeared to be adequate.

At the patient's last visit, the resident diagnosed her condition as epistaxis and ordered a complete blood count. A comparison of this blood count with the one taken in October revealed that the hemoglobin was 11.4 gm/100 ml with a hematocrit of 36.8% on the 12th of January and 10.5 gm/100 ml with a hematocrit of 35.4% on the 14th of October. In both reports it was noted that the red cell morphology was "indicative of moderate variation in size." Elliptical bizarre forms were described along with "occasional target cells" and "some diffused stippling." In general, the white blood cells and platelets were not reported as unusual.

Summary

With the exception of a discrepancy between residents in the diagnostic labeling of a sebaceous cyst, the review of the medical record generally supports the conclusions based on the patient profiles. The reviewer, however, after comparing the two blood count reports, did believe that a hematological problem might exist within this patient and should be resolved prior to the continuation of therapy with any hematinic. This case, then, illustrates the use of the patient profile as a tool to determine the need for review of the medical chart. Moreover, it illustrates the use of the profile as a tool to identify deficiencies, for example, in the use of diagnostic tests, that can be corrected through instruction.

Patient Profile No. 4

Review of Patient Profile

The patient is a diabetic male born in February 1966, with six visits recorded in this data profile (Figure 5). Four visits were by appointment, one for an emergency, and one by other means. Resident 7, who was graduated from the program in August 1975, managed two visits, a faculty member in the program (physician 1) managed one visit, and resident 13, who is assumed to have continuing responsibility for the care of this child, saw the patient on the last three visits. The fees for these visits ranged from 8 to 23 dollars.

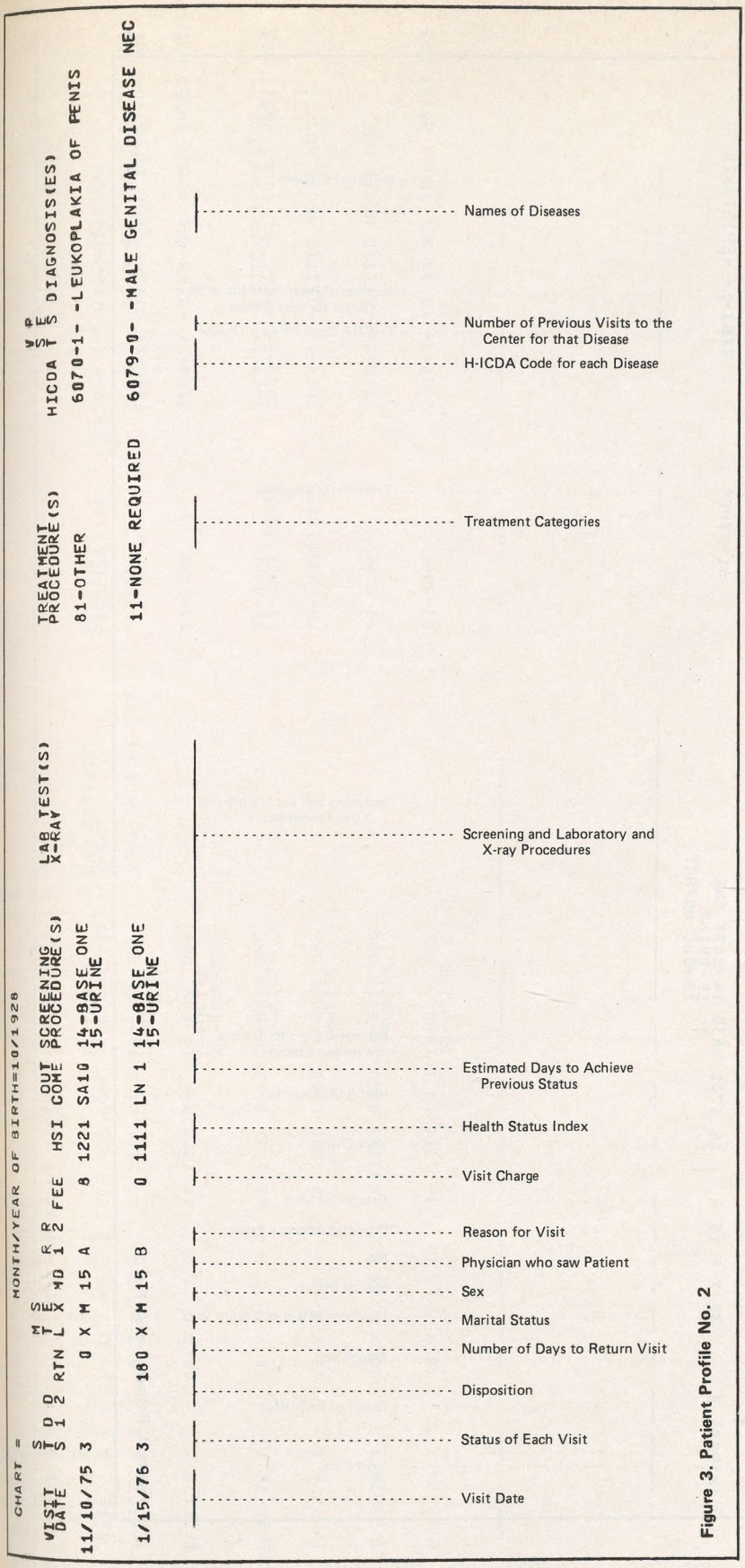

Figure 3. Patient Profile No. 2

The patient has visited the Family Practice Center for both long-term and short-term problems. The diabetes mellitus is considered to be a long-term problem, alterable by therapy with an essentially asymptomatic outcome. The acute pharyngitis and otitis media were short-term problems, alterable by therapy with resolution expected in ten days. No outcome was estimated for the urinary tract infection diagnosed at the January 13, 1975 visit.

Screening procedures of "base one" and urinalysis were recorded at all visits. In addition, a urine culture was secured at the January 13, 1975 visit and a blood glucose test ordered at the June 5, 1975 visit. Treatment procedures included antibiotics that were recorded for the third and fourth visits and "same," that is assumed to refer to therapy for the diabetes mellitus. The Health Status Index indicates that the child was confined to bed at the peak of the episode of acute pharyngitis and was symptomatic and experiencing discomfort at the time of most other visits. (The entry at the February 12, 1976 visit indicating that the child was confined to bed at the peak of illness is assumed to be an error in coding.)

Analysis of Profile Data

The reviewer is markedly disturbed by the fact that only three visits were listed for 1975: one in January, the next in June, and the last in October. So few and so widespread visits are considered inadequate for a nine-year-old diabetic. Three of the six visits involved infections in this diabetic child. Only one blood glucose was recorded, although the profile does indicate that urinalyses were secured at every visit. The profile includes no data that suggest untoward reactions in the management of the diabetes. The diagnosis of diabetes mellitus "adult onset" is inappropriate and probably represents an error in coding the encounter form. Based on the data contained in the profile, the reviewer would conclude that a review of the medical chart was necessary.

Review of the Medical Record

The care of this nine-year-old male diabetic is well documented within the

CHART = MONTH/YEAR OF BIRTH= 1/1962

VISIT DATE	STS	D1	D2	RTN	MTL	SEX	MD	R1	R2	FEE	HSI	OUTCOME	SCREENING PROCEDURE(S)	LAB TEST(S) X-RAY	TREATMENT PROCEDURE(S)	HICDA	WST	PLS	DIAGNOSIS(ES)
6/27/75	7			0	S	F	5	A		8	1111	HM	14-BASE ONE 15-URINE		11-NONE REQUIRED	2149-1-			-LIPOMA NEC NOS
8/14/75	3			0	X	F	15	A		8	0000	HM	14-BASE ONE 15-URINE		11-NONE REQUIRED	7062-0-			-SEBACEOUS CYST
10/14/75	3			7	X	F	15	A		13	0000	SA14	14-BASE ONE	8361=CBC	73-ANTIBIOTIC	4860-1-			-PNEUMONIA NOS
10/22/75	3			0	X	F	15	B		8	1221	SA07	14-BASE ONE		80-SAME	4860-0-			-PNEUMONIA NOS
1/15/76	3			30	X	F	15	A		14	1221	SA30	14-BASE ONE 15-URINE 19-CBC HB/HCT		81=OTHER	7761-1-			-EPISTAXIS

- Visit Date
- Status of Each Visit
- Disposition
- Number of Days to Return Visit
- Marital Status
- Sex
- Physician who saw Patient
- Reason for Visit
- Visit Charge
- Health Status Index
- Estimated Days to Achieve Previous Status
- Screening and Laboratory and X-ray Procedures
- Treatment Categories
- H-ICDA Code for each Disease
- Number of Previous Visits to the Center for that Disease
- Names of Diseases

Figure 4. Patient Profile No. 3

CHART = MONTH/YEAR OF BIRTH= 2/1966

VISIT DATE	STS	D1	D2	RTN	MTL	SEX	MD	R1	R2	FEE	HSI	OUTCOME	SCREENING PROCEDURE(S)	LAB TEST(S) X-RAY	TREATMENT PROCEDURE(S)	WST	RES	HICDA DIAGNOSIS(ES)
1/13/75	4	D		0	S	M	7	A		23	1221	LA 1	14-BASE ONE 15-URINE	8883-CULTURE ANY	80-SAME			2500-9- -DIAB MEL ADULT ONSET NOS 5995-1- -URIN TRACT INFECTION NOS
6/ 5/75	3			60	S	M	7	D		12	2222	HM	14-BASE ONE 15-URINE 32-GLUCOSE		80-SAME			2500-9- -DIAB MEL ADULT ONSET NOS
10/14/75	7			0	X	M	1	D	A	11	1521	SA10	14-BASE ONE 15-URINE		80-SAME 73-ANTIBIOTIC			4620-1- -ACUTE PHARYNGITIS 2500-9- -DIAB MEL ADULT ONSET NOS
1/ 9/76	3	D		10	X	M	13	A		8	1221	SA10	14-BASE ONE 15-URINE		73-ANTIBIOTIC			3819-1- -OTITIS MEDIA NOS
1/21/76	3	D		30	X	M	13	B	D	8	1211	SA00	14-BASE ONE 15-URINE		80-SAME			3819-2-R-OTITIS MEDIA NOS
2/12/76	3	D		60	X	M	13	D		10	1511	LA 1	14-BASE ONE 15-URINE		80-SAME			2500-9- -DIAB MEL ADULT ONSET NOS

Visit Date
Status of Each Visit
Disposition
Number of Days to Return Visit
Marital Status
Sex
Physician who saw Patient
Reason for Visit
Visit Charge
Health Status Index
Estimated Days to Achieve Previous Status
Screening and Laboratory and X-ray Procedures
Treatment Categories
H-ICDA Code for each Disease
Number of Previous Visits to the Center for that Disease
Names of Diseases

Figure 5. Patient Profile No. 4

medical record. His diabetes was diagnosed in the ambulatory care center in October 1972, with complaints of increased frequency of micturition, increased thirst, fatigue, and what was termed "abnormal behavior." The child has been managed since that time on two daily doses of insulin.

The 1975 visits of January 13, June 5, and October 14 were recorded with an adequate description of subjective and objective cues, assessment of the problems, and plan for care. There were also records of telephone conversations with the child's mother on January 17 and January 20, 1975 regarding an episode of nausea and vomiting. Also, there was a record of three additional visits on April 16, May 19, and August 18, 1975. All of these involved follow-up visits pertaining to "routine" diabetes mellitus care and the reviewer does not know why these did not appear in the data profile. Throughout the medical record there was both extensive documentation of an ongoing effort to acquaint the child and his parents with the disease of diabetes and adequate evidence of parental and patient involvement in the care of this disease.

Summary

The data included in the profile did not indicate comprehensive or at least adequate follow-up care for a nine-year-old diabetic. To the reviewer, three visits in a year's time were inadequate. Therefore, he selected this patient's record for review. On reviewing the chart, however, he deemed the care of this patient to be very good and was impressed by the amount of cooperation that existed between the patient and his parents in the management of this difficult entity in the young. The fact that the care of this child was so poorly documented in the patient profile points up the importance of instructing residents and staff in the proper completion of the encounter form. Inadequate completion may stimulate unnecessary review of certain medical records.

Discussion

In order to assess the appropriateness of residents' diagnoses and patient management strategies, faculty must examine data from the profiles in light of their own knowledge and then draw inferences regarding the probable adequacy of performance. The four case examples demonstrate how certain patterns of information cause faculty to question the performance of residents. The shifting of diagnostic labels and the assigning of different labels to a patient problem are two clear-cut examples of patterns in the data that raise faculty's suspicions regarding residents' diagnostic skills. Inconsistent estimates, such as an estimate that a premalignant condition will be resolved in ten days, also exemplify the way in which profile data cause faculty to question the diagnoses that residents assign to their patients. If faculty are to maintain acceptable levels of care and to train residents, they must begin by openly questioning the accuracy and quality of supporting evidence for assigning a diagnosis to a patient problem. Building a baseline of data and embarking on a course of management is irrelevant if the diagnosis is inaccurate.

Since faculty must infer appropriateness from the limited information provided by the patient profiles, the accuracy of their inferences may be questioned. As the examples indicate, two of the four cases represented essentially false positives. In Profile 2, the key encounter between the resident, the specialist, and the patient occurred in the hospital where the data system is not maintained. In Profile 4, the residents failed to complete the data collection documents. Even more critical are the false negatives, ie, cases considered – on the basis of profile data – to represent acceptable care but which are in fact not being managed adequately.

This issue represents one side of a larger dilemma facing clinicians who wish to review patient care. On the one hand, detailed reviews involving samples of medical records are time consuming and demand considerable effort on the part of the clinical staff. As a result, analysis of care is retrospective and not timely enough to affect changes in the process of care as it occurs. On the other hand, techniques that rely on inferences by clinicians, such as a review of the profiles, can affect changes in the current process of care but are subject to error because the data on which judgments are made are less rigorous.

The patient profiles clearly fall into this latter category. While the authors cannot state at this time the frequency of the false negatives (care judged acceptable based on the profile but inappropriate based on the record), the false positives are of less concern to faculty in a residency training program. Even if a case is found to be appropriately diagnosed and managed, based on the medical record, faculty nevertheless may wish to evaluate residents' knowledge of the course and impact of an illness on a patient or to question the residents regarding the use of a particular diagnostic or therapeutic procedure. The false positive cases can provide faculty with information for these purposes. The use of this approach in areas where the questioning of care based on inferential judgments may be politically or financially sensitive for providers ought, however, to be openly discussed prior to its introduction.

In summary, it has been demonstrated through case examples how providers can use an integrated billing-information system to conduct concurrent reviews of residents' performances, to select medical records for review, and to initiate feedback and instruction to residents as they care for their patients.

No special attempts were made to insure perfect compliance in reporting data for the information system. However, this "real world" system with a certain percentage of error is, nevertheless, capable of identifying cases which require faculty evaluation.

References

1. Smith HT, Schorer BJ, Bynum JD: Combining medical information with a business data system. J Fam Pract 2:365, 1975
2. Tindall HL, Henderson RA, Cole AF: Evaluating family practice residents with a problem category index. J Fam Pract 2:353, 1975
3. Froom J: An integrated system for recording and retrieval of medical data in a primary care setting. J Fam Pract 2:37, 1975
4. Alderson MR: Evaluation of health information systems. Br Med J 30:203, 1977
5. Herylinger R: Management non-information systems in health care organizations. Health Care Management Review 1:71, 1976
6. Ackoff RL: Management misinformation systems. Management Science 14:145, 1967
7. Spencer WA, Baker RL: Accomplishing the transition to computers in Medicine. In Flagle CD: Advanced Medical Systems. Miami, Florida, Symposia Specialists, 1975, p 37
8. Given CW, Simoni L, Gallin RS: The design and use of a health status index for family practitioners. J Fam Pract 2:287, 1977