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is easily diagnosed and inexpensively treated. Parents should be encouraged to supplement the diets of their breast-fed infants with a source of vitamin D if they are at a high risk. The recommended daily requirement of 400 IU of vitamin D is found in many pediatric multivitamin preparations, as well as many food products (the major food source being fortified cow's milk), and it is now available in pure form as Drisdol (Winthrop Laboratories). Conversion of endogenous precursors to the active form of vitamin D by adequate sunlight exposure, especially in the first year of life, should not be relied upon by dark-skinned persons, infants of mothers who themselves may be deficient in vitamin D as a result of dietary practices or clothing, and infants who are exclusively breast-fed beyond 6 months of age, even though they may be otherwise healthy.

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Use of Mainframe Computer for Analyzing Family Practice Information

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Maintaining even minimal physician-patient encounter data for a family practice is likely to entail managing a data base of considerable size.¹ Augmenting this with the additional information required for clinical or education research can further increase the scope of the data base. Not surprisingly, computers are being used more frequently to manage and process family practice data. Indeed, the results of a recent survey con-

ducted by Lutz and Green² indicated that of 308 family practice residencies surveyed, 61 percent were using computer systems. An additional 23 percent were initiating implementation of a system.

Part of the trend toward the increased use of computers for processing family practice data is the growing popularity of small microcomputers in family practice settings. However, while microcomputers may be well-suited to the needs of some physicians and training programs, others have found the software limitations and programming requirements that may be associated with such computers to be serious drawbacks to their use.

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The data processing system developed at Rush-Presbyterian-St. Luke's Medical Center for its family practice residency and for two affiliated family practice residencies utilizes the medical center's IBM 370 computer and a statistical analysis package (SAS) to analyze patient-encounter data. This system is one way in which family practice information may be analyzed by computer and provides an alternative to using a microcomputer.

Use of Mainframe Computer

Using a university mainframe computer allows access to highly sophisticated analysis programs and capabilities. Consequently, storing, sorting, and analyzing large amounts of data, which would be impossible on a smaller computer, can be undertaken without difficulty. In addition, a wide range of user services and utilities are often available to users of university mainframe computers. With regard to software, when a user becomes familiar with the terminology and requirements for a particular statistical package, numerous procedures and capabilities are available. In this way, using a software package eliminates the need to develop or purchase analysis programs.

With this approach, however, the results of data analyses often cannot be obtained instantaneously nor is it useful for such functions as billing or scheduling. Clearly, this system is not a complete family practice information management system. Rather, it is one means for storing, processing, and analyzing family practice patient-encounter information.

Hardware and Software

The Rush Medical Center computer used by the Department of Family Practice is an IBM virtual machine facility/370 (VM/370) operated by the Conversational Monitor System (CMS). CMS, with a storage capacity of 1 million bytes, enables a user to build and manage files, execute application programs, and compile, test, and execute problem programs.³ Data files containing approximately 4,000, 80-character lines may be edited in CMS. At the family practice centers affiliated with the medical center, data are entered by data entry technicians on CRT (cathode-ray tube) terminals

that use telephone-linked (acoustically coupled) modems.

Data from patient encounter records, including patient identification and demographic data, patient problem(s), outpatient procedures performed, and in two sites, faculty ratings of the resident's handling of the encounter, are analyzed using SAS, version 79.5. SAS⁴ is a computer software package for data analysis that is available on many IBM and related mainframe computers.*

Data for the family practice centers in the Rush family practice network are accumulated, cleaned, and analyzed in two-month blocks. The department maintains two linked CMS accounts: one account is used exclusively for raw data entry; the other account is used for maintaining the SAS command statements needed to analyze the data. When all data processing for a block of records is complete, program statements are removed, and the raw data file is copied, using IBM utility programs, to two magnetic tapes. One tape is a working copy; the other is a backup copy.

Reports Produced

The summary reports prepared in this department utilize relatively few of the many procedures available to users of SAS. It is anticipated that as the needs of the department and its affiliates change, the encounter record, as well as the file management and analysis strategies, will continue to be refined. At the present time, the SAS statements used to produce the residency's reports entail labeling variables and values, reading records to obtain totals in terms of patients and visits, calculating appropriate sums, and providing a ranked ordering of diagnoses. These statements now serve as the core of the analysis system, and the effort required to develop and type the program into the computer will not have to be repeated.

The bimonthly reports consist of four types of information: (1) a summary of demographic and evaluation data, (2) a summary of patient problems, (3) rankings of patient problems, and (4) a summary of procedures performed. A simple ad-

*Where SAS is not available, other analysis packages, particularly SPSS⁵ may also be used to process the information.

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antihypertensive agents that cause renin release.

Agents Affecting Sympathetic Activity — The sympathetic nervous system may be especially important in supporting blood pressure in patients receiving captopril alone or with diuretics. Beta-adrenergic blocking drugs add some further antihypertensive effect to captopril, but the overall response is less than additive. Therefore, use agents affecting sympathetic activity (e.g., ganglionic blocking agents or adrenergic neuron blocking agents) with caution.

Agents Increasing Serum Potassium — Give potassium-sparing diuretics or potassium supplements only for documented hypokalemia, and then with caution, since they may lead to a significant increase of serum potassium.

Drug/Laboratory Test Interaction: Captopril may cause a false-positive urine test for acetone.

Carcinogenesis, Mutagenesis, and Impairment of Fertility: Two-year studies with doses of 50 to 1350 mg/kg/day in mice and rats failed to show any evidence of carcinogenic potential. Studies in rats have revealed no impairment of fertility.

Usage in Pregnancy: There are no adequate and well-controlled studies in pregnant women. Embryocidal effects were observed in rabbits. Therefore, captopril should be used during pregnancy only if the potential benefit outweighs the potential risk to the fetus.

Nursing Mothers: Captopril is secreted in human milk. Exercise caution when administering captopril to a nursing woman, and, in general, nursing should be interrupted.

Pediatric Use: Safety and effectiveness in children have not been established although there is limited experience with use of captopril in children from 2 months to 15 years of age. Dosage, on a weight basis, was comparable to that used in adults. Captopril should be used in children only if other measures for controlling blood pressure have not been effective.

ADVERSE REACTIONS: Reported incidences are based on clinical trials involving about 4000 patients.

Renal — One to 2 of 100 patients developed proteinuria (see WARNINGS). Renal insufficiency, renal failure, polyuria, oliguria, and urinary frequency in 1 to 2 of 1000 patients.

Hematologic — Neutropenia/agranulocytosis occurred in about 0.3% of captopril treated patients (see WARNINGS). Two of these patients developed sepsis and died.

Dermatologic — Rash (usually mild, maculopapular, rarely urticarial), often with pruritus and sometimes with fever and eosinophilia, in about 10 of 100 patients, usually during the 1st 4 weeks of therapy. Pruritus, without rash, in about 2 of 100 patients. A reversible associated pemphigoid-like lesion, and photosensitivity have also been reported. Angioedema of the face, mucous membranes of the mouth, or of the extremities in about 1 of 100 patients — reversible on discontinuance of captopril therapy. One case of laryngeal edema reported. Flushing or pallor in 2 to 5 of 1000 patients.

Cardiovascular — Hypotension in about 2 of 100 patients. See WARNINGS (Hypotension) and PRECAUTIONS (Drug Interactions) for discussion of hypotension on initiation of captopril therapy. Tachycardia, chest pain, and palpitations each in about 1 of 100 patients. Angina pectoris, myocardial infarction, Raynaud's syndrome, and congestive heart failure each in 2 to 3 of 1000 patients.

Dysgeusia — About 7 of 100 patients developed a diminution or loss of taste perception; taste impairment is reversible and usually self-limited even with continued drug use (2 to 3 months). Gastric irritation, abdominal pain, nausea, vomiting, diarrhea, anorexia, constipation, aphthous ulcers, peptic ulcer, dizziness, headache, malaise, fatigue, insomnia, dry mouth, dyspnea, and paresthesias reported in about 0.5 to 2% of patients but did not appear at increased frequency compared to placebo or other treatments used in controlled trials.

Altered Laboratory Findings: Elevations of liver enzymes in a few patients although no causal relationship has been established. Rarely cholestatic jaundice and hepatocellular injury with secondary cholestasis have been reported. A transient elevation of BUN and serum creatinine may occur, especially in volume-depleted or renovascular hypertensive patients. In instances of rapid reduction of longstanding or severely elevated blood pressure, the glomerular filtration rate may decrease transiently, also resulting in transient rises in serum creatinine and BUN. Small increases in serum potassium concentration frequently occur, especially in patients with renal impairment (see PRECAUTIONS).

OVERDOSAGE: Primary concern in correction of hypotension. Volume expansion with an I.V. infusion of normal saline is the treatment of choice for restoration of blood pressure. Captopril may be removed from the general circulation by hemodialysis.

DOSAGE AND ADMINISTRATION: CAPOTEN should be taken one hour before meals. Dosage must be individualized; see DOSAGE AND ADMINISTRATION section of package insert for detailed information regarding dosage in hypertension and in heart failure. Because CAPOTEN (captopril) is excreted primarily by the kidneys, dosage adjustments are recommended for patients with impaired renal function.

Consult package insert before prescribing CAPOTEN (captopril).

HOW SUPPLIED: Available in tablets of 25, 50, and 100 mg in bottles of 100, and in UNIMATIC® unit-dose packs of 100 tablets.

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justment in SAS commands allows data to be summarized in parallel fashion for the center and for each resident separately. Thus, in all, eight reports are produced on a bimonthly basis. Four reports summarize data for the center; four summarize data for residents individually.

The SAS procedure PROC FREQ provides the summary of the demographic and evaluation data. This report uses a count of individual patients when summarizing demographic information and patient visits when summarizing the evaluation data. PROC FORMAT and LABELS statements are used to assign labels to the variables and values on the file.

The second type of report, summarizing patient diagnoses, lists the ICHPPC-2 system and problem designation, the patient's identification number, the number of encounters for each problem, and the number of visits for each patient. This is produced by using the SAS PROC MEANS procedure. An output file produced by PROC MEANS is formatted using PUT and HEADER statements. Labels are assigned to the diagnosis codes by a (quite lengthy) PROC FORMAT statement.

The SAS PROC RANK procedure is used to produce an output that ranks problems in terms of their relative frequency. The ranking generated for each center in the network is based on the number of patients presenting a particular problem. A SAS statement is used to subset the file so that each patient is counted once. It is also possible to generate a ranking based on the number of patient contacts instead of individual patients by simply removing the subsetting statements.

The last type of report is a summary of outpatient procedures performed. The SAS PROC PRINT procedure, including its SUM command and labels assigned in a PROC FORMAT statement, is used to produce this summary.

Comment

CRT terminals and the peripheral equipment required to use them can be purchased relatively inexpensively. Available clerical staff can be easily taught how to enter data for the type of system described here. In university settings graduate students in research-oriented disciplines, including the social sciences, are often available and

would be well qualified to conduct the analyses and manage a family practice data base. Thus, use of a university mainframe computer to process family practice encounter data may be a versatile and cost-effective option for processing data for some family practice centers.

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Citation Analysis of The Journal of Family Practice

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As has been previously observed, the literature in family practice is of two types: the *literature of record* (based upon original work) and the *derivative literature* (principally review papers and related reports).¹ These two types of literature are complementary, and both are needed. As family practice is an emerging specialty, however, a sizable literature of record examining the experience of the family physician and others involved in the developing specialty from conceptual, clinical, educational, research, and health policy perspectives is required. This developing literature is central to the viability of family practice as a self-sustaining specialty and will be instrumental to the further definition of family medicine as an academic discipline.

Since the literature of record directly molds the content, shape, and methods of a specialty, it is

useful to examine the nature of this literature itself. Garfield has demonstrated the value of citation analysis as a tool to describe and evaluate the characteristics of the literature within a specialty discipline through identification of the communication network represented by citation patterns.² Such an analysis was recently reported for medical education as a developing discipline based upon citation patterns of the *Journal of Medical Education* over an 11-year period.³

In the United States *The Journal of Family Practice* is the only monthly journal in the field primarily devoted to publication of the literature of record. The purpose of this paper is to report the results of a study of citation patterns over the nine-year period, 1974 through 1982.

Methods

All major articles, communications, and editorials published in the 15 volumes of *The Journal of Family Practice* from 1974 through 1982 were included in the study. Clinical Reviews, Problems and Procedures in Family Practice, Family Prac-

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