

Administrative Applications of Computers in Family Practice

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From maintaining records, to filling out forms, to documenting time of professional efforts, computers provide specific benefits to physicians and other health care personnel today.¹ The computer is a revolutionary tool with the potential for transforming every facet of medicine from office management to diagnosis and treatment of disease. Computers in use today provide help with patient monitoring (as in direct hookup with such laboratory test machines as autoanalyzers), reporting and analysis of test results, dietary planning, and evaluating patient profile data.² Today there is evidence that when computers are chosen and applied with rationality, the physician's practice can derive great benefits.

In the past many physicians have been reluctant to consider computers as direct support tools for their practice because computers were often difficult to learn to use and were expensive. Furthermore, until recently, computers required rigid conformity with definitions and protocols. Tailoring programs to specific applications was costly and difficult.

There are indications that the newer generations of computers will provide more flexibility, greater functional diversity, and ease of use that physicians and other health professionals require as the end users of information.³ Also, both the

mechanical and electrical components of computers have become faster, more capable, more reliable, and less expensive during the past few years. For instance, in 1973 the price per byte of semiconductor memory was 40 cents, whereas in 1983 the price per byte was 1 cent.⁴

Of all the improvements, one of the most dramatic has been in the reduction of size. Computers that fit in a briefcase today are more powerful than the earlier room-filling giants. For the purpose of this article, the term *computer* is defined as a self-contained system ranging in size from a desktop unit (a microcomputer) to one that will fit in a closet. Typically these units serve the needs of one physician or a group of physicians and are not shared by other administrative or medical units. These units may be used by the physician for activities ranging from record keeping to practice-based research.

As the science of computers in general, and personal computers in particular, continues to make rapid advances, the challenges faced by physicians managing a medical office also continue to grow. Such problems as (1) increased and changing reporting requirements from insurance companies and from governmental agencies, (2) financial management and management of office personnel, (3) increasing competition for patients, and (4) increasing patient demands plague physicians in all types of medical practice. Batson⁵ has recently advanced the hypothesis that automating certain aspects of the medical practice can help the

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Table 1. Administrative Functions of Computers in Medical Office Practice

Patient Billing
Patient registration
Patient billing statements, "super bills"
Computer-generated encounter forms
Insurance claim processing
Accounts receivable management
Credit and collection processing
Revenue and production analysis
Fee schedule
Financial Management
Employee records
Payroll
Accounts payable
General ledger
Financial reports
Budget financial modeling
Practice Aids
Appointment scheduling
Hospital rounds lists
Referral analysis
Word Processing
Personalized letters
Welcome letters to new patients
Patient reports
Patient recall reminders
Thanks to referring sources
Practice Analysis
Practice profiles
Epidemiologic studies
Research for publication
Evaluation of practice performance

word processing, and (5) practice analysis. Table 1 shows these categories and various functions that might be supported or conducted by a computer.

Patient Billing

Patient billing involves all of the functions relating to the definition of patient population, the accumulation and recording of charges, and efforts to collect and post those charges to the proper accounts. These essentially routine and repetitive functions are ideally suited to computerization. For example, once a billing report format has been designed, it can be used for all patient bills.

Patient registration establishes and maintains all necessary demographic information, including insurance data, about the patient. Patient billing and statement preparation involves the direct entry from an encounter form of charge and procedure information; the computer then automatically totals the charges and posts them to the patient's account. The patient statement function is usually designed to produce statements on a weekly, monthly, or demand basis. Thus, it is possible to produce, even while the patient is still in the office, a complete historical statement of account. Processing insurance claims involves the completion of insurance forms on a basis as specified by the physician, usually monthly. Most computer systems currently on the market will automatically print all required information directly on the insurance form and have a provision for maintaining the status of outstanding insurance forms. Insurance claim tracking involves itemization of outstanding insurance claims by insurance carrier and plan (including claim number, date, and amount). Many systems have a provision to allow follow-up and rebilling on an insurance claim, and almost all systems provide a complete audit trail of charges not paid by insurance companies. Also available is an automatic rebilling system that allows the charges that are unpaid by third-party payers to be billed to the responsible party without having to post-adjust entries. Accounts receivable management involves the automatic aging of accounts receivable. Different systems provide for a number of different formats for aged receivable reports. The accounts receivable subsystem is usually a part of the patient statement subsystem within the billing function of the system. Credit and collection processing involves the preparation of reports of

physician manage both the economic pressures and the spectre of litigation these challenges raise.

The purpose of this paper is to (1) provide an overview of the various computer functions that are currently available and can be used in management decision assistance in the physician's office, and (2) review the use of the computer in helping the physician deal with the major administrative problems and issues in office practice.

Functions of Computers in Medical Practice Management

There are five broad categories of functions of computers as they are currently used in the management of medical office practice: (1) patient billing, (2) financial management, (3) practice aids, (4)

patients with the information necessary for collection efforts. Most systems provide delinquency-report parameters that can be defined for an individual practice. For example, a delinquency report can be generated showing all patients with balances in excess of \$100 that are 60 or more days past due. Many systems are capable of automatically printing dunning and reminder notices on the statements on a defined basis (if, for example, a patient is over 45 days late in payment).

In group practices where various physicians are represented, it is possible that different physicians have different fee schedules. Because a computer can be preprogrammed with this information, fee schedules can be prepared to allow each physician within a group to have a different fee for any or all procedures. Revenue and production reports show production totals for physicians by the month and year and tally procedures and revenue. Computer-generated encounter forms may be developed to expedite the preparation of encounter tickets before the patient visit and, therefore, save clerical time when the patient arrives. Such encounter tickets can be tailored to the specific desires of different physicians.

Financial Management

Financial management functions that may be computerized generally deal with general ledger, accounts payable, payroll, and other aspects of the overall financial management of the practice. The payroll function generally includes the capability for maintaining employee records including pertinent facts about each employee, date of hire, evaluation dates, promotion dates, and so forth. The payroll function also involves the establishment of different categories of pay and deductions, maintenance of pay records, printing of payroll checks and employee lists, and provision of journal reports. The general ledger function provides statements of revenue and expense, balance sheets, ledger reports, and transaction reports. Typically, the general ledger function involves the development of a chart of accounts identifying each ledger account by name and categorizing each by number. The accounts payable function produces journal and ledger report details and summaries with regard to the management of the accounts payable of the practice. This function generally displays purchases and payment details for spe-

cific vendors, allows for vendors to be added, changed, or deleted, and produces checks and check stubs based on the date and type of payment. At the end of the accounting period, the accounts payable function also prepares the vendor ledger for the next month or year. Some computer systems are capable of producing financial reports that involve the detailing of specific information about a particular practice. For instance, specific reports of the practice cost experience may be wanted as preparation for opening a satellite office. This information can generally be compiled from the expense reports within the financial management functions. Finally, most financial management packages include the capability of preparing a budget or expected set of expenditures and revenues. This feature may be coupled with a financial modeling capability in which certain assumptions can be entered into expense or revenue equations, and their overall impact on the practice finances can be assessed. Financial modeling packages allow the physician to choose from among several investment choices (ie, hiring personnel vs buying a piece of equipment) the option that achieves a predetermined financial objective.

Practice Aids

Many computer systems offer a number of convenient features that are helpful in the overall management of the practice. The appointment-scheduling capability can improve the use of the resources within the practice by scheduling appointments by provider or by facility, or by showing the most convenient and optimal time based on the type of appointment. Also, appointment scheduling can coordinate appointments with collection activities. Most appointment scheduling modules print a daily appointment list by physician, and some can print patient information on an encounter form (Figure 1). A list can be generated from the appointment roster (in either alphabetical or chart-number sequence) to assist personnel in pulling patient charts. The hospital-rounds list feature helps to minimize revenue loss due to errors of omission in recording charges for procedures and visits to hospital patients. A well-designed system will print lists by hospital floor and room number for each hospitalized patient in the practice. Once a patient hospital file is opened, it is

26875-0
 COLLINS, RON
 3548 S W 57TH ST
 OKLA CITY OK 7312
 681-5854
 DATE LAST PAY: 16-MAR-81 FPC: 01
 PREVIOUS BALANCE - 1,370.00

MEDICAL ARTS CLINIC

COMPLAINT ----- HERNIA REPAIR
 TUESDAY 21-APR-81 08:00 AM TO 08:45 AM

PROCEDURES

FEE	CODE	DESCRIPTION	FEE	CODE	DESCRIPTION	FEE	CODE	DESCRIPTION	FEE	CODE	DESCRIPTION
	90000	NEW PATIENT, BRIEF		81000	URINALYSIS		93000	EKG		90736	DEPOMEDROL 60 MG
	90020	NEW, COMPREHENSIVE		85010	CBC		71020	CHEST X RAY		90737	DEPOMEDROL 80 MG
	90050	ROUTINE EXAM		85055	HCT		72100	LUMBAR SPINE X-RAY		90713	FLU IMMUNIZATION
	90060	PROLONGED EXAM		84330	FBS		73030	SHOULDER X RAY		90724	PROGESTERONE 100 MG
	90080	COMPREHENSIVE EXAM		86300	HOMO SPOT		73070	ELBOW X RAY		90721	ESTRADIOL 1 CC
	90001	NO CHARGE VISIT		85030	WBC		73100	X RAY WRIST 2 VIEWS		90722	ESTRADIOL 2 CC
	90055	POST-OP VISIT		87010	WET MOUNT		73120	X-RAY HAND 2 VIEWS		90723	TESTADOL 1 CC
	67210	EAR LAVAGE		84140	POTASSIUM		73140	FINGER X-RAY		90724	TESTADOL 2 CC
	45300	PROCTOSIGMOIDOSCOPY		87109	THROAT CULTURE		73510	HIP X-RAY (2 VIEWS)		90772	PROPEN 600-000
	97100	ULTRASOUND THERAPY		82250	BILIRUBIN		73560	KNEE X-RAY, 2 VIEWS		90773	PROPEN 1.2 ML
	56500	WARTS, CHEMICAL TR.		86410	VDRL		73600	ANKLE X RAY		90775	TERRAMYCIN 2CC
	17100	CRYOCAUTERY		83160	PREGNANCY TEST		73620	FOOT X RAY		90747	COPHENE 2 ML
	10640	I & D		83035	SICKLE CELL SCREEN		72040	CERVICAL SPINE		90754	B 12 1000 MCG
	53660	URETHRAL DILATATION		99000	LAB HANDLING FEE		72070	THORACIC SPINE		90757	B COMPLEX 1 ML

OTHER PROCEDURES: _____

PERMANENT DIAGNOSIS: DIABETES
 HEART DISEASE WITH ACUTE PULMONARY EDEMA
 APPENDICITIS

ALLERGIES: PENICILLIN
 SULFA
 CODEINE

SIGNATURE OF PHYSICIAN
 A.L. LENZ, M.D.

TOTAL CHARGES -----
 PAYMENTS TODAY -----
 P30 CHECK P31 CASH
 P32 N.O. P35 INS.
 ADJUSTMENTS TODAY -----
 NEW BALANCE -----

DIAGNOSIS

CODE	DESCRIPTION	CODE	DESCRIPTION	CODE	DESCRIPTION	CODE	DESCRIPTION
789	ABDOMINAL PAIN/COL	690	DERMATITIS	487	INFLUENZA	601	PROSTITITIS
714	ARTHRITIS: RHEUMAT	250	DIABETES MELLITUS	959.9	INJURY/TRAUMA	110.9	RINGWORM
427	ARRHYTHMIAS	989.5	SPIDER BITE	919.4	INSECT BITE	782.1	RASH
493.9	ASTHMATIC BRONCH	558	DIARRHEA	484	IMPETIGO	848	SPRAIN/STRAIN
440	ATHEROSCLEROSIS	274	ELECTROLYTE DISORD	384.3	LABYRINTHITIS	461.9	SINUSITIS
490	BRONCHITIS	345	EPILEPSY	754.2	LOW BACK SYNDROME	034	SCARLET FEVER
682	CELLULITIS	480.9	FURUNCLE/BOIL	627	MEMORIAL SYND.	053.9	HERPES ZOSTER
380.4	CERUMEN IN EAR CAN	558.9	COLITIS	626.4	ABNORMAL MENSES	451	PHLEBITIS
428	HEART FAILURE	455.6	HENORRHOIDS	075	MONONUCLEOSIS	463	TONSILLITIS
372.3	OBSTRUCTIVE PNEUM	847	SPRAINS & STRAINS	787	NAUSEA & VOMITING	465	URI
496	COPD	401	HYPERTENSION	380.1	OTITIS EXTERNA	599	UTI
078.1	WARTS	251.2	HYPOGLYCEMIA	381	OTITIS MEDIA	616.1	VAGINITIS
929	CONTUSIONS	274	GOUT	533	PEPTIC ULCER	780.4	VERTIGO
244.9	HYPOTHYROIDISM	614	PID	462	PHARYNGITIS	070.9	GENERAL EXAM

OTHER DIAGNOSIS: _____

Figure 1. Computer-generated patient encounter form. Reproduced with permission from EDP Systems Specialists, Inc, Oklahoma City, Oklahoma

maintained until the patient is discharged, when the charge information is transferred to the patient billing modules so that insurance forms and statements can be prepared. Most of the currently available computer-generated hospital rounds lists have space for the physicians to make written comments and notations.

Referral analysis is designed to help the physician estimate the impact of referrals and referral rate on the growth of the practice by providing referring physician revenue reports, patient analysis reports, and a report of the number of referrals by referring physician. Supply inventory involves the

computer tracking of the use of medical supplies to ensure that supplies are reordered on a timely basis. Such a system also prevents overstocking, which would inappropriately tie up working capital in the maintenance of a large supply inventory within the practice.

Word Processing

Word processing saves clerical time by automating office paper flow and by creating documents electronically. Most computer word processing involves electronic editing, which

makes writing faster and less tedious. The computer can be linked to a letter-quality printer and will produce letters indistinguishable from conventionally typed letters. The computer can automatically create and print letters that welcome new patients to the practice, thank physicians who have referred patients to the practice, and remind patients of scheduled and suggested appointments ("it's time for your physical examination"). Personalized letters may be sent to patients with reports of their visits and laboratory investigations and on follow-up information.

Practice Analysis

Practice analysis functions are used to assess the practice in light of marketing goals and objectives. For instance, a practice profile will show the distribution of patients by age, sex, race, marital status, or any other combination of variables. It is possible to examine the "typical" patient over a period of time to determine whether the practice is seeing an increasing or decreasing type of patient population compared with what would have been predicted over the previous year (ie, an increasing patient age means fewer children). By entering specific patient variables, it is possible to use the computer to warn certain categories of patients to come in for preventive care (eg, immunization). A letter may then be generated to inform the patient of possible risks and urge compliance with suggested regimens. Practice analysis may also be useful in supporting research activities. A research panel consisting of patients with particular characteristics can be quickly and easily identified. Evaluation functions allow the physician to examine patient satisfaction directly and indirectly (such as examination of nonrepeating patients).

As can be seen, a computer system can perform a wide variety of administrative functions to assist in the management of a medical office. It is obviously necessary for a physician or a group of physicians to define carefully the needs of an individual practice in the process of selecting a computer system for the office.

Discussion

In the next few years the computer could become a major part of the strategy used by physicians to meet the challenges of managing an office

practice including existing problems in financial management, increasing competition, increasing demands of third parties involved, and increasing patient demands.

Financial Management

An automated system will significantly improve the cash flow of most practices because the computer will consistently produce neat, legible, and aged balances for all statements. Collection messages can be printed on the bottom of the statement to remind patients of any delinquent balance. Also, through complete and accurate aged accounts receivable reports, excessively delinquent accounts can be spotted and action be taken before they become uncollectable.

In addition to improving cash flow, an in-house computer can also help a growing practice to moderate cost increases. A well-designed system enables a practice to grow by adding physicians or increasing services without necessarily having to increase office staff. The ability to grow without adding personnel can have a significant impact on cash flow and overhead costs.

In office operations the computer can facilitate management decision making by providing accurate records of the number of hours that employees have worked, by providing condensed statements of the total costs of different types of personnel, and by providing accurate records of employee anniversaries that are used for evaluations, raises, and so on. All of these functions related to personnel maintenance are a part of the payroll section of the computer's financial package and can provide significant information to physician managers for decision making.

Increased Competition

It is speculated by many, including the Graduate Medical Education National Advisory Committee,⁶ that the number of physicians in private practice will increase by 50 percent from 410,000 in 1970 to 600,000 in 1990. While the population of the United States is growing, the projected numbers of physicians will far outstrip population growth; therefore, the total number of patients available to each physician will be decreased. In a competitive environment, the physician who can economically provide competent health care to

patients when and where it is convenient to the patient will have certain advantages, and use of a computer system can help to increase physician productivity by providing the basis for new and improved services, such as extended hours, without additional staff. Moreover, the computer can provide more staff time for direct patient care and assistance and can help the staff in generating recalls and reminders to cultivate the patient population. The computer allows a central office to open satellites and yet keep all files and data centralized on the computer. Through the utilization of statistical reporting tools available in most computer packages, the physician may identify significant groups of patients to whom service might be offered. Coupling the patient billing with an overall office financial system, a variety of cost-accounting tools and service analyses are available within the computer data base to furnish quotes for contract medical care. In general, computers provide staff with instant access to data and, therefore, promote more efficient operation, which can enlarge the capacity of the office to deal with more patient care problems.

Third-Party Involvement

Two major problems in dealing with third-party payers and governmental agencies are (1) slow payments by agencies, and (2) challenges to billings. The computer can help the physician comply with third-party requirements by tracking payments and by utilizing the computer's capability to automatically rebill an agency after payment is not received within a specified period of time. Many third-party carriers are now offering the option of electronic claims filing, which allows a computer in the physician's office to communicate directly with a computer in the third-party office. The claim is then processed against set criteria, and payment is initiated in a very short period of time. The computer can also be used to generate agency fee and reimbursement profiles as well as practice-based fee profiles to provide the data base necessary for dealing with the third parties in a factual manner.

Increasing Patient Demands

Patient communications and relations are a major challenge to physicians, particularly in view

of increased competition and in view of the litigious nature of medicine. The computer can help through utilizing word-processing packages for reminders, announcements, reports to patients of examinations, results of tests, etc. The computerized data base of diagnoses and procedures can be used as the basis for generating an in-house audit or quality-of-care review of the practice. The results of such audits can be communicated to patients to assure them that efforts are being made to improve the quality of practice. Finally, as discussed elsewhere in this issue, a number of artificial intelligence clinical programs will be available to aid in the diagnosis and treatment of illness. These programs may provide patients with some degree of satisfaction that there is "high tech" backup being coupled with the physician's clinical judgment in treating patients.

In summary, the computer has the potential for becoming a major tool in physicians' hands for managing the medical practice. There is a wide range of computer programs available to perform functions ranging from patient billing, to reminders, to statistical reports useful in the development of a medical practice, to programs that will improve the financial performance of the practice. The continued development and refinement of computers can be expected to have a significant and positive impact on the physician's ability to spend less time on administrative matters and more time providing direct patient care.

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