

# The Cooperative Information Project: Part 1: A Sentinel Practice Network for Service and Research in Primary Care

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This is the first of two papers describing the Primary Care Cooperative Information Project (COOP Project), a program that integrates the interests of community physicians, medical school faculty, and health policymakers. This integration has been accomplished through the uniting of 44 rural medical practices in Maine, New Hampshire, and Vermont with faculty at Dartmouth Medical School in clinical research, quality assurance, practice management, and continuing medical education activities. This paper describes the structure, goals, and history of the COOP Project, together with the design, cost, and output of its computerized medical information system.

The purpose of this two-part article is to describe a new program, the Primary Care Cooperative Information (COOP) Project. The COOP Project is an experimental program uniting community physicians, medical school faculty, and federal policymakers.

The core of the program is a medical information system that meets the fundamental data needs of individual rural practices. As a derivative, the medical information system produces a cross-practice data base that the medical school uses for outreach service programs in practice management, quality assurance, and continuing medical education. Medical school faculty and community

physicians work together to use the medical information system to conduct clinical research and public policy oriented studies on quality of care, cost effectiveness, and cost containment.

This article describes the COOP Project objectives, outreach services, and research foci. In addition, this article discusses how 44 practices and two residency training programs use either a manual or computerized approach to contribute data to the cross-practice network, the multiple uses of the resulting information, and the associated costs of producing this information.

## The Primary Care Cooperative Information Project

### Overview

The Primary Care Cooperative Information Project consists of a network of 44 free-standing primary care practices that are working with med-

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ical school faculty to (1) establish a professional environment that can help attract, retain, and educate primary care physicians in a rural area, (2) develop practice based quality assurance systems, (3) improve management efficiency and heighten clinical cost consciousness in the daily practice of medicine, and (4) build a better system for continuing education based on practice self-study and cross-practice research.

The COOP Project was started in 1977 with 14 practices in New Hampshire and Vermont; 11 were private practices and 3 were community health centers that received government subsidies. Since that time, the network has grown to include 23 practices in New Hampshire and Vermont, and 21 in Maine. Eighteen sites are private practices, and 26 are community sponsored, federally subsidized health centers. Two additional sites are residency training programs in family medicine and pediatrics. The practices are staffed by 76 physicians and 27 physicians' assistants and nurse practitioners; they average 28,000 visits per month. The "hub" of the network is Dartmouth Medical School, part of the Dartmouth-Hitchcock Medical Center.

### *Medical Information System*

Central to each of the goals of the COOP Project is a medical information system that is a permanent feature of each practice in the network. The medical information system is not an add-on data collection effort. It is being constructed as an integral part of each practice's patient encounter, billing, accounts receivable, and general ledger system.

The core of the COOP Project is development of a medical information system in all practices that is tailored to the requirements of each, yet contains a basic data set common to all participants in the network. The basic data set captured in each practice has been collected since November 1978 through the mailing of encounter forms to Dartmouth, where the information is keypunched and put on a mainframe computer. The medical information system currently "captures" compatible patient encounter data on 28,000 visits per month. The average data processing cost per physician per year for the batch method is approximately \$1,440. In July 1980 five practices started to collect information "automatically" by entering data into a microcomputer, located in their prac-

tice, that is linked to a mainframe computer.\* The computerized system, in addition to capturing the minimum data set, automates billing and accounts receivable procedures.

### *Services to the Practices*

By combining the data base generated by the medical information system with medical school faculty with the relevant expertise, the COOP Project provides a four-part package of services to practices: (1) clinical and management feedback reports, (2) practice management consultation, (3) quality assurance technical assistance, and (4) continuing medical education and primary care research opportunities. The four elements of the services are described as follows.

#### *Clinical and Management Feedback Reports*

Each practice receives standard monthly management (utilization, productivity, charges) and quarterly clinical (diagnostic index, age-sex registers, patient call-back lists) feedback reports. There are two sets of feedback reports. Intrapractice reports provide a quantitative picture of within practice longitudinal trends; interpractice reports provide each practice and each physician with a statistical analysis of individual standing or ranking within the entire group.

Reports of special interests to practices are available upon request,\*\* and sites with external reporting requirements (such as those with government subsidies) receive tailored data that help them meet their reporting requirements.

#### *Practice Management Consultation*

A highly qualified practice management specialist assists the practices in developing financial data systems that meet individual needs and are compatible with other sites. The management consultant works directly with the practices, making use of the feedback reports, to increase management

\*The manual data collection system is designed to integrate with pegboard billing and accounts receivable (A/R) systems used by most small practices. The computerized data collection system is designed to replace the manual pegboard systems and automates the billing and A/R functions.

\*\*An example of a special request report involved the Selacryn recall, a drug used for treatment of hypertensives that was found to have dangerous side effects. In this case, practices using Selacryn requested listings of all hypertensive patients.



efficiency, hold down operating costs, and provide ad hoc consultation. He gains knowledge of each practice's strengths and weaknesses over time and is thereby capable of making recommendations and monitoring progress.

The management consultant coordinates cross-practice management research. Studies have been conducted on (1) total operating costs, (2) expenses associated with transition to a computerized medical information system, (3) the accuracy of administrative data, and (4) number of active patients in practices' panels.

### *Quality Assurance Technical Assistance*

A consultant in quality assurance works with each practice that wishes to develop an ongoing system for medical care assessment. The specialist helps each site set quality assurance goals that reflect its principles of practice and assists them with planning, executing, assessing results, and repeating the cycle. The emphasis is on using quality assurance as an education medium for practice self-analysis and on the development of practical assessment protocols that small practices are able and willing to institute on a long-term basis.

### *Continuing Medical Education and Primary Care Research*

The COOP Project holds several meetings each year. The meetings are designed to blend continuing education with cross-practice research.\* During these meetings, alternative clinical and management study ideas are presented, a vote is taken to decide which topic to focus on for interpractice research, and a subcommittee of community and medical school faculty is formed to draft a protocol and oversee data collection. The results of the preceding study are distributed and discussed, and set the stage for a formal educational presentation related to the results. Participants receive Category 1 Continuing Medical Education credits, at no charge, for attending the meetings. In addition to the educational ramifications of quality assurance and primary care research activities, there is a standing Continuing Medical Education Committee that assesses the educational interests of primary care physicians and relates them to educational opportunities within the region. The Continuing Medical Education Committee serves as a plan-

ning and lobbying force to promote relevant primary care oriented learning experiences.

In return for this package of services, each practice agrees to (1) develop compatible encounter and financial systems, (2) purchase special data collection forms and use office staff to complete the forms and submit them in accordance with set control procedures, (3) participate in cross-practice clinical cost effectiveness and practice management research, and (4) attend all COOP Project meetings-of-the-whole.

### **COOP Medical Information System**

As indicated above, the core of the COOP Project is the development of an integrated medical information system that is tailored to the requirements of individual practices, yet contains a basic data set common to all participants. It is constructed as an integral part of each practice's clinical and administrative systems. Patient encounter data are collected via an encounter form. The encounter data are entered directly into the Dartmouth computer by a batch system or indirectly through a microprocessor. Practice revenue and expense data are submitted monthly by all practices on a batch basis. Three weeks after the close of each month, encounter data feedback reports are produced and mailed to each practice. More extensive reports are produced on a quarterly and year-end basis.

### *Source Documents*

The integrated medical information system includes two categories of data: (1) patient encounter data on each visit registered in all locations (office, hospital, nursing home, patient's home) and (2) expense and accounts receivable data.

The first category of information, patient encounter data, is gathered on compatible encounter forms called "Superbills." The Superbill is an encounter form that is also acceptable as a bill by many insurance companies. (In New Hampshire and Vermont these companies include Blue Cross and Blue Shield, Connecticut General, and Medicare when attached to Part I.) In fact, all Superbill design features and modifications have been worked out with Blue Shield staff. A sample Superbill is shown in Figure 1. The data set consists of the following variables: practice identification, clinician identification, date of visit, location of

\*Agendas of COOP meetings are available on request.



1. PATIENT (LAST NAME FIRST)										DATE OF BIRTH 2. MO. DAY YR.			GROUP NO. 3.		CERTIFICATE NUMBER 4.			CLAIM NO. <b>N<sup>o</sup> 001441</b>									
6. RELATIONSHIP TO SUBSCRIBER										STUDENT? 7. YES NO		WORKER'S COMP? 8. YES NO		ACCIDENT? 9. YES NO		DATE OF ACCIDENT 10. MO. DAY YR.		DATE OF EARLIEST SYMPTOM 11. MO. DAY YR.		HAS PRACTICE TREATED PATIENT BEFORE? 12. YES NO							
3. SOC SEC NO. OR PATIENT'S I.D. NO.										14. INSURANCE SECTORS 1. 2.		17. PRIMARY? IF SECONDARY MEDICAL OTHER 3. 4. 5.		15. OTHER INSURANCE IF YES GIVE NAME OF COMPANIES AND I.D. NO.													
16. SUBSCRIBER'S NAME AND ADDRESS										<b>Forest Community Health Center</b> <b>Sunapee Street</b> <b>Forest, NH</b>										18. PAY SUBSCRIBER YES NO		19. PHYSICIAN OR PROVIDER NO.					
PHONE:										ZIP CODE										20. DATA RECALL 5 1 1 1 2							
21. TYPE OF APPOINTMENT										1. SCHEDULED		2. WALK-IN		3. EMERGENCY		4. NO SHOW		5. CANCELLED		6. PT. RESCHED.		7. OFC. RESCHED.		8. LEFT		9. OTHER	
22. DATE OF SERVICE MO. DAY YR.		23. POS		24. TOS		25. U H I S		26. PROCEDURE CODE		DESCRIPTION OF SERVICE			DIAGNOSIS			27. 28. 1. 2. OR 3. 4.		29. ICD 9 CODE A T U S		30. CHARGE		INSURANCE CODE					
		1 6						9025		Routine Office Visit			ASHD					412.9									
		1 6						9003		Initial Office Visit			Allergic Reaction					692.9									
		1 6						9010		Initial Visit, Comp. Evaluation			Allergy Shot					702.0									
		1 6						9023		Brief Office Visit			Anxiety Reaction					300.0									
		1 6						9020		Minimal Service			Asthma					498.0									
		1 6						9004		Intermediate Office Visit			Bronchitis					490.0									
		1 6						9026		Extended Office Visit			CHF					427.0									
		1 6						9030		Comp. Eval. Est. Patient			COPD					492.0									
		1 6						9040		Annual Physical Exam			Conjunctivitis					360.0									
		1 6						9045		Well Child Exam			Corneal Abrasion					910.0									
								9153		Complete Consult for another DR			Depression					790.2									
		1 6						9019		Comp. Gynecologic Exam			Diabetes					250.9									
		3 6						9080		Newborn Nursery Care			Eczema/Dermatitis					692.9									
		1 7						9021		Immunization			Foreign Body Eye					930.0									
		1 1						9022		Allergy Shot			Gastroenteritis					561.0									
		1 4						8700		Urinalysis			Headache					791.0									
		1 4						8885		Throat Culture			Hypertension					401.0									
		1 4						8888		Urine Screen			Immunization					702.0									
		1 4						8368		Hematocrit			Medical Examination					700.0									
		1 4						8954		Vaginal Smear			Muscle Spasm					780.3									
		1 4						9351		Audiogram			Osteoarthritis					713.0									
		1 4						9354		Tympanogram			Otitis External					380.0									
		1 4						8556		Tine Test			Otitis Media					381.0									
		1 4						9370		ECG with Interpretation			Pharyngitis					462.0									
		1 4						9450		Spirometry			Sinusitis					461.9									
		5 6						9123		Emergency Room Visit (Med)			URI					465.0									
								0498		Emergency First Aid			UTI					599.0									
		1 1						5435		Removal Foreign Body, Eye			Vaginitis					622.1									
		1 4						9800		Gifford Memorial Lab			Viral Illness					079.9									
31. ADDITIONAL INSTRUCTIONS.										32. SUMMARY OF CHARGES										TOTAL CHARGES							
										11. ADJUST CODE 1 PC 2 0 3 CO 4 IN 5 E 6 0										ADJUST AMOUNT							
										14. PLEASE PAY THIS AMOUNT										PLEASE PAY							
35.										36. DISPOSITION										37. CASH CHECK CREDIT CARD		PAID POST					
1. RETURN IF NEEDED NO FOLLOW UP PLANNED										2. DISPOSITION PENDING TEST RESULTS										3. CASH		PAID					
4. REFERRED OUT										5. OTHER										4. CHECK		POST					
6. HOSPITALIZATION										6. RETURN APPOINTMENT										5. CREDIT CARD		[ ]					
RETURN _____ DAYS _____ WKS _____ MO. SEE [ ] DOCTOR										SIGN AND DATE (PATIENT, OR PARENT IF MINOR)										M.D. REQUESTING CONSULT		REFERRING M.D.					
SCHEDULE 5 10 15 20 30 45 60										NEXT APPOINTMENT WITH _____ PROVIDER NAME										I CERTIFY THE ABOVE SERVICES WERE PERFORMED							
										DAY _____ DATE _____ @ _____ TIME _____										SIGNATURE OF PROVIDER							

Figure 1. Sample "Superbill" used for collecting encounter data



visit, patient identification,\* new or old patient to practice, patient date of birth, patient sex, patient ZIP code, all diagnoses treated, all procedures performed, charges, disposition, appointment status, expected source of payment, adjustments to charges, payment received, and data for special studies.\*\* While the basic form is identical across the practices, diagnoses and procedures are crash imprinted on an individual practice basis, allowing for some variations by specialty, location, or preference. (Approximately one half of all diagnoses and procedures are standardized.) The Superbills are purchased in bulk by Dartmouth and distributed to the practices at 7 cents per form. Typically, practice clerical staff complete the top portion of the document, the clinician checks the appropriate procedure codes, diagnoses, and disposition at the end of the visit, and clerical staff complete the coding by listing charges and scheduling return visits. The top copy of the Superbill is sent to the patient's insurance company, if assignment is accepted, or it is given to the patient as a statement. The patients may then submit the form copy to their insurance company. The second copy is batched and mailed to Dartmouth on a weekly basis. The third copy can be included in the medical record. Those practices using the microprocessor terminal do not batch and mail copies of the Superbill, but enter Superbill data directly into the microprocessor.

Use of Superbills has both advantages and disadvantages. The principal advantage is that they streamline the billing process for many accounts by reducing duplicate recording of information. It follows that since the Superbill is the basic billing document, the data accuracy and completeness are generally high. Between October and December 1980 the completeness rate for procedures varied from 99 to 100 percent; for patient's birthdate, the completeness rate varied from 97 to 100 percent. The main disadvantage of the Superbill

involves accurate coding of diagnoses and procedures. When it functions as the bill given to the patient, there may be inaccurate coding of sensitive diagnoses (eg, venereal disease, schizophrenia, alcoholism). Because the Superbill is most frequently sent to an insurance company, there may be undercoding of nonreimbursable problems (eg, marital counseling, family planning) or procedures. Finally, the preprinting of common procedures and diagnoses, while facilitating their recording, may also result in a "forcing" phenomenon in which the closest preprinted diagnosis is selected rather than writing out the true diagnosis. A validity study in five practices comparing the Superbill diagnosis to the medical record diagnosis yielded an average discrepancy rate of 5 percent.

The second category of information, involving practice revenues and expenses, is gathered once per month. Data related to revenues and information on operating expenses are summarized on monthly worksheets that incorporate uniform definitions and categories. This allows collection of comparable information across the practices on the following accounting variables: revenues (gross receipts, refunds, net receipts, and collection ratio) and expenses (personnel, office overhead, supplies, equipment, insurance, and bad debt). The expense categories correspond to those contained in Internal Revenue Service Form 1040, Schedule C. The vast majority of the practices in the COOP Project file Schedule C with their tax returns; thus their accounting system is structured to meet its requirements. Accordingly, using those expense categories minimizes clerical effort for the practices and circumvents definitional problems arising from the adoption of a newly created chart of accounts.

### *Data Entry*

The COOP Project has two different methods for entering data from practices in the network and two input documents (Superbills, and monthly worksheets on revenues and expenses). One method for entering Superbill data involves a service bureau approach, and the other, a distributed microcomputer strategy which is integrated with the practice's billing process. All revenues and expenses are entered on a service bureau basis. Figure 2 depicts the overall flow of data through the medical information system.

The majority of practices (37) use the service

\*For confidentiality purposes and generalizability across practices, the Hogben code has been adopted as the patient identifier (ie, first four digits of last name, initial of first name, and birth date).

\*\*A small space in the lower left-hand corner of the Superbill is reserved for additional data items desired on a short-term basis for special clinical studies. A stamp is made with the appropriate data elements and imprinted on all Superbills used during the study period. For example, in a recent study on the use of antibiotics, the particular drug used, the length of time prescribed, and the mode of administration were recorded in this space.



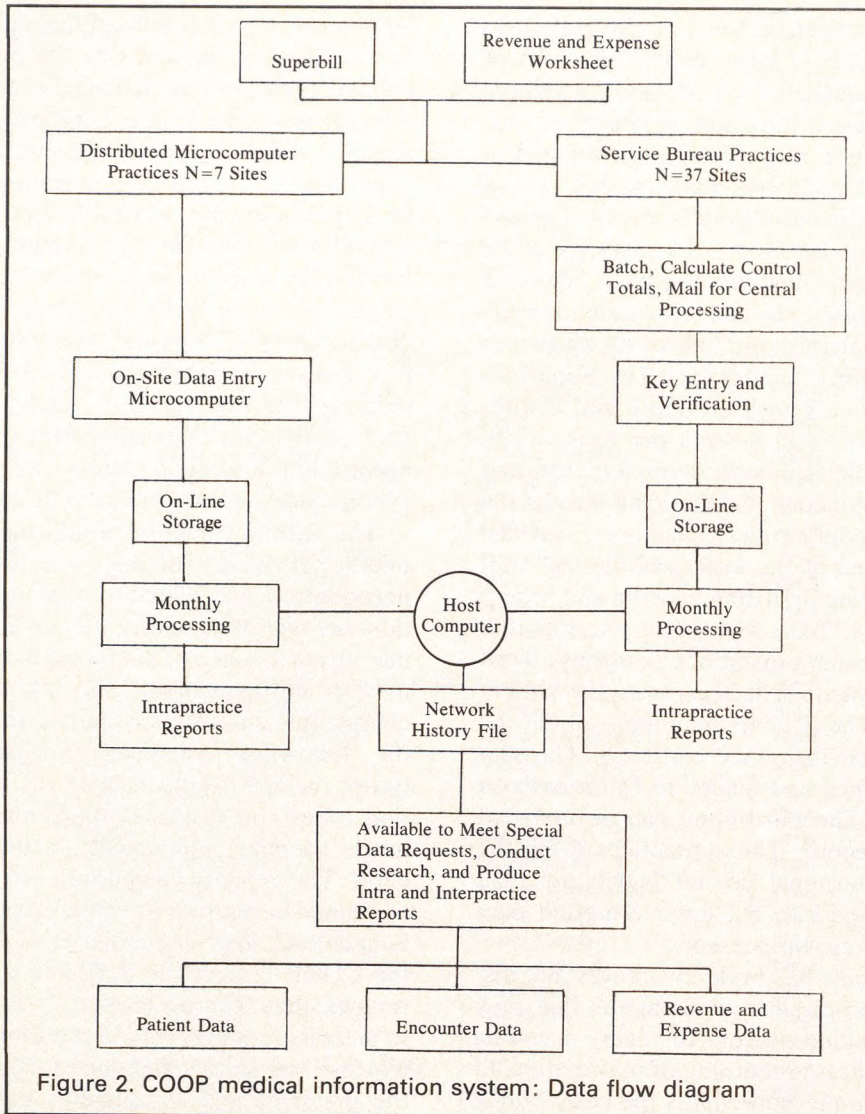


Figure 2. COOP medical information system: Data flow diagram

bureau approach for Superbill data. Practice staff assemble the Superbills in batches, calculate control figures (on charges and number of visits) for batches of Superbills, and mail the Superbills weekly, and the worksheet on revenues and expenses monthly, to Dartmouth for data entry, storage, and report generation. Special colored, pre-labeled, and reusable mailers are provided for this purpose. All data are processed through a strict verification program, and the final data set is reconciled with the practice's control figures. The data are entered in a format that can be used directly by a comprehensive data base manager. All personnel involved in entering and processing the

data sign confidentiality documents, and data access and storage are carefully protected.

Seven practices currently use the distributed microcomputer approach. These practices were either too large to continue using their manual billing system or were interested in experimenting with a computerized billing system. Dartmouth had conducted a national search to determine the most cost effective commercial billing system for small rural practices which could also collect the entire COOP Project data base. A company was selected, and the seven aforementioned COOP Project practices reviewed the costs and performance of the billing system and decided to adopt the



system. Each of the seven practices has a microcomputer in its office. Practice staff enter Superbill data directly into the microcomputer terminal. The microcomputer stores the data entered that day. During the night following each working day, the host computer places an automatic phone call to the practice's microcomputer and (1) receives the information stored during the day and enters it into the memory of the host computer, and (2) updates the information stored in the microcomputer's memory regarding patients' outstanding balances. (The phone call averages 20 seconds.) The actual bills and past-due account notices are sent directly to the patients every month from the host computer location. Every three months all transaction files collected by the microcomputer system are put on magnetic tape and mailed to Dartmouth for reformatting and inclusion in the central COOP Project data base.

Both the service bureau and distributed microcomputer methods enable the network to capture the same basic data set for use in practice management, quality assurance, continuing education, and research. The main difference between the two approaches is that practices with microcomputers can automate the billing, collections, and bookkeeping functions that service bureau practices continue to perform manually. A controlled study is currently being conducted in five practices to measure the impact of the computerized system on collection rates and age of accounts receivable, distribution of staff time, staff attitudes, patient inquiries, and insurance turnaround time. These results will be available in the fall of 1981.

Expense and revenue data are entered monthly by COOP Project staff into an interactive data base manager designed for accounting purposes. This allows accounting data from each practice to be stored centrally using uniform categories for revenues and expenses.

### *Feedback Reports*

Both service bureau and microcomputer practices receive a monthly administrative report. The service bureau report is mailed to each practice no later than three weeks after the close of each month. It includes the number of patient visits and gross charges registered by each practitioner in each visit location, number of new patient visits, percentage of self-pay charges collected at time of visit, and percentage of charges sent to third party

payors. The microcomputer practices (which use the computer to automate monthly billing, aging of accounts, and some bookkeeping functions) receive a standard package of billing reports, which includes (1) a transaction control report that documents the daily charge/receipts of the practice, (2) an account activity report that shows monthly and year-to-date charges and receipts on all open accounts by date and type of service, and (3) an overdue account analysis that indicates the name and telephone number of patients with balances due by age of charge.

All practices receive quarterly intrapractice feedback reports that document (for each clinician individually and the practices as a whole) (1) production: total number of visits, days worked, unscheduled visits, total number of patients, number of new patients and charge information; (2) patient characteristics: age, sex, town of residence, primary insurance coverage, and diagnosis; and (3) encounter characteristics: type of appointment, procedure frequency and charges, and disposition of patient. A special software package exists for approximately one half of the practices that are federally supported health centers. These practices receive tables and patient lists for all patients meeting the "clinical indicators" criteria. This facilitates the completion of their federal reporting requirements every quarter. Such data include hospital admissions by specialty, family planning utilization by age group, and patients with Pap tests for review of follow-up.

In addition to the routine monthly and quarterly reports, practices are encouraged, through individual and group meetings with COOP Project staff, to request data which may be of use for either clinical or management purposes. Most frequent requests involve patient recall lists for patients meeting specified criteria (eg, elderly patients with respiratory problems for influenza shots, or pediatric patients turning two years of age to review immunization status). Other examples of data requests are age and revisit rates of new patients, total laboratory charges by clinician, and patients with hypertension subsequent to the Selacryn drug recall. In the past eight months, 67 requests have been processed. Because all data have been stored in a data base manager format, most of these requests can be processed by a research assistant with no programming experience.

The capacity to produce interpractice reports is



the hallmark of the COOP Project. These reports allow each practice and each clinician to observe his standing within the entire group, by specialty, or by practice organization. For example, specific comparisons can be made across practices for type of visit, fees for selected procedures, visit frequency for specific chronic conditions, and costs per visit. Interpractice reports can be requested by a practice. In that case the COOP Project confidentiality policy stipulates that only ranges will be released unless written permission is received by each directly or indirectly (eg, specialty mix, patient residence) identified practice. COOP Project staff work on a regular basis with practice administrators and clinicians to point out trend indicators in the routine reports, deviations from practice objectives (eg, too few preventive services), and suggestions for both intrapractice and interpractice data requests.

### *Cost of the Medical Information System*

From the beginning the COOP Project aimed to develop a cross-practice data system that would collect clinical and financial data in an ongoing manner at a reasonable cost. The program will be a failure if a medical information system is developed that costs more than mainstream practices are willing to pay. The goal has not been to develop the most comprehensive computerized medical information system. Rather, the aim has been to construct a multipurpose medical information system that a majority of practices will want to use for themselves and that facilitates interpractice cooperation on research and education.

The operating costs of the batch medical information system are approximately 30 cents per Superbill; 70 percent is for data entry and verification and 30 percent is for computer time and personnel time used in report generation. For physicians seeing approximately 400 patients per month (only one Superbill is completed for hospital services provided to a patient) this cost totals \$120. For practices using the microcomputer, the cost incurred by the COOP Project is less because the practice is responsible for data entry, although some additional computer time for data reformatting is required. The actual charge to a solo physician for the commercial billing system is approximately \$3,500 for the purchase and installation of the microprocessor plus a \$150 per month service fee for subsequent months.

### **Discussion**

The COOP Project is based on four premises regarding (1) control of the project, (2) role of an integrated information system, (3) medical school outreach, and (4) voluntary (vs regulatory) strategies. The first premise is that the COOP Project aims to meet the educational, managerial, and research interests of primary care physicians. It is a collaborative effort involving a medical school, community practices, and policymakers, but the direction of the COOP Project is determined by interest of the physicians. Medical school based personnel "staff" key positions in the program and coordinate activities, but representatives from the practices and the group as a whole vote on what activities should be emphasized. The medical director of the COOP Project is a general internist practicing full time in a rural community.

The second assumption is that the multiple functions of the COOP Project can best be promoted by development of a computerized interpractice data network. The intent is to construct an integrated, multipurpose medical information system that helps practices to perform routine management tasks and enables each physician to observe his rank within the group on quantitative indicators of clinical and managerial performance. The medical information system should enable reliable data capture as well as aggregation of data across practices and over time and should be efficient to maintain after developmental costs have been expended.

The third premise is that medical schools have a regional responsibility to foster a professional environment that helps communities recruit and retain well-trained primary care physicians. Parker and Sorenson studied the reasons for physicians' decisions to settle in and leave rural communities. They concluded that the major reason for departing "seems to stem chiefly from an unsatisfactory professional situation," while the main reasons for selecting an area related to "good professional support, especially a good community hospital, a nearby tertiary medical center, and medical consultants in various fields."<sup>1</sup> The COOP Project is implementing programs like those suggested by Parker and Sorenson to improve the health care system.

The fourth premise is that policymakers should consider testing the effectiveness of a voluntary,



decentralized, physician instigated approach to quality assurance and cost containment. In the United States, policymakers have adopted regulatory approaches for quality assurance and cost containment and are using a subsidy strategy to improve access to care in physician shortage areas. These regulatory and subsidy approaches may be less effective than market oriented strategies that use competition, information, and education to contain costs, improve access, and assure quality.<sup>2-8</sup> Therefore, the COOP Project hopes to promote competition by using cross-practice information (showing each practice its relative management efficiency and clinical cost effectiveness) coupled with a unique brand of continuing education (promoting discussion of the cross-practice clinical and management information with other physicians and outside experts) and mounting programs to improve weaknesses that are identified.

The development of the regional data network is currently being supported by the practices, Dartmouth, and special grants. Plans are being made to make the network substantially self-sufficient by 1984. To accomplish this, the costs of the data system must be as low as possible and must be shifted fully to the practices themselves and to other users of the data. The first step in making the data system as efficient and useful as possible to the practices has been the integration of a practice billing system into the data network.

The data network concept pursued by the COOP Project appears to be the most cost effective organization allowing small medical practices to utilize a medical information system at this stage of computer technology. The clinical and management benefits of an in-house comprehensive system such as Co-Star, which has been developed by the Laboratory of Computer Science at the Massachusetts General Hospital (\$2.76 per encounter for a practice with 55,000 encounters per year),<sup>9</sup> are not affordable by small practices. Moreover, the interpractice comparisons and the consultative resources of a central organization for clinical research, statistical analysis, and management applications would not be available. At this moment, COOP Project practices are more interested in focused interpractice comparisons and collaborative clinical research than in computerized medical records, automated flow charts, and other uses of the computer to assist medical practice. Similar conclusions have been reached

by the M/POP Project in Colorado, where the costs of a similar system for small practices are \$1.17 to \$1.61 per encounter,<sup>10</sup> and a commissioned study in England.<sup>11</sup> The ultimate viability and self-sufficiency of the data network will be boosted if it can be demonstrated that an integrated (management plus clinical data) approach with an umbrella service organization will produce useful and affordable data for participating practices and outside users.

In conclusion, while the medical information system is the most visible aspect of the COOP Project, the COOP Project is more than a data network. It provides services to practices and opens up new opportunities for primary care research, medical audit, and continuing education based on quantitative practice self-analysis.

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