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specific ST changes excluded from the 7 percent CMP rate. Manning, screening 5,000 young men in the Royal Canadian Air Force, noted 3.2 percent abnormal ECGs, including nonspecific ST changes.³

Several factors may explain the higher rate noted in this urban population. For example, more specialized knowledge of the 1970s would account for left posterior hemiblock and Mahaim syndrome appearing in the CMP population but not in the studies of the 1950s³ and 1960s.^{1,2} Also, some electrocardiographers may consider certain diagnoses as normal and not include them in the overall rate, incomplete right bundle branch being a case in point.

Even with these limitations, a high rate of abnormalities appears in this asymptomatic urban group. Most of the diagnoses (Table 1) suggest congenital or acquired conduction system lesions. Perhaps urban blacks and Puerto Ricans manifest higher rates of ECG abnormalities without signifi-

cant underlying pathology. Larger studies should extensively examine ECGs in young urban people and further define their cardiac problems.

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Use of Computer Systems in Family Practice Residencies

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Computers have emerged as able assistants to family physicians in performing many data gathering tasks. This has been accomplished most easily through the integration of office billing systems

with systems designed to (1) describe and analyze practices, (2) directly assist physician-patient encounters, and (3) provide educational assistance to practitioners and patients. Residency programs are logical places to develop these computer systems because not only are there additional educational needs for residents but also there are often additional funding and expertise available for development of such systems. To date, however, there have been no published reports of the number of residency programs using computers or to what extent or with what satisfaction they are doing so. This survey was undertaken to gather

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information about computer use in family practice residencies.

Methods

A three-part questionnaire was developed for data collection. The questionnaire was designed so that only one part needed to be completed by any one residency program. The first part gathered information from residencies already using computer systems. Questions were asked about length of time in use, office management uses, educational uses, satisfaction, and possible future uses. The second part was completed only by programs presently planning development of a system. Information was obtained about anticipated starting date, what the system was expected to be used for, and what other uses would seem helpful. The third part of the questionnaire was completed by programs without systems and not presently planning to use a computer. They were asked if they would be interested in having a system, and if so, what their reasons were for not pursuing one.

The questionnaires were mailed to the directors of all accredited family practice residency programs listed with the American Academy of Family Physicians as of April 1980 (n=354). A follow-up mailing was done six weeks later to all nonrespondents.

Results

Of the programs contacted, 308 returned questionnaires, for a response rate of 87.0 percent. Responses from the first mailing (n=243, or 68.6 percent) were compared with those from the second mailing (n=65, or 18.4 percent) to identify any differences between the two groups. No significant differences were found, and further analysis was done on all respondents.

The distribution of computer use by types of family practice residency programs is displayed in Table 1. Of the 308 respondents, 188 (61 percent) were presently using computer systems, and 72 (23 percent) were in developing stages of implementation. The final 48 (16 percent) of the respondents had no present plans for developing systems. Both

the response rate from the questionnaire and the rate of computer use in all groups were relatively high.

Residencies With Computer Systems

Most of the residency programs (159, or 85 percent) were collecting diagnoses, and of these 159, most (128, or 81 percent) were routinely reviewing them with the residents. Also, most residencies (135, or 73 percent) were using computer systems for billing, and 93 (69 percent) of those programs were reviewing these data with the residents. Use of computers for other management tasks, such as scheduling (9 percent) and inventory (4 percent), dropped off markedly, possibly because greater programming sophistication is required.

The number of residency programs reporting use of their computer systems for research purposes was very small. Only 31 (16 percent) made any mention of such application, and there was no difference in responses from university and community based programs.

Each residency program with existing computer systems was asked to rank its satisfaction on a scale from one (low) to five (high) for each category listed in Table 2. No correlation could be found between the level of satisfaction and the type of residency program. Nor was there any correlation between satisfaction and length of time the computer system had been in use or whether the computer system had been changed.

The number of programs initiating systems each year has been relatively stable over the last several years. In terms of total number of computer systems currently in use, however, nearly 50 percent are less than three years old (90 of 188).

Residencies Planning Computer Systems

Thirty-seven programs expected to have a system in place within one year, and another 35 were in planning stages to start after that time. Programs developing systems were planning to use them more extensively than had programs with

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Table 1. Computer Use by Type of Family Practice Residency

| Program Structure | Number of Questionnaires Mailed | Number of Questionnaires Returned | Using Computer No. (%) | Planning Computer No. (%) | No Plan No. (%) |
|--|---------------------------------|-----------------------------------|------------------------|---------------------------|-----------------|
| Community based | 47 | 36 | 23 (64) | 6 (17) | 7 (19) |
| Community based, university affiliated | 176 | 159 | 88 (55) | 41 (26) | 30 (19) |
| Community based, university administered | 52 | 47 | 34 (72) | 8 (17) | 5 (11) |
| University based | 62 | 54 | 35 (65) | 13 (24) | 6 (11) |
| Military | 17 | 12 | 8 (67) | 4 (33) | 0 (0) |
| Total | 354 | 308 | 188 (61) | 72 (23) | 48 (16) |

existing ones. When the residency programs with existing systems were divided into groups by the length of time they have had systems, a trend emerges. The more recently developed systems do more and with greater sophistication than do the older ones.

Residencies Not Planning Computer Systems

Of 48 programs not planning computer systems, 11 (23 percent) stated they did not want to have a system. The other 37 (77 percent) did desire a system but had various reasons for not pursuing one; the major reason reported by 25 programs was lack of funding.

Comment

The use of computer systems in family practice residency programs is quite high. Not only were 61 percent of programs using such systems and another 23 percent developing them, but only 3.5 percent of the programs did not want a system. This growth in the use of computers is not limited to university programs, as similar percentages of all program types are using and developing systems. Computers are indeed becoming a universal tool for office information management. Despite this general availability of computers, fewer pro-

Table 2. Satisfaction with Computer Systems

| Features | Rank* |
|----------------------|-------|
| Overall | 3.51 |
| Ease of use | 3.42 |
| Cost of system | 3.38 |
| Service availability | 3.40 |
| Programs | |
| Return time | 3.29 |
| Completeness | 2.95 |
| Ability to change | 2.87 |

*Average of ranking from 1 (low) to 5 (high)

grams are using them for educational purposes than for office management, with an even smaller number of programs utilizing available data for research.

The satisfaction level of residency programs using computer systems was also quite high. It is difficult to characterize programs with higher satisfaction from those with lower satisfaction, as responses were generally uniform. Overall, programs seemed to indicate that computer systems were affordable and easy to use. Nevertheless, respondents also desired greater capabilities of their systems and indicated it was difficult to change existing systems to generate additional output.