

Planning for the information age: a survey of microcomputer use in a faculty of health sciences

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Microcomputers can greatly enhance information processing by clinicians and improve the quality of health care. We surveyed 983 full- and part-time faculty members to assess the state of microcomputer use in the Faculty of Health Sciences at McMaster University, Hamilton, Ont. The ratio of faculty members to microcomputers was close to 1; however, 29% of the full-time and 52% of the part-time members who responded indicated that they did not use a computer. Among those who did, the range of applications was generally limited. There was no mention of more advanced uses such as diagnosis, treatment and patient records. Only about 30% of the respondents had taken a computer course, but all indicated a desire to take courses (on average, three of the seven listed in the questionnaire). Our results showed an extensive but unequal distribution of microcomputers and revealed the need for planning and education to put them to optimal use.

Les micro-ordinateurs sont précieux dans l'informatisation du travail clinique et l'amélioration des soins. Enquête sur leur usage auprès de 983 médecins enseignant à temps complet ou partiel à la Faculté des sciences de la santé de l'université McMaster à Hamilton (Ont.). On dénombre

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en moyenne plus d'un micro-ordinateur par médecin, mais 29% des répondants à temps complet et 52% des autres ne s'en servent pas. Chez ceux qui le font, la gamme des emplois est habituellement étroite. On ne fait nulle mention des emplois de pointe, tels le diagnostic, la thérapeutique et les dossiers des malades. Seuls quelque 30% des répondants ont suivi un cours d'informatique, mais ils disent tous vouloir profiter des cours dont il est fait état dans le questionnaire (en moyenne, de trois des sept cours offerts). Nous avons démontré que la distribution des micro-ordinateurs est vaste mais inégale et que leur usage optimum demande planification et instruction.

Affordable personal microcomputers became available to health care professionals in the early 1980s. Prices have decreased, machine power has increased, and health care professionals can now use a personal computer for an expanding and already considerable array of tasks. In addition, randomized trials of computer-assisted quality assurance have documented improvement in the quality of care.¹

In recognition of these developments, the American Association of Medical Colleges has recently adopted resolutions concerning the new discipline of "medical informatics", which it defined as "a developing body of knowledge and set of techniques concerning the organization and management of information in support of medical research, education, and patient care".² The association recommended the establishment of a medical information department and computer courses for students in every medical school.

To assess the readiness of our faculty mem-

bers to use and teach medical informatics, we conducted a survey of their access to microcomputers and their desires for further training and use.

Methods

We surveyed full-time and part-time members of the Faculty of Health Sciences at McMaster University in Hamilton, Ont. The faculty sponsors a full range of activities in research, education and health care services. The education programs include undergraduate medicine, nursing, and occupational and physical therapy, postgraduate medicine, master's and doctoral programs in health sciences and a continuing education program for health care professionals.

To survey the use of microcomputers by faculty members a 10-page questionnaire was designed, with input from the Program for Educational Development, the Learning Resources Committee, the Health Sciences Library, the Computer Services Unit and the administration of the Committee for Scientific Development. (Copies of the questionnaire are available from the authors.)

The questionnaire was mailed in February 1986 to all full-time (508) and part-time (475) faculty members. Up to three mailings and follow-up letters were necessary to achieve an adequate response rate. Data were tabulated by means of the Personal Data Manager portion of the Sci-Mate program.³

Results

The response rate was 84% for the full-time and 65% for the part-time faculty members; 29% of the full-time and 52% of the part-time members stated that they did not use a computer. The remaining 453 members had access to 631 computers, for an average of 1.5 per full-time and 1.2 per part-time member.

IBM personal computers and compatible models accounted for 42% of the machines available, and Apple and its compatible models for 19%. More than 65% of the full-time and 58% of the part-time faculty members who had access to a computer had one in the office, 47% and 44% respectively had one at home, and 25% and 9% had one in the laboratory.

The number of members with computer access varied considerably among departments; those with joint appointments were counted in each of the departments to which they belonged for this analysis only. Departments in which over 75% of the full-time members had access to a microcomputer included Radiology (100%), Clinical Epidemiology and Biostatistics (96%), Physiotherapy and Occupational Therapy (93%), Biochemistry (87%), Anesthesia (80%), Anatomy (78%), Family Medicine (77%) and Neurosciences (77%). The remaining departments, from highest to lowest rate

of access, were Obstetrics and Gynecology, Pathology, Surgery, Psychiatry, Nursing and Pediatrics. For part-time faculty members the range was from 100% in the departments of Biochemistry and Neurosciences to 34% in the Department of Surgery.

Even though most of the faculty members used a computer, the applications were limited (Table I). Only 30% reported the use of computers for word processing and 27% for statistical analysis. Only 6% did their own on-line searches, and less than 5% used the computers for scheduling, education or self-assessment; 2% stated that they designed some of their programs. There was no mention of more advanced uses such as diagnosis, treatment and patient records.

Only about 30% of the faculty members took computer courses (a total of 239). However, when asked about what courses they would like to take from a list of seven specific applications, the respondents indicated three courses on average; the most popular courses were on information handling for keeping up to date (on-line searching of large bibliographic databases such as MEDLINE was chosen by 59% and personal reprint filing by 53%) and orientation to computers (chosen by 52%). There was smaller but still substantial interest in courses on research data management (49%), word processing (33%), clinical application software (31%) and office practice management (30%).

Interest among members to volunteer for tasks and committees was high: 51% volunteered to teach computer applications or to contribute or review software, 50% volunteered to participate in future research projects on computer applications in clinical practice and health care education, and 45% offered to join one of four groups to develop or disseminate specific computer applications.

Forty-four percent of the respondents thought that MEDLINE should be available on the wards and in the clinics and laboratories. In addition,

Table I — Uses of personal microcomputers by 737 members of the Faculty of Health Sciences at McMaster University, Hamilton, Ont.*

Use	% of faculty members		
	Full-time (n = 429)	Part-time (n = 308)	Total
Word processing	38	19	30
Statistical analysis	38	13	27
Data collection	27	10	20
Nonstatistical analysis	23	6	16
Spreadsheet analysis	21	10	16
Filing (e.g., reprints)	10	6	8
On-line searching	7	3	6
Local-area networking	7	4	5
Scheduling	5	3	4
Education	3	4	4
Program design	2	1	2
Self-assessment	2	1	2
Other	2	3	2

*Based on all respondents, regardless of computer access.

there was substantial support for the following services to be available to health science students free of charge: self-assessment programs (54%), computer-assisted learning (52%), do-it-yourself word processing (32%), MEDLINE and other search programs (29%), and other database facilities (24%).

Discussion

Clinicians have many difficulties in collecting, interpreting, communicating and applying clinical and research data.⁴ Computers have proved their worth by overcoming some of these problems and will undoubtedly assist with many more. Faculties of health sciences therefore have an obligation to upgrade their use of modern information technology and to provide opportunities for their students to learn appropriate applications.

The survey reported here represents one of the first steps our faculty has taken to provide a basis for this important enterprise. The results of the survey demonstrate that our faculty members are enthusiastic to take on the challenge but are not well equipped to meet it. Many members still lack access to computers, and many of those who have access are not making the best use of the computers. There is a great demand and apparent need for

courses for faculty members to learn new applications, but few members have the skills to share. Fortunately those with knowledge and experience indicated a willingness to teach, and we are now organizing ourselves to take advantage of this expertise. Whether the enthusiasm indicated on paper can be translated into action remains to be seen.

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References

1. Haynes RB, Walker CJ: Computer-aided quality assurance: a critical appraisal. *Arch Intern Med* (in press)
2. Evaluation of medical information science in medical education. Adopted by the Executive Council of the Association of American Medical Colleges, Washington, DC, January 23, 1986. *J Med Educ* 1986; 61: 487-543
3. Stout C, Marcinko T: Sci-Mate — a menu-driven universal searcher and personal data manager. *Online* 1983; 7: 112-116
4. Haynes RB, Sackett DL, Tugwell P: Problems in the handling of clinical and research evidence by medical practitioners. *Arch Intern Med* 1983; 143: 1971-1975

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ACTIONS: *Sulcrate®* (sucralfate) exerts a generalized gastric cytoprotective effect by enhancing natural mucosal defence mechanisms. Studies conducted in animals and clinical trials in humans have demonstrated that sucralfate can protect the gastric mucosa against various irritants such as alcohol, aspirin, hydrochloric acid, sodium hydroxide or sodium taurocholate.

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INDICATIONS: *Sulcrate®* (sucralfate) is indicated for the treatment of duodenal and non-malignant gastric ulcer.

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CONTRAINDICATIONS: There are no known contraindications to the use of *Sulcrate®* (sucralfate). However, the physician should read the "WARNINGS" section when considering the use of this drug in pregnant or pediatric patients, or patients of child-bearing potential.

WARNINGS: Use in Pregnancy There has been no experience to date with the usage of *Sulcrate®* (sucralfate) in pregnant women. Therefore, *Sulcrate®* should not be used in pregnant women or women of child-bearing potential unless, in the judgment of the physician, the anticipated benefits outweigh the potential risk.

Pediatric Use Clinical experience in children is limited. Therefore, *Sulcrate®* therapy cannot be recommended for children under 18 unless, in the judgment of the physician, anticipated benefits outweigh the potential risk.

PRECAUTIONS: The following should be taken into account before treating patients with *Sulcrate®* (sucralfate):

Recurrence may be observed in patients after a successful course of

treatment for gastric or duodenal ulcers. While the treatment with *Sulcrate®* can result in complete healing of the ulcer, a successful course of treatment with *Sulcrate®* should not be expected to alter the underlying cause of ulcer disease.

Proper diagnosis is important since symptomatic response to *Sulcrate®* therapy does not rule out the presence of a gastric malignancy.

Drug Interactions Antacids should not be taken within half an hour before or after *Sulcrate®* intake because of the possibility of decreased binding of sucralfate with the gastro-duodenal mucosa as a consequence of a change of intra-gastric pH.

Animal studies have shown that simultaneous administration of *Sulcrate®* with tetracycline, phenytoin or cimetidine results in a statistically significant reduction in the bioavailability of these agents. In clinical trials, the concomitant administration of *Sulcrate®* reduced the bioavailability of digoxin. However, *Sulcrate®*, administered respectively 30 and 60 minutes before aspirin or ibuprofen, did not alter the bioavailability of these agents.

These interactions appear to be non-systemic and to result from the binding of *Sulcrate®* to the concomitantly administered drug in the gastro-intestinal tract. In all cases, complete bioavailability was restored by separating the administration of *Sulcrate®* from that of the other agent by 2 hours.

The clinical significance of these interactions is unknown. However, it is recommended to separate the administration of any drug from that of *Sulcrate®* when the potential for altered bioavailability is felt to be critical to the effectiveness of this drug.

ADVERSE REACTIONS: Very few side effects have been reported with *Sulcrate®* (sucralfate). They are mild in nature and have only exceptionally led to discontinuation of therapy.

The main complaint has been constipation in 1.7% of patients.

Other side effects reported included diarrhea, nausea, gastric discomfort, indigestion, dry mouth, skin rash, pruritus, back pain, dizziness, sleepiness and vertigo.

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Help recurrence-prone
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For relief of pain, antacids may be added to the treatment. However, antacids should not be taken within 1/2 hour before or after *Sulcrate®* intake.

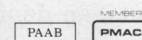
In duodenal ulcers, while healing with *Sulcrate®* often occurs within two to four weeks, treatment should be continued for 8 to 12 weeks unless healing has been demonstrated by X-Ray and/or endoscopic examinations.

In the case of gastric ulcers, an alternative treatment should be considered if no objective improvement is observed following 6 weeks of *Sulcrate®* therapy. However, patients with a large gastric ulcer that has demonstrated a progressive healing tendency may require a longer period of time of treatment.

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