

Implementation of a microcomputer-based opportunistic health maintenance programme in a general practice teaching clinic

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SUMMARY. *The general practice teaching clinic at the Chinese University of Hong Kong uses a microcomputer-based medical record system. To implement a uniform and up-to-date health maintenance programme, a set of protocols has been written for a list of health maintenance items, and the computer has been programmed to identify the items which should be carried out at each patient encounter. Over a period of 16 months, after the start of this programme, 99% of the 1120 clinic patients had a minimum of two items performed. Of a selected sample of 203 patients 119 attended the clinic more than once in the same period and 47% of these patients had all of the health maintenance items recommended for their age and sex group completed. Abnormal screening results led to action by the general practice team. The process of implementing a health maintenance programme has helped the team to discuss current recommendations and to agree on standards. The programme has also helped with undergraduate teaching. The automated opportunistic health maintenance programme is a practical tool for improving patient care.*

Introduction

THE usefulness of the conventional annual check-up has been challenged because it does not cater for the needs of different age and sex groups. Moreover, the effectiveness of most of the tests and procedures included in routine examinations has not been demonstrated and their optimal frequency has not been ascertained.¹ Health protection packages specifically targeted to age and sex groups and based on procedures which have some evidence of effectiveness have been recommended.²⁻⁷ Opportunistic implementation of these health protection packages is practical and makes optimum use of resources because about 90% of the population see a general practitioner at least once every five years.⁸

Periodic health checks can be implemented using a manual⁹ or check sheet,^{12,7} and updates can be made as new recommendations become available.¹⁰ However, this method is tedious and often impractical for busy general practitioners. Computeriz-

ed health maintenance programmes have been shown to improve levels of screening.¹¹⁻¹³ This paper describes a scheme based at the general practice teaching clinic at the Chinese University of Hong Kong and assesses its success after 16 months.

Method

The clinic began using a computerized problem-oriented medical record system in January 1986.¹⁴ The system comprises an IBM PC-XT computer with a 10 Mbyte hard disk for mass storage and an IBM PC compatible machine with two floppy disk drives in each of the three clinic rooms for data entry. An advanced relational data base programme (Revelation) was used to generate the data base functions. Three months after the installation of the basic medical record system a programme was written to automate the health maintenance procedures.

The general practice team of four doctors, two nurses and a receptionist discussed current evidence and recommendations for opportunistic health maintenance in their weekly meetings. Thirty recommended health maintenance items were selected on the basis of recommendations from the College of Family Physicians of Canada,⁹ from Frame⁷ and from the authors' research interests (Table 1). For each item a standardized procedure was drafted, which is revised periodically. The team members agreed to adhere to the protocol as closely as possible during their clinic sessions. Copies of the standardized procedures are kept in the clinic for easy reference. For each age and sex group, a list of recommended items was determined by the doctors. The items are stored in the microcomputer in order of priority. An example for women aged 20-35 years is shown in Table 2. The lists can be updated easily as new recommendations are made by the authorities.

Computer operation

An encounter sheet is generated for each patient visit. The computer searches the patient's data file to determine whether immunizations and screening procedures are up to date. All outstanding items are listed on the encounter sheet in order of priority. In the clinic, the nurse checks to see whether there are any items she can carry out, for example, weight, height and blood pressure measurements or immunization status check. After these items have been completed, the patient is seen by the doctor who carries out any other outstanding items. Although all the outstanding items are listed on the encounter sheet for each patient visit, the number actually performed depends on the amount of time available to the nurse or doctor. The health maintenance programme should not interfere with the normal running of the clinic.

Following the consultation, the results of the health maintenance items are entered immediately into the patient's data file by the receptionist, or when they become available. They are stored in uniform format for easy access in the future. An entry can also be made on a pending file, which lists patients requiring special follow-up.

The results presented here are based on the health maintenance

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Table 1. Health maintenance items selected.

Item	Possible condition
<i>Implemented (good evidence)</i>	
Adult immunization status	Tetanus
Advice on accidents	Accidents
Antismoking advice	Smoking related diseases
Blood pressure	Hypertension
Body height	Obesity (with body weight)
Body weight	Obesity
Breast examination	Cancer of breast
Check for postmenopausal bleeding	Cancer of endometrium
Childhood immunization status	Diphtheria, whooping cough, tetanus, polio and measles
Contraception	Unwanted pregnancy
Cover-uncover eye examination	Strabismus
Developmental screen	Developmental delay
Examination of testes	Undescended testes
Head circumference	Hydro/microcephaly
Hearing and speech assessment	Deafness
Hip examination	Congenital dislocation
Nutritional assessment	Malnutrition
Oral hygiene	Tooth decay
Papanicolaou smear	Cancer of cervix
Papanicolaou smear (teenagers)	Cervical dysplasia
Rubella status	Congenital rubella
Vision check	Blindness
<i>Under consideration</i>	
Advice on alcohol consumption	Alcohol related diseases
Discuss parenthood	Child abuse
Marital, family and sexual adjustment	Family dysfunction
Occupational assessment	Occupational disease
Osteoporosis risks	Osteoporosis
Urinalysis	Diabetes and renal diseases
<i>Not implemented (poor evidence)</i>	
Hypothyroid screen	Hypothyroidism
Stool for occult blood	Cancer of colon

Table 2. Health maintenance items recommended for women aged 20–35 years, in order of priority.

Item	Screening interval (months)
Breast examination	12
Anti-smoking advice	12
Blood pressure	12
Papanicolaou smear	24
Rubella status	60
Body weight (and baseline height)	12
Contraception	12
Hearing assessment	12
Oral hygiene	12
Adult immunization status	60
Advice on alcohol consumption	12 ^a
Marital, family and sexual adjustment	12 ^a

^a Validity of item under review.

records of the 1120 patients who were registered in the computerized system in the 16 months after it was implemented. A more detailed study has been made of 203 patients selected on

the basis of the last two digits (00 to 14) of their Hong Kong identification number. This sample should be fairly representative of the clinic population.

Results

Of the 1120 patients 392 were male — 35% were aged 15 years or less, 53% 16–65 years and 12% over 65 years; 728 were female — 16% aged 15 years or less, 65% 16–65 years and 18% over 65 years. Ninety nine per cent had at least two health maintenance items performed and 27% had more than five (Table 3). Of the selected sample of 203 patients, 119 (59%) attended the clinic more than once. Of this group the health maintenance items recommended for their age and sex group had been completed for 56 patients (47%). The items that had the highest completion rate are hypertension (97%) and obesity (98%) (Table 4). Since there is no official recommendation for tetanus and polio vaccinations in adults in Hong Kong, it was not surprising that none of the patients had up-to-date immunization status. After reviewing the prevalence data for Hong Kong the general practice teaching clinic has implemented its own policy for tetanus immunization among high risk patients. All the remaining 84 patients (41%) who attended the clinic only once had a minimum of two items completed (usually blood pressure and body weight and height measurements).

Table 3. Number of health maintenance items performed among the 1120 patients.

No. of items performed	No. (%) of patients
0	0 (0)
1	9 (1)
2	155 (14)
3	316 (28)
4	196 (18)
5	140 (13)
>5	304 (27)

Table 4. Number of patients for whom selected health maintenance items have been completed among 119 patients who attended the clinic more than once.

Item	No. (%) of patients	
	Item recommended	Item completed
Body weight and height	119	117 (98)
Blood pressure	118	114 (97)
Breast examination	51	33 (65)
Papanicolaou smear	51	23 (45)
Immunization status	101	101 (100)

Of the 1120 patients, 1090 (97%) had their blood pressure recorded — 237 were found to have elevated blood pressure and 44 were later diagnosed as having hypertension and are being treated. Thirty nine men (mean age 54.8 years, standard deviation 15.5 years) and 171 women (mean age 54.2 years, SD 15.7 years) were found to have a body mass index greater than 25. Of these patients, 11 women under 30 years of age were referred for nutritional assessment and they are being followed up for continued assessment and counselling. The 56 patients aged 30–45 years will also be considered for nutritional assessment if simple intervention by the doctors is not effective. During the 16 months 134 patients had a cervical smear taken. One 37-year-

old woman was found to have cervical dysplasia and was followed up.

Discussion

As the clinic was already employing a computerized medical record system, the implementation of an automated health maintenance package was relatively easy. The system described here takes into account the constant changes in local authority recommendations and the process of establishing an in-house protocol has allowed the general practice team to discuss current literature recommendations and to agree on standards.

The numbers presented here are too small to be of any use in epidemiological studies. However, they illustrate how an automated opportunistic health maintenance system can help with patient care.

The general practice teaching staff have been teaching undergraduate students the concept of opportunistic health maintenance and how to implement it during busy consultations. The present system illustrates to the students both the theory and practice of opportunistic screening.

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