

The Computer in the Consultation

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The Department of Community Medicine at Monash University (Melbourne) in cooperation with the Royal Australian College of General Practitioners has completed a three-year project to develop a range of prototype software designed to enhance clinical practice. Although the second stage of testing in a single-handed and a group practice has now commenced, the system is not yet available commercially.

DESCRIPTION

The original plan was to develop a series of modules, concentrating on clinical applications, which would be integrated around the patient's medical record. It was envisaged that the family physician would have a screen and keyboard in his or her office that would be used unobtrusively as an additional consultation tool. Despite initial negative arguments, including high costs, unavailable suitable software, and predicted lack of acceptance by patient and physician, the researchers were confident that these objections would soon be overcome. The project is outlined in Figure 1.

HARDWARE

Various affordable microcomputers were examined. It was found that when a number of peripheral units were attached, their reduced response time became unacceptably slow. The solution chosen to develop this project was to install a network.¹ How the network functions is illustrated in Figure 2. Briefly, the concept is to link a series of personal computers through a common passageway, the local high-speed network. The system installed has the capacity to support 64

devices through interface cards known as transporters, and these all share the expensive disk and peripherals. The alternative approach being explored is the use of a supermicrocomputer running a multiuser, multitasking system such as UNIX.

SOFTWARE

Software for various billing and management functions has been produced commercially for some years, and there is now a wide range from which to select. The patient care functions have been neglected because they are perceived as financially nonviable. The patient care applications being developed in this system are those chosen to be of special interest, and no claim is made to their being comprehensive. The heart of this system is the medical record. There is debate as to whether this record should be a medical record summary or a totally paperless system. Progress notes, for example, are often used as a form of diagnostic doodling written during the consultation process and not as a true record to be completed after its conclusion.

The value of allocating time and computer storage for this sort of information is questionable. Two decisions have been made: first, to commence with two parallel systems, computerized and paper records; second, to use an expandable record so that individual physicians can use as much or as little of a computerized record as they wish. To do this, it was necessary to abandon the notion of fixed field records. The traditional computer record is designed with a predetermined slot size for each data item, eg, 6 by 20 character size field for the problem list. This record was devised with the following characteristics. It must be transportable, it must be transportable in a readable format, ie, in English or a subset of English, and it must be sufficiently flexible to allow for the endless variation inevitably required by individual physicians. These requirements have been achieved by developing a system using key words and entering data in English, a system that was given the name PORTA.²

The PORTA medical record system offers an opening into a universally transportable patient medical re-

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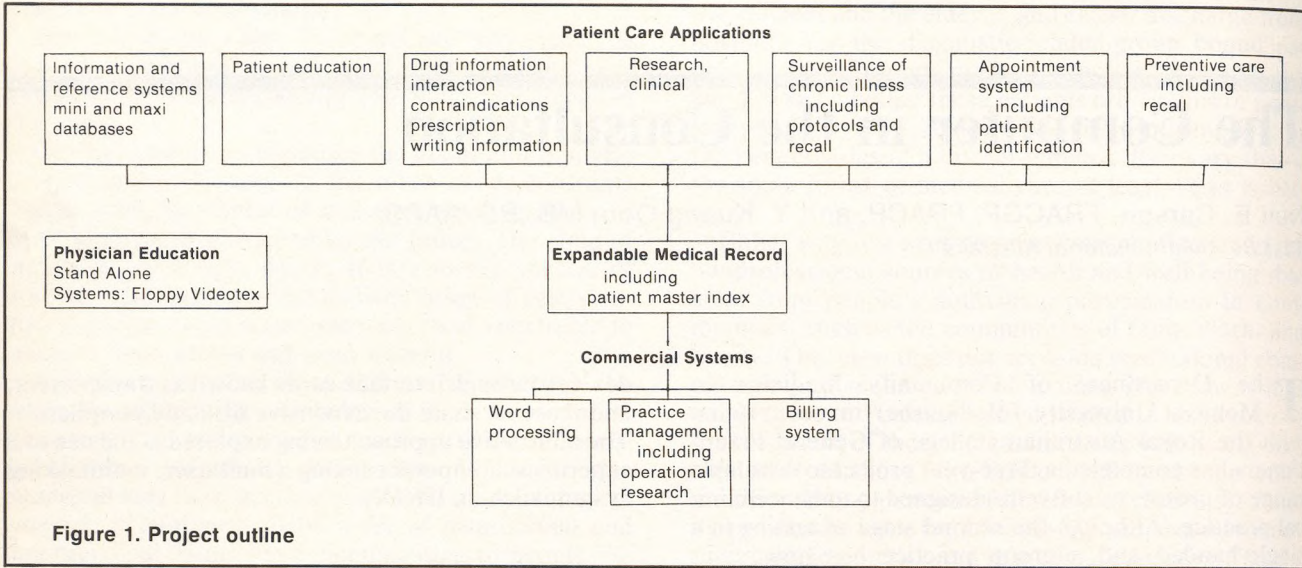


Figure 1. Project outline

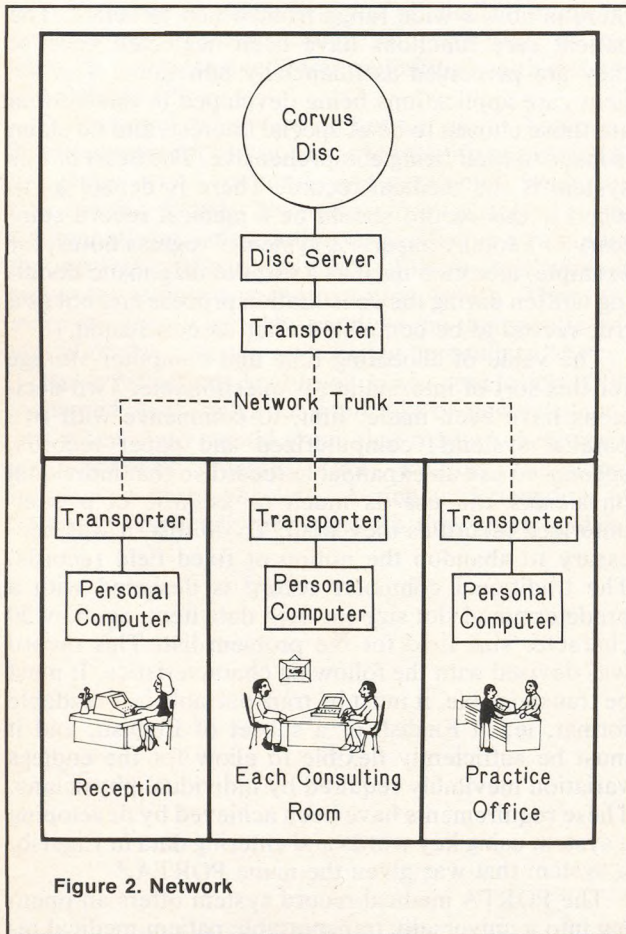


Figure 2. Network

cord system. The PORTA design enables a patient file to be independent of the underlying hardware, computer language, and operating system. The traditional medical record is a manila folder with the notes in between the covers, which is accessible by a unique registration number. The PORTA system implementation is that of a string of characters of unlimited length. The PORTA has key words to trigger the recognition of important fields. Computers do not yet have the facility to handle English reliably, the traditional approach being the use of high-level languages to instruct the computer. These high-level languages are really small subsets of English with strict syntax and semantic rules associated with the use of key words. PORTA relaxes the traditional constraints of the use of high-level languages for programming the computer only and extends the use of a high-level language definition for patient data. The end result of this innovative approach is that the patient data in the PORTA format is both computer and human readable and understandable. An implementation of the PORTA system has been carried out in a UNIX environment.

The PORTA system can be seen as an intermediate step between the conventional fixed field record of a computer file and the promise of a completely intelligent computer system that can digest the classical manual record. This latter goal may not be achieved in a lifetime, and the timely implementation of a universally transportable medical record is a practical solution to what will become a very big problem, ie, how patient information is to be transferred from one location to another.

Integration of the separate modules with the patient

record is essential. For instance, one of the modules is concerned with providing a summary of drug information,³ which includes indications, contraindications, side effects, and interactions on a single screen. For example, drug interactions may be referenced by looking up each drug concerned, by entering the drugs currently used by a patient together with the additional drug under consideration, or in a truly integrated way by typing in the new drug and programming the computer to interface automatically with the drugs listed in the patient's record.

Prototype software has been developed for all the modules listed (Figure 1) with the exception of that labeled surveillance of chronic disease. In family practice there are a number of conditions (eg, hypertension, asthma, epilepsy) that are sufficiently common to require continuing physician care. Hypertension has been selected as the prototype model. Diagnostic and monitoring protocols have been designed.⁴ The medical record display will clearly indicate that a protocol is in use for that patient. A recall system written for the preventive package can also be used for better monitoring of these patients.

The patient education module differs from that described so far in this series.^{5,6} The screen is used as a visual display to highlight with graphics, where appropriate, the problem under discussion. The printer will prepare a take-home pamphlet to reinforce the verbal and visual information provided during the consultation. The pamphlet is integrated with the record so that the printed material is personalized with the patient's and physician's names.

For more than a year, one of the authors has over one thousand medical records in the PORTA format on-line in his clinic.

SUMMARY

The majority of computer software suitable for family practice has concentrated on the business realities of private medical care at the expense of the more exciting patient care applications. This paper has briefly outlined one development in this area. The authors think that the computer is a not too-distant consulting room tool, capable of improving patient care. The hardware-software systems will need to provide high-speed response, multitasking, including interrupt ability, and a range of imaginative modules integrated with a flexible and transportable medical record.

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