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VIEWPOINT

Developing an integrated data management system for general practice

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Abstract: Developing a software program to manage data in a general practice setting is complicated. Vision Integrated Medical System is an example of a integrated management system that was developed by general practitioners, within a general practice, to offer a user friendly system with multi tasking capabilities. The present report highlights the reasons behind the development of this system and how it can assist day to day practice.

Introduction

Dr Ila Hemendra Doshi, my late wife, and I developed the software system presented here. We began private practice in 1973 and began using a computerized system, based on DOS, in 1993 because of escalating overhead costs in addition to an unmanageable record system that lead to frequent duplications of card files.

Computerizing the records saw a marked reduction in the problem within 8 months, and a by product was savings through the reduction in the number of staff, filing cabinets and patients' cards. However, in the early 1990s, only DOS based software was available locally and by 1996, it was apparent that our recording system, although good by its standard, was not sufficient. As we were practising dermatology, sexually transmitted infections (STI), HIV and reproductive medicine in addition to our normal general practice; slides, photographs, imaged copies of ultrasounds, electrocardiograms, X-rays, laboratory reports, etc. still occupied a substantial amount of filing cabinet space and needed to be located whenever the patient visited. In addition, many of the records were deteriorating in quality and the color of the images was fading as a result of aging and the humid environment.

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We searched both locally and further afield in Europe, UK, and USA, but although numerous software products existed most were only suitable for local needs. Knowing the limitation of the DOS system and the impending introduction of the newer Pentium 4, we eventually decided 2 years ago to design our own, as a research and design product that was wholly self financed. We presented our report of this process at the Wonca conference in Kuala Lumpar on 3rd April, 2003.

The software program

The operating system

We named our software VIMS (Vision Integrated Medical Systems) as the vision was to bring every aspect of private medical practice together.

We are currently using the Oracle 9i as the developer base. It is the background engine on which the whole system operates. This Structured Query Language (SQL) system is the most powerful one in the market, but because of its high cost, can be a deterrent to most small time software writers. It became a hobby and a passion to explore the limits of the program.

Integration is brought about by the Oracle's Database Relational Database Management System (RDBMS) and the use of the Open Database Connectivity (ODBC) standard driver, which permits data connection and a graphic user interface. Thus data integration, migration, backup and restore are easily achieved by even the novice. The doctor can carry his whole clinic in his laptop computer and get connected to his clinic's server through the use of the internet sys-

tem. Or he can send in portable direct files (PDF), rich text format or Word files and reports generated from the individual or multiple modules in the system.

Functions of the system

Patient registration

On registering in a clinic, a new patient's total medical history is recorded on a user friendly opening page. Numerous relevant fields have been created for recording the data in a very simple way. The patient's face, through the use of a digital camera, is recorded. An identification card, bearing a unique barcode can be collected prior to the patient leaving the clinic. Finger print recognition for patient identification is also possible, but the hardware for this is not cost effective currently. The receptionist has no access to the data that the doctor records into the patient's file, which is governed by a high level security password system.

Accounts clerk or nurse

Undertaking a range of tasks from maintaining a drug inventory to preparing staff rosters, generating various reports about drug usage or clinical audits is very simple. Fill in a few fields and all the reports are available in 15–45 seconds.

The doctor

Instead of the pen, the keyboard and the mouse are the tools of the day. The computer program can manage the entire consultation from complaints to examination, investigations, diagnoses, differential diagnosis and finally the prescriptions, using the arrow keys and the mouse.

Although a number of these features are available in most software available at present, certain essential and important requirements have been added, such as drug prompting; for example, if an asthmatic patient is prescribed a non-steroidal anti-inflammatory drug, a warning appears. A notification form can also be programmed to automatically fill and be ready to print or send by email, when a diagnosis of a communicable or notifiable disease is made. There are numerous checks and cross check systems added, which can be tailored to the needs of the user, whether generalist or specialist.

To assist in patient management, a navigating tool relevant for specific complaints has been added, by which a list of possible diagnoses appears with the relevant investigations and a suggested prescription list.

Various modalities of investigation, such as electrocardiogram, ultrasound, digital camera photographs, camcorders, X-rays, audiometry, spirometry or laboratory investigations can be embedded into the patient's file and viewed as a slide presentation just before calling in the patient to the consulting room. Their driver softwares can be tuned to VIMS and your table is free of any papers, folders and films to shuffle through.

The system has various modules for the different needs of different specialties. An executive medical examination encompassing all the findings and investigations and images is within the module. The full report can be given to the patient or hospital department in PDF format on a CD-Rom or printed format or sent by email. From the general practitioners point of view the main features are as follows:

- A pharmacy module provides inventory control including stocks that are on order plus those running short. It will also keep a list of drug expiry dates
- Dermatology*:* photographs of pre, intra and post treatment can be stored, as well as microscopic pictures
- Laboratory*:* sample registration and results, and downloading into the patient's file are integrated
- Surgical module: full operative fields to fill in the pre, intra and postoperative findings, including video recording or digital images, which can be stored and embedded into the patient's file for future reference
- Pediatric module contains various comparative charts
- Ward module for day care surgery or small medical center is provided to manage the inpatients. Management of the current ward and beds, patient enrolment in the ward, transfer, termination etc. have been included
- Auditing: done instantly by recalling the various provisions made for patients, drugs, disease, ward bed, surgery etc
- Research and statistics: included as a separate module; for example, patterns of drug prescription, disease analysis against age, race or date. All these reports can be exported into either email, a Word document or PDF file or built into the slide show system in VIMS. Currently, genetic and Accident and Emergency Departments modules based on inputs from different countries are being developed
- Integrated Accounting Package*:* reduces the cost of keeping an accounts clerk. The sales and purchase of medicines and overhead expenses are recorded in the normal fashion in the accounts database. The drug stock position, creditors and debtors are picked automatically. At the end of a user defined period, the trial balance sheet and finally the profit and loss accounts can be obtained.

Conclusions

I have reported on the development of an integrated management system by two practising doctors as a

response to escalating costs and out of control practice management problems. This system has enabled many of the normal aspects of medical practice to be effectively brought together, which was not possible with a paper based system. Although this process has been difficult and finding the right operating systems can be expensive, it has been worthwhile and may have wide applicability for other practitioners.

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