26

Health informatics in general practice

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The aim of this chapter is to describe the scope of health informatics in general practice. In so doing four principal organizational structures in general practice is identified, the need to document medical records described, and the undertaking of research in general practice is explained together with the benefits associated with using information technology for this purpose. Many of the principles of practice management, documentation and research identified in this chapter apply equally to other types of community health practices.

General Practice forms the core of patient information management in primary care and covers a broad range of issues. The general practitioner or family physician must care for all patients who present, treating all ages, socioeconomic classes, ethnic backgrounds, and states of health. The information presenting to the doctor is often undifferentiated resulting in classification difficulties. There is usually more than one problem presenting at an encounter requiring a comprehensive approach to information gathering. The family doctor needs to maintain a longitudinal record of the patient's history with the ability to succinctly summarise the record if the patient moves to another area. There can be legal requirements to keep records for specific time periods. This may require duplication of information if a patient wishes to attend another practitioner.

Relationship to other health workers

General Practitioners relate to almost all other personnel in the health area to a greater or lesser extent. Patients may attend their family doctor for general medical care, but attend primary care clinics with special interests such as Womens' Health clinics, Family Planning clinics, Pain clinics, or Sports Medicine Clinics. Communication between community nurses, paramedical staff such as physiotherapists or podiatrists, pharmacists, dentists, counsellors and alternative medicine practitioners, demonstrate the range of communication which occurs between primary health care workers.

Communication also occurs between the primary care doctor and secondary and tertiary care health workers. Communication between specialists and primary care doctors forms a major component of health information communication for the primary care doctor. This may be directly to the specialist as the treating doctor, to a secondary referral hospital such as a local mental health clinic or geriatric after-care hospital, or to the major tertiary teaching

hospitals both within and outside the local community. Much of this information is in the form of admission assessments and discharge summaries.

The secondary referral centres of diagnostic imaging and pathology, transfer information with the primary care physician on a daily basis. Much energy is expended in primary care dealing with this area of health informatics.

Variability of primary care practice style

Clinics operate in a range of different administrative structures. The style of a primary care practice relates to the method by which it attracts funds. Clinics can be owned by doctors, funded directly from government expenditure, funded from hospital budgets, or owned by non medical commercial organizations.

Fee payments for patient primary care services can be either the direct responsiblility of the patient, the government, or the hospital. Patient fees may involve third parties such as governments, health insurance agencies including work related insurance claims or primary care health claims associated with road accidents. These organisations may be responsible in part or all of the accounts on behalf of the patient.

As funding arrangements vary, so can the style of practice. Episodic care is more appropriate to accident and emergency departments provided by hospitals. Comprehensive continuous care is a feature of the traditional family practice or the hospital outpatient clinics. Community clinics, funded through local or regional governments, are able to offer a public health perspective. These clinics are likely to employ nurse practitioners and other paramedical staff such as social workers, physiotherapists and health educators. This clinic style encourages group education and is better able to assist the socially disadvantaged and people whose first language is not the native tongue.

An alternative system for general practice financial management is that of the fund holding structure being trialed in England. This places the financial responsibility for total patient care in the hands of the primary care providers.

The principal organizational structures in primary care are practice management, clinical record keeping, clinical research and medical education.

Practice management

Practice Management has four major components in the General Practice setting: Patient Billing, Appointments, Practice Administration and Electronic Tools.

Patient billing

Each style of general practice will have its own patient billing method. This has been the first area practices have taken to computerize. In a recent Australian survey on the attitudes of general practitioners to computerized medical records (Cacek 1992), 35% of general practices were using computers in the practice. Of these 78% were using word processing functions and 63% were under taking financial management. This is in line with the uptake of computer use in Singapore where between 30 - 50% of practices have computerized for

routine practice management activities (Lun 1993). The UK experience differs in this regard as patient billing does not fall within the province of the family doctor but 50% of practices are using computers in an administrative capacity (Hayes 1993).

Originally the medical packages were adapted from off the shelf accounting systems, but it was soon realized the modifications required were extensive for the general practice environment or the system failed to satisfy the requirements of the practice. Modern systems software now have been purpose written for the style of practice accounting. A good accounting system should be structured on a Clinic Master Patient File. Every member of each family should be individually listed. Each patient should be able to have multiple account types depending on their reason for presentation. An example would be a patient attending as a member of a family with a parent as the account payer, as an individual, as a patient funded under a direct account to the government, as a work injured member or as a patient requiring an insurance report. Much flexibility is required within the accounting system. Any system selected by a practice will need to consider ease of use, as this will determine the amount of time taken by office staff to train new and relieving staff. A busy practice needs to be able to give immediate accounts, receipt payments over the counter and resolve account queries. Costs of stationery need to be determined as some systems rely on expensive pre-printed stationery while others enable the use of plain paper.

A computerized accounting system can form the basis of a general clinic patient register and enable the use of patient demographics (Kidd 1994). An age/sex register can be developed and from this age/sex register preventive care and recall programs can be developed (Hall 1992).

Appointments

The use of computerized appointments has enabled greater flexibility into the organization of reception. Appointments can be run from the Master Patient Index. This enables correct identification of the particular patient and the appropriate history pulled in readiness prior to the patient attending. New patients are readily identified ensuring extra allotted time if necessary. Cancelled appointments can be removed and logged and the appointment chart will remain uncluttered by altered appointments. Clarity of typing versus hand writing further reduces errors of identification.

Some appointment systems are able to time when a patient arrives and give information on waiting room times. This can assist all members of the clinic with the problem of those visits running over time and with the management of the ‘drop in’ patient.

For systems using computers in the consulting room for clinical records, the appointment system can be integrated and eliminate the need for the paper record and its sundry retrieving and filing tasks. This is a major time and cost saving in the general practice environment releasing the receptionist for other activities. In the integrated system, the clinician has ready access to the appointment system and is able to keep abreast of changes to the appointment list. A further benefit of a networked or multiuser system is the flexibility of any staff member to answer the telephone call when an allocated member has become preoccupied with other tasks.

Practice administration

The administrative tasks of a modern general practice have become more complex over recent years and in order to manage a practice efficiently tight control needs to be maintained on income and expenses.

Day end procedures

The Day End procedures for either a manual or computerized office include a daily list of patient consultations, account status of each consultation, receipts paid to the practice that day, and the banking report for the day or period including that day. A similar series of information could be generated per doctor, and per branch practice. Similarly lists of clinical services can be produced.

Month end procedures

The reports generated for Month End should also be able to be generated over a practice defined period. This EOM process should print statements to all account holders. A facility for tracking over due debts should be instituted and form part of the EOM procedure.

Clinics may choose to include service audits in their EOM function and others use the EOM as a time to generate recall letters to patients for due clinical services. Computerization can enable these additional EOM functions to be set automatically greatly assisting the practice in comprehensively managing both the financial and clinical responsibilities of the practice.

Service item maintenance

General practices are required to document the services performed within a consultation by means of a service item coding system. Each country has its own government determined schedule for fee paying to clinics, hospitals or individual patients. These schedules are updated regularly and the general practices must upgrade their own lists as changes occur. Computerization of the Item Service database enables clinics to audit their practice and their individual doctors for services performed, compare practitioners' practice profiles and determine fees generated per service type or per doctor or clinic.

Batching

Practices which directly bill the government for an individual consultation (fee for service), are required to prepare them in a batched format to the responsible agency for processing and payment. Accounting systems need to be able to perform this task efficiently. Computers deal with this task most efficiently, informing accounting staff when the required batch number is reached, calculating the total moneys owing and maintaining a ledger of moneys owing and moneys receipted. Each doctor will require his own batch number and the computer should be able to allocate the particular direct bill payment to the individual doctor.

Salaries

General Practices are required to manage the salaries of their staff, both medical and non medical. This may be a task performed by the practice manager or in a smaller practice by one of the principals. Payroll including taxation, superannuation, holiday leave pay, work cover insurance and where required payroll tax can be performed as a manual bookkeeping task or can be managed using a payroll computer program which may be integrated with the clinic accounting system in the form of a practice ledger.

Stock control

Larger practices undertake a formal stock control and document items purchased and items utilised. This may be performed as either a manual or computer task. Larger organisations such as hospitals have sophisticated computerized stock control systems.

Electronic tools

By far the most useful tool in use in general practice today is the telephone. This piece of technology has changed the way information has moved across the health community. Recently the facsimile (fax) machine has further extended the use of this telephone system enabling the transfer of the printed word, either directly or through the computer to anywhere in the world. The introduction of the computer, initially in the form of a dedicated word processor, has further increased the scope of how information is managed in primary care. Word processing also occurs within any general practice offices particularly in the form of letters of referral, medical reports, and clinical notes. Use of the mail merge feature can generate recall letters.

Practices with multi-user networked systems can use the feature of in house electronic mail or messaging service (E-Mail). These clinics are able to leave messages electronically for clinic staff. General practitioners have a high interest in using this facility (Cacek 1992).

Clinical records

The general topic of the electronic medical record is discussed in chapter 12 by Terry Hannan. Some of the issues concerning the computerized medical record as it relates to general practice are noted here. The development of a computerized medical record which can replace the paper record has eluded many a medical record developer. Why is it that doctors are quite ready to computerize their office but not their consulting room? A recent survey (Cacek 1992) gives us some insight into the attitudes of the doctors in Australia to computerization. This study revealed a high degree of concern with the concept of computerizing the consulting room, despite the fact 30% were performing word-processing tasks at home. Manual systems were considered adequate and there was little understanding of benefits to be gained from a computerized medical record system. Similarly in the United Kingdom, 90% of primary care physicians work in computerized practices but only 50% use the computer for recording progress notes (Hayes 1993).

There are three major reasons for creating medical records:

Aide-Memoir. This is to refresh our memory of the past consultation. It may be adequate for another doctor to use or it may simply suffice as a memory jog for the documenting doctor. If hand written there may be little decipherable to any other clinician. This form of record is gradually becoming less used.

Patient care. Managing patient care has increased in complexity. There are now more health workers involved in an individual's care. Diagnosing has become more sophisticated, often depending on test results to determine a diagnosis. There is an ever increasing number of drugs with their various functions and side effects which need to be considered. Doctors are being encouraged to practise proactively requiring recognition that a patient should have particular preventive services, or certain routine pathology performed. This creates a heavy

demand on the doctor to have the information readily available at the time of the consultation for optimum health care. The paper record struggles under this demand.

Legal Documentation. The patient's medical record needs to be able to serve as a true historical document of the consultation. The courts have often accepted the hand written paper record as the doctor's true record. It is necessary for the electronic record to demonstrate it is a true representation of the patient's care. Electronic records need a method of demonstrating whether information has been altered after the initial input, what changes have been made, and the ability to produce the original documentation. These issues are addressed in the more sophisticated electronic record packages with date and time signatures.

Benefits of computerizing the medical record

Information retrieval is the major reason for computerizing the medical record. Retrieval is used for rapid real time access of clinical information, practice auditing and research. To retrieve information the data must be collected in a structured format. This will entail some degree of coding and classification. The most frequently used coding systems used for primary care are the International Classification of Primary Care (ICPC) (Lamberts H & Wood M (eds) 1987), International Classification of Disease, Ninth Revision, Clinical Modifications (ICD-9-CM)(United States National Center For Health Statistic 1980), and the READ codes (Chisholm J 1990). This area is discussed by Don Walker in chapter 4. These coding systems are being mapped to each other so that the issue of which coding system used is not of great importance. Of more importance is the user interface.

Real time information access

To decide what information needs to be accessed in real time one needs an understanding of the information that is collected in the medical record. Patients have information related to their registration including such details as their name, address, telephone number, date of birth, sex, social security number, account status, medical insurance status, Medicare number. The primary care doctor can utilize any combination of this registration information on documents, forms and prescriptions

A patient health summary can provide the doctor with a precise during a consultation. This information could include social information, family history, allergies, past history, life risk factors and current medial ills and medications. As this is computer based, changes to data can be readily updated giving a clear picture of the patient's current health and past history.

Computer programs have been designed to manage preventive care with on screen reminders for anticipatory care and the facility to produce mail merge recall letters for those patients who have not attended the practice and would miss their screen prompts. These systems have been trialled and found to increase the uptake of influenza vaccinations and papanicolaou smears (Hall 1992).

A computer program which includes a Problem Orientated Medical Record (POMR) structure (Weed L Case Western Reserve Press), can provide a list of current problems readily updated when the patient's history is altered. Systems incorporating a computerized script writer can keep a database of current medications, and rapidly provide the history of past medications. Checking for patient allergies should reduce the inadvertent prescribing of

allergic drugs, by providing an onscreen warning to the doctor. Results of tests ordered can be incorporated into an associated database. This information can be presented by test, by date or by problem in real time. Some systems can present this information in a graphical format on a time scale. For example blood glucose levels, or blood pressure levels can be plotted against time.

General practice information systems can include databases of other providers. These providers may be referring specialists, hospitals, paramedics, or companies. Reports to these sources can be documented in the system, and if created by a word processor integrated into the computerized record, and be available for ready reference. Similarly database entries can be made for reports received. This may be by summary entry, by fax or scanning with indexing for access.

Research by practice audit

Research in Primary Care can be performed by practice audit and by formal research projects such as clinical trials.

Audit functions

Practice audit can be performed manually or by computerization. Manual audits are usually based on sampling practice populations and may require the skills of a research officer. They are time consuming and consequently performed infrequently. Computerization of the clinical record opens a new dimension to practice audit. Whole practice populations can be included with a range of inclusion and exclusion criteria. Practices can use audits for a number of purposes.

Patient care management

The principal purpose is to improve patient management. The availability of a new diagnostic test for a particular condition may require the practice to know which patients have this condition and arrange to communicate with these patients. New vaccines for patients with particular risks can be identified and notified.

Preventive care management

Practices are now being required to be more proactive in their approach, taking some responsibility for ensuring those patients overdue for certain preventive services are notified. From an audit program mail merge letters can be created and personalized letters of invitation can be produced.

Doctor education

An audit serves as a powerful tool for continuing medical education of doctors. Auditing rates of particular services performed such as vaccinations, blood pressure recording, pap smears or test ordering, make for interesting comparison between colleagues. The results can be provided confidentially allowing doctors to reflect on their practice behaviour.

Formal research projects

Research is a new field of primary care. Until the introduction of the computer, general practice research had been limited to the academic institutions who had a particular interest in community medicine. Computerization has enabled the anonymous collection of whole population data. As some medical conditions in general practice occur relatively infrequently large population numbers need to be used to gain enough statistical power for useful conclusions. With the costs of medical care ever increasing, governments are looking to primary care for information solutions and outcomes. From a community perspective general practice will need data collected into computerized records to achieve these goals. Data collection will need to be organized, requiring the use of classification and coding. The topics of 'Research' and 'Classification and Coding' are discussed elsewhere in this book.(Research in Section 5; Classification and Coding by Don Walker in Chapter 4).

Medical education

Medical education includes the education of the undergraduate, the new graduate and the experienced general practitioner. It also includes the education of the patient and this has been a major role in family medicine since its inception. Undergraduate education is not addressed in this chapter.

New graduates

When the new graduate enters general practice there is much information to be learnt. Community services, practice providers, trade names of drugs, preventive care management, relevant test ordering and administrative tasks to undertake. Each different community will have its own services and each practice its own style. Computerization can help assist the new graduate by providing ready access to databases of information, screen prompts for preventive care and reference to protocols of management (Hayes 1993)

Experienced General Practitioners

The more experienced doctors benefit from access to up to date knowledge basis. There are several CDROM programs now available based on authorative sources. Other knowledge base programs present doctors with clinical case scenarios, predictive indices of diseases, and knowledge bases incorporated into the system. These systems can be utilized in the consulting room with the aid of a CDROM drive incorporated into a PC or by access via modem to a site with a CDROM bank of resources.

Patients

The computer can be incorporated most effectively into patient education. The simplest of these is the personalized patient hand out. Handouts can be indexed to illnesses and when appropriate printed out for the patient's use. The doctor can then explain details to the patient. The information is readily accessible reducing the frustration of searching through myriads of papers. Another means of educating patients is to empower them by noting screen prompts. Preventive care prompts display to both the patient and the doctor that certain services are due for review. This may motivate both patient and doctor even when this may not be on the original agenda for the visit. Vaccinations rates for tetanus can be increased utilizing this technique. Medication information is an ideal topic for computer education and pharmacists are using this widely with dispensed medications. Sophisticated programs have been created

by specialists to educate patients on particular topics. Diabetes and low fat diets are topics that the computer can manage for this purpose.

Telecommunications

The use of telecommunication for health information is a new field. Doctors involved in research have used modem connections to bulletin boards and networks for research information, communication with colleagues via E-mail, and to authorative databases. Some clinics are now transferring their direct bill accounts via modem eliminating the physical task of collating accounts. Many computer software suppliers use modem connection for maintenance to reduce costs of on site visits. In the future general practitioners will transfer their pathology and radiology requests and results via modem. They will have connections to hospitals for admission and discharge information, access to knowledge bases, and ready communication with colleagues as their research peers have today. The field of telecommunications will open up a whole new dimension to the practising family physician.

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