ABC of Computing

J A INGRAM
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PATIENT ADMINISTRATION—I

Computers for patient administration systems were developed in the United States largely to help with patient billing and hospital accounting and have been commonplace there since the late 1960s. In the United Kingdom developments have been much slower.

One of the major problems in developing a computerised patient administration system is that hospitals have traditionally organised their administrations independently to suit local needs. Indeed, departments within a single hospital often have individual administration systems each separately handling the same patient administration details and holding slightly different data. For example, a recently married woman may inform an outpatient receptionist of her change of surname and address. She may also be attending another clinic, be held on a waiting list for another consultant, or have x ray or laboratory reports pending. These systems will not have her new details although the patient will almost certainly have assumed that she had to inform the hospital only once of any changes.

Because departmental systems have grown independently there is often little standardisation in the collection and presentation of patient data. Some departments may record the patient's age at the time of first attendance rather than the full date of birth, thus making it difficult to find records in departments where the date of birth is used as part of a record key. Details of marital status, specialty, consultant, diagnoses, test requests, and religion may be coded by some departments, although a common administrative coding structure rarely exists throughout a hospital.

Despite this lack of standardisation, most of the administrative data collected by separate departments are common to a single patient. A complete computerised patient administration system can provide each department with the administration facilities required by that department while maintaining a single patient database shared by all departments. The design of such a complex series of interlocking systems requires much development, but the advantage to each department of being able to identify patients quickly, being aware of all contacts with other hospital departments, and being certain that the data held are up to date is invaluable. The accuracy of the data held and the benefit to the hospital as a whole increases proportionately with the number of departments using the system.

Although many individual patient administration modules are operating in NHS hospitals there are few complete computerised patient administration systems—largely because of the amount of development effort required.

Hardware

A typical hardware configuration would be a powerful real time computer, capable of servicing a fairly large number of visual display units and printers, and with enough disc capacity for the large data files. A magnetic tape unit is required to transfer data files to microfiche and possibly provide security copies of the data, although security copying is more commonly performed from disc to disc as this is faster. The computer system will run continuously throughout 24 hours. The visual display units are used for patient registration, appointment making, and general inquiries, while the printers are used to provide patient identity labels, registration documents, clinic lists, etc.

Security

If a hospital is to rely on a computer system then data loss or corruption, as a result of power loss or equipment failure, must be prevented. So that the data can be restored to the position before failure regular copies of the data files are loaded on to disc or tape. As each normal transaction, such as patient registration, is completed a copy of the transaction is loaded on to a small exchangeable disc unit. The transaction disc file is cycled daily so it is possible to restore the data files from the last full security copy and subsequent transaction disc copies. In the event of a prolonged breakdown the staff will use the latest microfiche copies of the data files for reference and provide patient documentation manually. Another method of protecting against computer failure is to have two computers running in parallel, preferably powered from different sources. This method is expensive and to be effective requires that the data files on each system be kept in synchronisation.

Hospital staff come into contact with the computer only via terminals in their own working area. Access to the main hardware is restricted to a few trained staff. This reduces the possibility of accidental corruption of data files or physical damage to the hardware. The hardware must be protected from vandalism and the discs and tapes from theft. A further level of security is provided by passwords. Before the user can have access to the system the computer will check his identification by requesting him to enter a unique password. The password can only be used to tell the computer the extent of the user's legitimate access to the system. (The computer also records and notifies the computer operations staff of all unauthorised attempts to use the system.)

Having checked that the user is allowed to use the system, the computer may further protect the information from unauthorised viewing. For example, if a receptionist entering data in a casualty department is called away to the telephone the computer will automatically erase the information shown on the screen after a specified period of inactivity—to prevent unauthorised reading of confidential material. Access to the computer via the visual display units may also be restricted to certain times during 24 hours.

Type your password :

■ FRED

What command ?

■ LIST NAMES

*** STOP ** You are not authorised to inspect this data.

Computer-user interaction

Patient admission

Type in surname:

■ Asbury

Type in first name:

■ John

Any more names? Y or N:

■ N

Type in year of birth:

■ 1852

***Is this correct? Y or N:

■ N

Type in year of birth:

□

Patient master index

Most systems are designed on the "prompt and respond" principle, where the computer requests information and the user provides it. If the user makes a mistake the computer will immediately draw attention to it before accepting the data for storage. The corrected version can then be entered without the user losing track of the transaction. In a dedicated system specific self help features can be included such as specially coded keys and locally relevant self help messages. This has the advantage that, though the system is well documented, the user rarely needs to use the written guide, as the self help features and the error messages cope with most eventualities. For example, when registering a patient a receptionist may need to know which consultant will be responsible for the patient. If the help key is pressed, a list of consultants for each specialty in the hospital can be displayed.

The patient master index is central to any patient administration system: it provides a register of information on patients who have attended the hospital, so that current events can be related to previous medical treatment. Typically the user can see the patient's information subdivided into a number of visual display unit screens—for example, the first screen might show all the basic details such as name, age, sex, while a second screen might show a historical record of all the patient's treatment periods giving dates, consultants' names, wards, hospital numbers, discharge dates, etc.

The data in the master index form the core of the patient administration system database for the whole hospital. The patient's personal data are recorded only once (within the master index) but are accessible from any of the departmental modules linked to the patient administration system. The modules making up the total system must share a common computer file structure, coding system, and visual display unit presentation. The design of the master index will therefore dictate the design of all the other system modules, but the data items to be included on the original index file design must take into account the data requirements of the other modules in the system.

Whenever a patient comes into contact with the hospital, whether as an inpatient or an outpatient or through the accident and emergency department, the index is searched to find the hospital number and previous consultant so that the case notes can be located. If the patient knows his own hospital number then the record in the index may be accessed immediately. Probably the patient will not know his number, and the index may be searched using details such as surname, forename, sex, and date of birth. The date of birth is a particularly good discriminator between similar names. In practice the clerk types in the details and requests a search; the system then shows the records of patients which match the search criteria and the clerk can select the correct one. This apparently simple task is more difficult than it seems. The surname may have previously been entered incorrectly with a similar sounding name. For example, "Brierly" may have been recorded as "Brearley." The computer will consult a file of similar sounding names and offer all the patient records whose surnames are alternative spellings of the name entered. If this method fails the names can be processed to give alternative matches—for example, by interchange of surnames and forenames. The Soundex code method, a technique where the name is represented in a numeric form, can be used to aid the search. Patients may also be known to the computer by several names—for example, maiden names. The computer system is capable of locating the same patient record which is known by several different names. Because the index shares the same database with the other patient administration systems in the hospital, a change in details made in, say, an outpatient clinic, will automatically be recorded by the master index and be available immediately to any other patient administration system in a department.

Medical records: outpatient systems

As part of the process of registering a patient as an outpatient a search for any previous record of the patient will be carried out on the master index file. If a previous record is found then these details may be used for outpatient registration and the medical records clerk invited to make any necessary changes to the details. The computer system will offer the clerk a set of suitable appointment dates and times for the patient to attend. The system will then inform the patient by letter of the appointment details and provide all the necessary documentation such as clinic lists for the medical and reception staff, appointment cards for the patient, patient identification labels, etc. Ambulance booking and requests to service departments may be organised at the same time through direct links from the outpatient system to the ambulance scheduling system or the x ray department administration system.

Inquiries from patients may be handled either from a central inquiry desk or by the clinic receptionist keying the patient's name and date of birth into the system. The outpatient system can reschedule clinics automatically. For example, if a clinician is unable to hold a particular clinic session then the patients booked can be rescheduled to the next series of free appointments. The patients will be informed by letter of the new appointment and all the necessary clinic documentation will be reorganised to the correct date.

COUNTDOWNSHIRE DISTRICT GENERAL HOSPITAL

OUTPATIENT STATISTICS
MONTH ENDED 31-JUL-82

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Specialty/Consultant	<-----Sessions----->				<-----Attendances----->						<-DNAs-->		Appointments Cancelled			
	Planned	Held	Red'd	Canc'd	New	Treat.	Wd.Att.	Total	Avg.	Reatt.	New	Total	by hospital	by patient	New	Total
HOSPITAL TOTAL	340	290	20	50	2550	1224	200	11350	38	4.4	310	1340	190	890	230	520
16 TRAUMA & ORTHOPAEDIC	34	29	2	5	255	61	0	1135	39	4.5	31	134	19	89	23	52
6A ORTHOPAEDIC	21	16	2	5	117	34	0	556	35	4.4	16	56	14	66	16	30

Medical records inpatient system

As with the outpatient system, any registration of an inpatient into the computer system automatically generates a search of the master patient index for any previous reference to that patient. The patient can also be admitted from a computer controlled waiting list, in which case the computer system can transfer the patient's details.

The computer system produces all the necessary registration documentation and identity labels and records such information as the admitting consultant, specialty, ward, nursing dependency of patient, general practitioner, next of kin, etc, relating to the patient. The transfer of patients between wards, specialties, or consultants is recorded. An inquiry on a patient's name provides the exact location of the patient, and medical records staff no longer have to produce manually daily admission and discharge registers, bedstate returns, and so forth as these can be produced on demand from the computer system. The system can also produce a printout of patients by religious denomination in each ward for use by hospital chaplains. A link from the inpatient system to a catering system enables meals to be produced only for patients actually on the ward, so that meals for patients in intensive care or in theatre are not wasted.

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