
Basic applications and expectations

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Most health professionals would agree that computer technology could help most aspects of their work. The problem is in using the computer. The focus of undergraduate and post graduate training is on delivering healthcare. Information management and information technology have had a low priority in this process. Many health professionals complete their tertiary education with little or no exposure to computers.

We are all busy. Keeping up with our professional work and continuing education takes time. Developing computer skills requires a commitment in time. Gaining a short term benefit from a simple useful computer application will enable a new user to maintain interest. From this point skill can be developed further into more serious use of the technology.

The first problem is communicating with the computer. In the past learning to type was a skill reserved for those moving into clerical tasks. Keyboard skills are required to use a computer well. This is rapidly changing. Speech will soon be the major form of communication between the computer and its user. This will break down many of the barriers faced by health professionals in the past. The next problem is what immediate use do you have for a computer? If we look at surveys of computer usage amongst medical practitioners the major usage is in the simple tasks (Wynekoop 1994). Essentially this chapter looks at these simple tasks. What are they, what do you need and what are the benefits.

Communicating with the computer

The keyboard and screen are still the major communication vehicle between us and the computer. In the early 1980s we all thought we would be talking to computers before the end of that decade. The task of identifying all the variations of human speech proved more difficult than first anticipated. The computer has problems with our accents, with words that are phonetically similar and when minor illness effects our pronunciation. It takes a great deal of processing power to incorporate these variations. Despite the rapid advance in hardware technology it took some time to deliver sufficient power in a low cost personal computer format. Even with speech recognition and touchscreen technology now well established in the personal computer world, keyboard skills are still an essential element.

The keyboard

The design of the original QWERTY keyboard is to slow down the user. The frequently used letters are relatively inaccessible. Letter placement defies logic to a user faced with the keyboard for the first time.

The computer keyboard has added complexity. There are at least twelve function keys labelled F1 - F12. These have different roles in different software packages. The only constant is pressing F1 will generate the help information in most software packages.

In addition to the Shift key there is an Alternate (ALT) and a Control (CTRL). These are relatively easy to use. Like a Shift key, they are used with letters, numbers or the function (F1 - F12) keys. They differ from the shift key in that they generate commands to the computer instead of simply placing characters on the screen. The commands vary depending on what computer software package you are using. For instance in a common word processing package Control A generates a command to format all the characters as capitals. In a common database package Control A means locate the next field in the database.

In addition to a numeric keypad and arrow (direction) keys there are usually eleven other keys. These are easier to understand. The Enter key is the most important. It tells the computer to accept what the user has typed or to run a particular task offered by the computer. Esc is a favourite key - it means escape out of here. It is particularly important to the new user when exploring the unknown. Pressing escape will return the user back to the previous step or out of the programme. Page up, page down, delete, insert, home and end mean what they say. Print screen, scroll lock and the pause or break are little used.

Combining the Control Alternate and Delete key generates a command used often by the new user. This essentially restarts the computer erasing the current tasks. This re-sets the computer back to the state it was in when it was initially switched on. The major disadvantage is that one loses any new work created but not filed. Essentially all the keys beyond the standard type-writer keyboard generate commands not characters. Most computer programs give guidance on how to use the extra keys.

The mouse and the graphical user interface (GUI).

Older design software relied on the user learning or becoming at least familiar with the command keys and when to use them. This added greatly to the barrier for the new user. Unfortunately most of the common medical record software has retained this system. With the advent of the mouse it has become much easier to drive modern software.

The mouse and a screen layout called the Graphical User Interface changed the face of personal computing. A Graphical User Interface (GUI) is where the computer software produces pictures and pull-down menus to indicate the choice of commands available to the user. A mouse (or other pointing devices) controls a moving arrow on the screen. The user points at the command and presses a button on the mouse or presses the computer enter key to request that the computer runs the command.

No longer did the user have to learn which keys to press to generate a command. Instead it is available on the screen. "Point and click" reduced the learning time for new users. The Graphical User Interface made it easy for anyone to learn to use a computer.

Touch screen technology was available prior to the common use of the Graphical User Interface and the mouse. Hardware technological development usually precedes software innovation. A sophisticated computer screen can provide input to the computer. When the user touches the screen, the screen identifies the location of the touch. The software processes the location of the touch and uses this information to generate a particular response. The computer can then use this information to respond to a command or the input of information.

This is particularly good for situations where non-computer users need to communicate. Shopping center location maps and automated post offices provide good examples of the use of this form of interface. The disadvantages include the slow speeds, the cost of the screens and the limitations of size in defining the location of the touch point. Modern electronic diaries have taken this technology to the next stage. They have combined touch screen technology with the Graphical User Interface.

Apple was the first to effectively market the Graphical User Interface. It did not take the IBM and compatible personal computer world long to see the benefit of the GUI environment. Microsoft designed Windows to fill the role. This is now the major GUI interface around the world.

The real advantage of GUI is that the command format is the same across a wide range of computer software applications. For instance a user will find that a word processing package, a database, a cashbook and a spreadsheet all look much the same in a GUI system. Pull down menus for filing new and finding old material are the same. Common tasks such as the cut, copy and paste editing tools are requested from the same pull down menus across different packages. Once a user has learned basic commands in one package they find that they can easily drive others.

The GUI controls the printer and printing initiated by any software package. The process of printing is standard from any application running under the GUI. The Help screens are standardised. In any application indexing and searching are the same. Learning new software becomes a matter of understanding the principles of what it can do rather than learning yet another detailed set of commands.

Having learned to drive a word processing package one can move easily into driving a database or spreadsheet. It is simply a question of understanding what a database is and how it can help you. Prior to the GUI it would take many weeks of use to learn to drive a database even when the concepts were understood. Today it may take one to two days to get to a level of reasonable productivity.

The medical software industry has been slow to develop within the GUI environment. This has contributed to the slow implementation of medical records in practices. This situation is rapidly changing and most major suppliers have or are developing for the Graphical User Interface.

The GUI allows the user to drive the commands. The user still has to type to enter information and data. In medical records and other health applications there is a lot of information. Typing skills to some level are still essential.

Typing

The computer itself has proved a useful tool in teaching people to type. One can run any number of typing tutor programs on a computer and learn to type without taking the time to travel to lessons. Few health professionals take advantage of these programs. Most prefer to hunt and peck. This is using one finger on each hand and hunting around the keyboard looking for letters in the manner of a chook in a yard. Gradually their speed improves. They start to learn where the keys are and use more than the two index fingers. Eventually one can slowly progress to typing without looking at the keyboard (touch typing).

There is good evidence that learning to touch type from the start is more efficient. Health professionals spend most of their time consulting and communicating with other people. A computer can be a tremendous barrier in this communication. Most write notes as they go and lose eye contact with the patient or client. To type can be even worse. A health professional skilled in touch typing can maintain eye contact and still generate notes.

Typing tutor programs make reasonable claim to teach basic touch typing with less than a day of user time. In learning to type the user needs to be in a situation where they can continue to use and build on the skill immediately. Moving straight into word processing can be an easy way to accomplish this. Having a skilled word processing person build the format for a letter or document and then the user enters the text is a productive way to build skill.

Voice recognition and notepads

Voice input has been available in various forms since the late 1970s'. It is now available at reasonable cost for the average user. The current programs are useful in word-processing. They are only just starting to be useful for commanding the computer and running other software programs.

English has a large vocabulary. Many words with different meanings sound the same. We have many quite different pronunciations within the English speaking world. Minor upper respiratory illness further alters the pronunciation. Extraneous noise compounds the problems.

We can speak quite rapidly. As we speak the computer has to compare each word with its own phonetic list. The computing power required to do this at reasonable speed is enormous. It is only in the last few years that the average personal computer user has had access to the power required to run voice recognition. Many companies are developing in this area. Voice recognition programs draws heavily on the computer power and the memory storage. A typical example requires a computer with 12 Megabytes of Random Access Memory to run and occupies 22 Megabytes of hard disk space with an additional 5 megabytes required for each individual user.

Most voice systems come with both software and hardware. The software consists of the programs to run the system and the dictionary. The hardware includes the voice card to fit

inside the computer and the headset microphone. This raises another issue for the health professional - a headset microphone is a definite intrusion into the consultation. New directional microphones are now being designed that attach to the computer terminal. These are likely to be more acceptable to patients.

Currently these systems are still less efficient than learning to type. Typing is still required for difficult words. One still needs to learn to use the normal computer applications.

Notepads are another mode of entry. This is a small hand held personal computer. The user can print or write using a special pen on the notepad. The software then interprets that writing and converts it to text. It will respond to a command written with the pen. This is slower than moderate typing speeds. This technology is designed for the electronic diary type application

For the new user a Graphical User Interface as seen in the Apple or Windows environments is an essential starting point. One can then focus on understanding the concepts and functions of the software application. Gone is the need to spend endless hours learning the complex commands to drive the computer.

Specific applications

Health professionals have found a number of basic software applications important to their everyday needs. The relative importance depends on the nature of their work.

Word processing

This is still the major software application of the personal computer. Old type written and hand written letters no longer fit the image of the modern health professional. Who has not seen the occasional referral letter written on prescription stationary? 'Dear doctor herewith Mrs Jones, chest pain, please take over her care.' To promote a confident professional image modern health communication needs clarity, detail and legibility. Word processing meets this need.

A word processor is a software package that combines a text editor with sophisticated formatting and page layout tools. Fifteen years ago to be able to bold, center and underline were the new important features. Today the modern programs can format and produce a full text book ready for the printer.

For health professionals there have been further changes to word processors that are important. Take producing a letter. When comparing word processing for yourself with dictating to a clerical person the dictating consumes less time. The time consuming task for the professional is the formatting and layout of the document, particularly a letter. Modern word processors solve this with document templates and intuitive help tools.

The program already contains basic formats for letters, memos, faxes, agendas, reports presentations, résumé and any number of other basic office documents. The user can choose the appropriate layout and simply fill in the details. The software automatically creates the page and document layout. The software can also produce the envelope information and send it to the printer.

Some of the help tools will take a user through producing their own version of a letter or other document. By asking the user a series of questions the software designs the appropriate document format. This further expands the flexibility of the program. The user can focus on the content and forget the extraneous formatting detail.

The programs retain mailing names and addresses. One can quickly recall these details for use in future letters. This includes merging one letter with an address list sending out any number of personalised letters from one typed letter.

An average typing speed and working knowledge of the word processing package enables the health professional to match the speed of clerical personnel when producing documents.

The Graphical User Interface has made a big difference to the word processing software. Altering a margin is simple. Point and grab at the edge of the margin and then drag it to the new position. A page layout view is available when editing a document. The screen then provides the same layout on the page as will be seen on the printed document. Called What You See Is What You Get (WYSIWYG) this tool has enhanced the ease of using a word-processor.

One can use many different fonts and sizes of fonts throughout one document. One can place lines, drawings, tables and graphs anywhere in the document. Tools such as spelling checkers, grammar checkers and on-line thesaurus add to the value of using a word processing package. A spelling tool can go through and check the document. It will learn new words or names from the user's response to corrections. One can add a medical dictionary to the word-processing dictionaries.

In addition the word processor can trap common spelling errors as the user types. It can then be set to correct these errors automatically. It can also retain common abbreviations converting them to the full version (eg type GP computer responds general practitioner). It will keep track of documents retaining the most recently used documents on a simple list for recalling.

With the advent of the Fax one can now set the computer up to fax straight from the word processing package into the telephone.

The current major packages include Word and Wordperfect. Both are available in a Windows and an Apple format. Each one leaps the other with additional features in the new versions. Using a word-processor even at a sophisticated level is easy. A few hours of training and the new user can expect to feel comfortable with most of the tasks described. For the health professional a word processor is an essential tool.

Spreadsheets

For the organised and mathematically minded the spreadsheet is a creative tool. In its simplest form it is a table of columns and rows. The intersecting space is a cell. A cell can retain text, numbers, formulas or a macro. A macro is a small program that performs a simple task. Formulae and macros can be combined to make the spreadsheet one of the most powerful basic computing tools.

The spreadsheet program builds a large number of functions around this basic table structure. A single cell can contain a large amount of information. The user controls how much is displayed and in what format. A cell may contain a formula to average the contents of a number of other cells. One can set the cell to display either the formula or the resulting number. The user can then manipulate the formula and assess the result.

A large range of mathematical, statistical, logical, date/time, special and financial formulas are available for use in a cell. These vary from simple sum, average and standard deviation to complex financial tools. Each formula can include data from a range of other cells in the table. Formulas can be combined to achieve a vast range of function.

In addition spreadsheets can be used to calculate “what if” solutions to research, financial and other mathematical problems. “What If” functions allow the user to build up a set of information and then use the computer to model the outcome of different sets of conditions or events.

The problem for the new spreadsheet user is comprehending the power and flexibility. It takes time to build up more than a basic range of formulas and functions. Often there are short cuts in handling a problem that the user will not know. Modern spreadsheet software actually monitors what the user is doing and will offer these short cuts as an alternative. This allows the user to build skills as they use the tool.

There are unlimited ways to use a Spreadsheet. The most common use is for financial tasks - building budgets and financial models. In the health arena the uses extend to research (data collection and statistical analysis), graphing information and analysing data direct from databases (medical record software).

It is more difficult to learn to use a spreadsheet than most other computer tools. For the non-computer user it is difficult to understand the concept of a spreadsheet. There is no equivalent non-computer based tool. The range, size and complexity of spreadsheets defy our capacity to conceptualise them.

A single sheet table can be eight thousand rows by two hundred and fifty- six columns. This is two million cells. One can expand this by having more than two hundred such tables in the particular spreadsheet file. One can use a formula or macro to build a relationship between one cell and any other cell in the whole file of more than four hundred million cells. In addition one can relate the information in a cell or range of cells to a completely separate spreadsheet file. Consider that for a multi-dimensional mathematical puzzle.

In large organisations a number of people will build a particular spreadsheet. They will share their spreadsheet over a computer network. They can use information from sections of the file created and updated by another member of the team. One needs to foster true team management in these circumstances. Issues such as data security and back up of data are of paramount importance.

The current major spreadsheet tools available are Microsoft Excel for Windows or Apple, Lotus 123 for Windows and Borlands Quattro for Windows. Like the word-processing programs the newest version of each of these will leap frog the other two in terms of function. For the Health professional interested in research, administration or practice management learning to use and working with spreadsheets is challenging, productive and fun.

Database applications

At a conceptual level a database is easier to understand than a spreadsheet. We have a non computer equivalent. It is a filing cabinet. Each drawer contains a set of information. Within each drawer is a set of files. In each file are pages of information relevant to that file.

The computer based filing cabinet is more rigid. The drawers are similar. At the file level there is a defined structure. The term for the individual file is a table. The table consists of columns and rows. Each column defines the nature of the information (eg Surname, initials, Date of Birth). Each row is a record in the table (eg Bloggs, JH, 24 January 1952).

A database program allows the user to build their own tables. The user defines the fields of information. What will go in the field (eg a number, a date, text), its length and any special properties (eg default to female, default to today's date). Once a table and the information are defined, the user can enter the data. This data then forms the records in the table.

The most startling difference between a filing cabinet and the computer database is in the way the computer can handle the information. The computer can quickly sort the table into any required order. The user may want to sort by postcode or by date of birth. Knowing the structure of the table one can quickly determine the field containing postcode. The computer can then sort the whole table by that field. It can sort by more than one field (eg list the patients by the field age and then by the field sex).

One can ask the computer to pull out a sub-set of the information. One defines the field and type of information required (eg In the table of patients, list all the patients where the field sex contains the term female). This process is filtering of the information. By sorting and filtering one can manipulate and analyse the information in a computer database to an extent not possible in the paper equivalent.

There is an additional concept not so evident in the paper filing system. One can link tables. In the paper world we do this by making a reference (eg see file on medication, page 25 paragraph 2). In a computer database this is much more powerful. We can relate one table to another table through a common field of information. This field will need to be present in each table. In a medical record system we may wish relate the table containing patient medication records to the table containing the patients' details. To do this we would need a common field or fields. The easiest common field would be a patient number. By having the patient number in the table of patient details and in the table of medication records one can relate the two tables.

A database program with this facility is a relational database. A single table is limited. Consider a medical record. Defining fields for the name, address and date of birth is easy. How do we incorporate the need to have a medication list or a list of allergies? The table becomes very large with a field each for one medication, one allergy, one health problem, etc. What if the patient is on two medications.

When one can build relationships between tables then a table can be small and simple with a limited number of fields. Medications, allergies, health problems and patient details would each be in their own tables. The relationships between the tables allow the computer to put the information together.

The sorting and filtering functions can be added to this relational database. This produces a powerful information management tool. List all the female patients over forty with hypertension and on medication is a massive task in a paper medical record filing system. In a relational computer database it is simple and fast.

There is a vast range of database tools. A Medical Record system is usually based on a relational database. Companies developing this type of software use these database tools and often programme a great deal of the database themselves.

The average health professional does not always need that level of performance. There are now simple modern database tools that are easy to use and will service most needs. Dbase was the original major personal computer based tool. There is now a range of easy to use Microsoft Windows and Apple based databases. They combine all the simple Windows based functions with a full relational database.

The graphical user interface has made a big difference to the ease of use. One can see the relationships between tables on the screen. A table is a physical table. The fields can be moved and re-defined by pointing with the mouse and dragging them across the screen. The relationships are seen as graphical lines between fields in the tables.

There are help tools that take the user through building a query or report. No longer does the user have to type a carefully prepared sentence in a strange version of English to retrieve information.

One could build a medical record system using the “over the counter” database tools. It takes some time and considerable skill with the chosen product to do this. It is the design, layout and relationships of the tables that causes the most problems. A poor initial data structure will diminish the efficiency of the system. As the system develops this underlying weakness will become more obvious. This is a major frustration for amateur medical record designers. Another problem is the speed of the software when under the loads of large complex medical record tables. Poor design will reduce the speed of the program. In health care the speed of information management is a key feature.

Not all health professionals want full medical records. One may wish to create a subset of a medical record. For example an infant health nurse may wish to track some aspect of children’s health. Building a data collection and reporting for this type of application is now quite easy with the modern tools. A three day course on a typical relational database would allow the average user to build such an application.

A new feature of the modern programs is the ability to integrate with other databases. This includes mainframe systems. A user with a commercial medical record system could attach tables from the medical records to tables in their own database. By building relationships between the tables from both systems they have access to composite data. For example one may build a simple table containing information about diabetic patients in a personal computer database. One could then attach the patient names and address table from the main medical record system. The personal computer can now use the address information combined with the list of people with diabetes to mail out a letter to all diabetics.

Care must be taken when connecting different databases. Firstly confidentiality may be an issue. Who has access to what information? How will it be used? In a commercial

medical record package the designers have usually thought through these issues and set safeguards. By networking one database to another one can by-pass some of these safeguards.

An additional problem is in the potential to corrupt data in the host database. If one uses a personal computer database to alter data on the main medical record computer then it is possible to seriously damage the medical record information. One needs to understand the structure and function of both databases before using one to alter information on the other

It is relatively safe to use different tools to read and report on information. For changing or adding information it is important to use the original product that created and is responsible for maintaining that data.

Object linking adds an extra benefit in using a modern database. Object linking is where information created and stored in one application is used in another. For instance one may create a Diabetic mailing list in a database. With Object Linking that information can be linked to a letter in a word processing tool. When the letter is created, the word-processing package can open the database and retrieve the latest mailing list.

Another example is in creating a budget in a spreadsheet. One can link the tables from that budget to a financial planning document in word processing. An alteration to the figures in the spreadsheet appears the next time the word processor prints the financial plan document. These features add a great deal to productivity in the administration, practice management and research areas. They are an important function within the Windows environment. Most major software producers are taking advantage of this Object Linking feature.

Presentation software

Health professionals have to communicate well. Modern presentation software provides some real solutions. Take the typical presentation to a group of people. One needs an outline, speaker's notes, slides or overheads and a handout. Modern presentation software allows the user to create all these with a minimum of duplication.

The modern laser and the colour ink jet printers can create overhead templates direct from the software in colour. The computer can place the images on a disk for colour slide production. The tools that automatically process the computer image onto 35mm slides and now relatively in-expensive.

The software can correct spelling. It can use Object Linking to grab charts from the spreadsheet or text from a document created in the word processor. Large files of diagrams and illustrations come with the software. These can be quickly incorporated into the overhead. The software comes with tutorials on the computer and on-line help. A course is not necessary but is more efficient. A half day will assist the average user to generate simple and effective presentations.

The modern software will produce miniature copies of each overhead. It then places speaker's notes beneath these. These can then be used as prompts during the presentation. The software can produce a handout by combining two or three overheads on one page, printing them out for photocopying. The time taken to generate a full quality presentation is

reduced considerably. With all the information on the computer, updating and modifying the presentation is easy.

The slide show is another feature. Most presentation packages can link direct to video projection units. The presentation is transported to a notebook computer. The presenter then connects this to a video projection unit. The overheads run on the notebook as a slide show. The presenter uses a mouse to change slides as the presentation proceeds.

Financial Tools

The simple financial tools have led the way in ease of use. The computer is particularly good at manipulating numbers. When this is combined with a graphical user interface one can change the face of small business management. There is a proliferation of all the financial tools. From simple cash books to full accounting and payroll tools, the choice is enormous. For less than one hundred dollars, users can finally bring some order to their personal finances.

Some of these tools act as cheque books. They can print cheques ready for you to sign. They keep track of all income and expenditure. They can then provide reports. One can group expenditure under tax deductible and non-tax deductible. All accounts and credit cards are entered and reconciled within the package.

In addition they can take the user through the process of producing a budget. One can build this from the preceding years figures or from scratch. The computer will then convert this to a quarterly, monthly or weekly budget. Information entered during the year is reported alongside the expected budget figure. One can immediately see the variance and take corrective action. In addition to personal finances these packages are adequate for small companies such as medical practice, health-care center, community service agency.

More sophisticated packages are available for the larger business. These carry additional features such as general ledger facilities, accrual accounting, payroll etc. With increasing sophistication there is an associated increase in price. Ease of use is inversely proportional to sophistication. It is often tempting to go to these higher level packages.

The new user should choose a product that suits current needs. Such a product is likely to be easier to use. With the development of one's own business there is usually a parallel development of the selected computer software.

The cashbook is a good application for the novice computer user. It provides immediate tangible benefits for little learning time. The tutorials in the manuals and on-line are usually adequate to get a good grasp of the product.

Payroll products have been slow to develop. They are specific to Australian conditions and it has not been easy to revise a popular American product as is the case with cashbooks. Payroll is a difficult area to manage for most small business. Many health professionals practice through small business structures. The modern medium to high end cashbooks are adding payroll tools. For any business with more than a few employees this tool is easy to set up and can save considerable time.

References

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