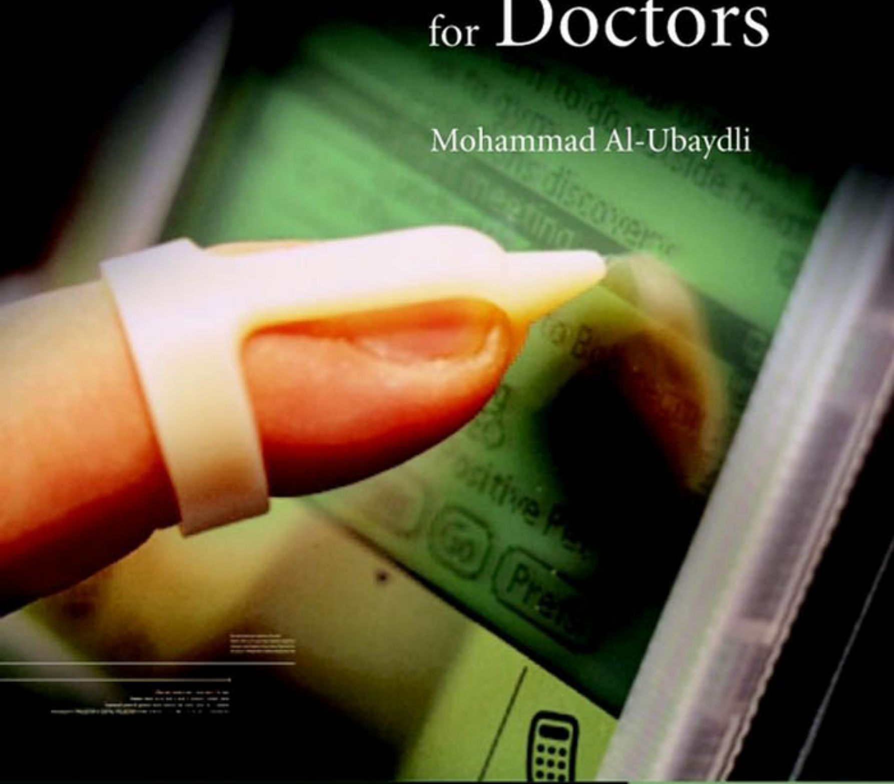
Handheld Computers for Doctors

Mohammad Al-Ubaydli



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handheld computers for doctors

MOHAMMAD AL-UBAYDLI

National Institutes of Health,
Bethesda, MD, USA

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To Buthaina, Ahmad and Omar

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Angela and Karl, the coolest of Americans.

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about the author

Mohammad Al-Ubaydli is a doctor and programmer who uses information technology to improve healthcare.

He graduated as a doctor with a first-class degree from Cambridge University, UK. His research project, ImmunoSim, won the Fulton Roberts Immunology Prize that year, the first time that a software project has received the prize.

Since then, Dr Al-Ubaydli has continued to combine his medical and computing knowledge. He has worked for several institutions and companies in the UK and the USA. This included developing the software for Project Palm at Cambridge University, which allows medical students to share their learning using handheld computers. In this project (www.cbcu.cam.ac.uk/handhelds), he also provided teaching, training and technical support to 30 medical students on the best use of their machines.

In 2001, he co-founded Medical Futures Ltd, which launched the Medical Futures Innovation Awards (www.medicalfutures.co.uk). The awards, now a much-anticipated annual event, have greatly raised awareness amongst doctors of the process of using their ideas and inventions to improve healthcare. The event also raises money for UK hospitals.

During his first year of clinical practice, he was able to lecture and consult on the use of handheld computers in medicine. This includes the launching of *Medical Approaches* (www.medicalapproaches.org), the world's first peer-reviewed electronic medical text, available for all handheld platforms. For this, he was selected to join the Executive Committee of the British Medical Informatics Society (www.bmis.org).

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He is now a Visiting Research Fellow at the National Centre for Biotechnology Information in Washington, DC, USA (www.ncbi.nlm.nih.gov).

preface

One morning in May 1998, the College porter burst through my door. This was during the final year of my degree. In particular, it was 9.15 am, and my exam had already been underway for 15 minutes – I thought the exam was in the afternoon.

At 9.20, I was out of my room.

At 9.25, I arrived at the wrong exam hall – the lethal cocktail of morning drowsiness and chronic disorganisation.

At 9.29, I was in the correct place, rushing past a Professor who found this all too amusing.

There is a happy conclusion to this story – I got my degree and progressed to clinical school. However, another good thing happened. I had finally had enough of my disorganisation and bought a handheld computer. Within one month, I had been transformed from the least well-prepared student to the most organised within a three-mile radius.

Every day, I would open my diary. Unlike my friends' paper versions, which were littered with tiny scribbles and repeated crossing out, my day always appeared clear. Changing appointments was easy and scheduling them as regular events took no effort. As I went through the day, I would pick up the names of good patients to see on the wards and add them to my to-do list.

I had my entire course's lecture notes in my pocket. I took them during the lecture, often faster and always in a more structured way than my 'papered' colleagues did. Ward rounds were also a source for clinical pearls, which I scribbled down eagerly. When I

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saw another of my friends with a handheld, I beamed those notes to them. Beaming involves lining up two machines and seamlessly transferring information using infrared. You really have to try this to appreciate its elegance.

When I saw patients on-call, I could clerk them on my handheld. For this level of text-input, I switched from handwriting to typing. I kept a pocket keyboard, which unfolded into a full-size keyboard, and was a great way to make friends with the patients. They loved to play with it. In the morning, before the ward round, I would add the results of investigations to the record and proceed to distance myself from the notes trolley. When I began working as a doctor, I convinced my colleagues to get a similar machine. Morning handovers no longer involved frantic scribbling of patients' details. We just lined up our handhelds and beamed away. Then we discussed the most important details . . . while having a coffee.

Nevertheless, despite all this efficiency, medicine involves a lot of waiting – especially as a medical student. I no longer found this irritating. I bought books that I never thought I would have time to read and devoured them during such waiting times. I downloaded the latest newspapers, which I digested at my own pace. One such publication was the *New England Journal of Medicine*, although, in truth, I only downloaded it to create an impression of hard work.

Then there were the games.

organised disorganisation

A few years on, however, I began my house job[1]. The feeling of being disorganised returned.

I truly loved that year, above all because I so enjoyed the company of those around me. Hardworking, honest and often hilariously funny, my colleagues made the job a great deal of fun.

However, there was an overwhelming amount of information to deal with and the only tool we had was paper. This was not enough and the situation was getting worse. Talking to my colleagues in the

---

[1] This is the equivalent of the first year of medical practice in American hospitals, i.e. the internship.

NHS and around the world, I found that this experience seemed to be commonplace.

What surprised me most was how few clinicians seemed to realise the role that handheld computers could play in their work. Most clinicians' experience with computers in the workplace was of complicated, expensive and unreliable equipment. They expected a handheld to be even worse, because many thought it to be brand new and only experimental technology.

Typically, it took only a few minutes of demonstrating the machines for a doctor to change his or her mind. At seminars and presentations, the audience would quickly become enthused about the technology. And articles I had written were convincing many to take the plunge and invest in their own machine.

who am I?

My name is Mohammad and I graduated as a doctor in the UK. During my medical studies, however, I kept up my interest in computers. During my third year, I worked at a wonderful place, Cambridge University's Clinical and Biomedical Computing Unit (www.cbcu.cam.ac.uk). The folks at CBCU were constantly trying out the latest technology to see whether it would be useful in a clinical context. I was hooked.

After graduation, I worked there for six months as part of Project Palm (www.cbcu.cam.ac.uk/handhelds). The team's aim was to create software for handheld computers to aid clinical medical students in their education across the region. It was a fascinating experience. During this time, I learnt a lot about handheld computers and medicine, and how the two worked together.

Dr Laura Dean was also part of Project Palm. At the start of her studies at the university, she had never used a computer. By the time she had reached CBCU, she was already teaching her colleagues how to use them. Project Palm pushed her teaching skills to the limit because her students had the full spectrum of information technology (IT) literacy.

As Laura and I began our house jobs at the same hospital, it was inevitable that we would put our computer skills to work. Slowly, we convinced our friends to invest in the technology; then a few departments asked for our help; and then we were invited to speak around the country about handheld technology.

My vision is for the Government to provide every doctor with a handheld computer as they arrive at their hospital. I hope that this book helps to achieve this.

who is this book for?

This book is for anyone trying to cope with the information overload in medicine. This includes doctors, nurses, other healthcare professionals, hospital managers, clinical IT staff, medical librarians and medical students who are late for exams.

From this book, I hope you will realise that handheld technology can make a real difference in your clinical practice today, so you will be encouraged to buy a machine. I also want to give you the tools to help your colleagues get a handheld and to take advantage of their group-work features.

To achieve such changes in your working lives, you do not have to be good with computers or even like them. I recommend handhelds to everyone because I know that anyone can learn to use them.

how to use this book

I have tried to keep this book short and entertaining. This is because I want you to enjoy reading it and then enjoy setting up your own handheld projects. The book is in three sections:

> **Section 1,** or 'Why Star Trek is science past.' Many people around the world think that Star Trek is good science fiction. However, it was only after several million Palm Pilots had been sold that we saw episodes in the series featuring actors

writing on small handheld computers. Star Trek is not really about the future, just today's technology working a little faster[2]. I want you to think of handhelds in the same way. They are not futuristic gadgets, just today's technology working well for busy people, including clinicians around the world.

Section 2, or 'Why two handhelds are better than one.' The handheld technology becomes particularly impressive when you begin using it with your colleagues. This section discusses three teams who put the handhelds to different clinical uses.

Section 3, or 'On being a project champion.' Once you get this far, you will probably already be your department's expert on, and champion of, handheld technology. This section explains the tools and techniques you will find useful as you introduce the technology to your team.

Begin at the beginning, with Chapter 1. After this, feel free to dip into the other chapters in the order that interests you. I wish you a pleasant read.

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[2] My apologies to Star Trek fans for the harshness of my opinion. However, if you would like to read some truly imaginative science fiction, try *Last and First Men*, Olaf Stapledon, ISBN 185798806X.

SECTION ONE

WHY STAR TREK IS SCIENCE PAST

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one

so, you'd like a handheld

'I can't keep track of all the pieces of paper for my job. I think I need a bigger folder.'
No you don't, you need a PDA.

'Great, another Three Letter Abbreviation.'
PDA stands for personal digital assistant. It is a computer that is small enough to hold in your hand, or keep in your pocket. It helps you organise all the information you need to keep track of as a doctor.

'A computer? That means it's expensive, takes ages to figure out, then it crashes.'
Not necessarily. Many handhelds are quite the opposite. You may have seen a few of your colleagues using them. Handhelds are already very popular in the USA. It is becoming the norm for every medical student and doctor to use one. If you don't get the habit, you might be missing out.

'OK then, tell me more.'
Handheld computers are now very cheap, with prices starting at £100 ($150) for a good machine. If you want extra features, such as a

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colour screen, a camera, or even a car-navigation system, you may have to pay more. Nevertheless, even the cheapest model is powerful enough to handle most medical software.

They are also very simple to use. Whereas your first brush with a desktop computer was probably a painful learning experience, you will find that a handheld is very easy to pick up. You can write on one using a pen (or even your finger) and the programs are simple and clear.

Nor do handhelds crash all the time. Instead, their reliability makes them perfect for the medical setting.

'But how does this 'PDA' thing help me in my job?'

All handhelds come with the four essentials – diary, address book, to-do list and memo pad. These programs are simple and quick to use, but much more powerful than any paper organiser. For example, the to-do list can let you keep track of your jobs, and arrange them by ward, patient and most usefully, priority. The diary keeps track of all your appointments and teaching sessions. The address book includes the phone numbers of all the wards and departments in your hospital.

One way to obtain all these numbers is a further illustration of the machine's power – a colleague can beam them to you.

'Beam?'

Beaming is the process of transferring information from one handheld to another via the machines' infrared beams. So, when you bump into a friend who has a handheld with the information you need, just line up your machine with theirs, and ask them to beam the information you need. In a few seconds, you can have over 100 addresses copied across. Then you can beam your own addresses back to them, and so on.

'That's very useful. But can I do anything else apart from swap phone numbers?'

This is where the fun begins. There are literally thousands of programs available to allow your handheld to do extra things. These include clerking software to keep track of your patients; medical textbooks for your reference; books, music and videos for your entertainment; the latest news and journals; and games, of course. Many of these take advantage of beaming technology.

'Now you're talking. How do I get one of these machines?'

That's easy – they are on sale in most computer shops, mobile phone shops, and via the internet. The trouble is choosing from among all the models.

Your first decision is probably led by your budget. Prices start at a very reasonable £100 (about $150), but you can easily spend £600 ($900) if you are not careful. For £200 ($300) you can get a colour-screened machine that runs Microsoft Word and Microsoft Excel. After that, the extra money gets you cool features, but does not affect the kind of programs you can use on it.

Your next choice is between a handheld with the Palm or Pocket PC operating system.

'I knew this was going to get technical . . .'

All you need to know is that there are currently two types of handheld computer: one works with Palm, and the other with Pocket PC. Palm machines are the cheapest and simplest to use, whereas Pocket PCs have a few extra tricks. One thing to be aware of though is that most of your colleagues will have Palm machines. Most medical software is only available for the Palm, plus beaming is easier if you have the same type as your colleagues.

Finally, you should always check before buying a handheld that it works with your main desktop or laptop computer. This is because handhelds can copy all their information onto a desktop or laptop computer. It is a great feature, meaning that if anything happens to your handheld, such as it being stolen or someone spilling tea on it, a copy of your information is still safe.

Try doing that with your big folder of paper.

two

choosing hardware

Jeff Hawkins, the designer of the original Palm Pilot, carved a small piece of wood that was literally the size of his palm, and showed it to colleagues at 3 Com. This, he announced, was going to be the size of his new organiser. At the time, nobody believed him – Apple was the pioneer of this market, and its organiser, the Newton, was the length of a forearm.

Now, 25,000,000 handhelds later, there are many models to choose between. My advice: decide how much you want to pay, then find the machine that gives the best features at that price. Otherwise, the sales clerk is likely to dazzle you into unbudgeted territory.

should you choose a palm or pocket pc?

Palm is not the only company making handheld computers. The biggest competitor is Microsoft with its Pocket PCs, but you may find machines by many other companies such as Psion and Sharp.

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palm™

POWERED

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You will find this on handhelds made by Acer, AlphaSmart, Handera, Handspring, Kyocera, Palm, Samsung, Sony and Symbol.

Microsoft®
Windows®
™ Powered

Pocket PC logo. The trademark in this illustration is owned by Microsoft.

You will find this on handhelds made by Acer, Audiovox, Casio, Dell, HP, Mexmal, NEC, Siemens and Toshiba.

What it comes down to is a choice of operating system. The operating system determines how much medical software you will find and how many of your colleagues can beam data to you. Because of this consideration, you really should not get any handheld that does not have the Palm OS or Microsoft Pocket PC logo. Resist the temptation to get any other kind of handheld. No matter how cheap or impressive it looks in the shop, if it cannot run the necessary software, it will be of little use to you as a doctor.

Choosing between Palm and Pocket PC is tricky. The importance of beaming means that an easy rule of thumb is to buy a machine that runs the same software as your friends' machines. However, a problem arises when your friends have different machines.

Often, you will find that your friends will get very animated about which machine you should buy. In fact, this will happen even if you don't ask for their opinion. You should at least look on the positive side, i.e. that people tend to become very emotionally attached to their handhelds.

Perhaps I can offer a more objective view. On the one hand, Palm-compatible machines are cheaper and simpler to use and have better battery life. On the other hand, Pocket PCs tend to be more powerful. These are general guidelines, not cast-iron rules, because all handhelds are improving so quickly.

However, it is useful to clear up two misconceptions. The first concerns popularity. At the end of 2002, Palm-compatibles were still more popular and they had been around for longer. Therefore, most medical software is currently made for the Palm first and most of your colleagues will have Palm-compatible handhelds. However, you should not rule out a Pocket PC. These have gained a lot in popularity and software developers are responding. The 2002 version of Microsoft's operating system also allows beaming with Palm-compatible machines, so you should still be able to exchange information with your colleagues.

The second misconception concerns compatibility with your main computer (PC). You do not need a Pocket PC to work with your existing Microsoft software. All Palm-compatibles can work flawlessly with Microsoft Outlook straight out of the box. In addition, all models costing more than £200 ($300) include software for viewing and editing your Microsoft Word and Excel documents. In fact, this software works slightly better than a Pocket PC's software. And for a little extra money, you can buy more powerful versions that allow you to edit your PowerPoint slides on a Palm.

In conclusion, there are slight differences between the two types of handhelds, but both companies are competing extremely hard for your money. That means you are likely to fall in love with whichever you choose in the end.

which palm or pocket pc should you choose?

The most important decision to make is how much RAM ('memory') you can afford – this is how much information your handheld can hold, and denotes, therefore, how many programs and texts you can keep in it. The next decision is colour or monochrome. The former, I believe, is worth the extra investment. With a colour screen, you get a clarity of text simply not achievable in any of the monochrome models; you will appreciate this working on the wards. If you go for a machine with a lot of RAM and a colour screen, you can then choose amongst a host of other features, including music playing, wireless connection and global positioning system (GPS) navigation. None of these is necessary, but most are highly enjoyable.

inventive input

One of the best features of handhelds is that they allow you to write straight onto them. This feature is not, however, perfect, and as you

TrueTip finger stylus. Reproduced with permission

TrueTip pen-cap stylus. Reproduced with permission

grow increasingly reliant on the handheld, you might want to shop around for some extras that will make text input easier.

Two such solutions are styli and keyboards. First to consider is Karl Robb's TrueTip finger stylus, which is shown on the cover of this book. It expands to fit on the tip of any finger, but the index finger gives the best control. The idea came to Karl the first time he saw someone using a handheld and he quickly set about starting his own company (www.truetip.com).

An alternative model, the pen-cap stylus, fits on the bottom end of most pens. This means that you can write on paper using the pen, and then write on your handheld using the pen cap. Finally, because I constantly lose styli, I particularly appreciate the price of $9.99 for any four caps.

Bob Olodort of Think Outside took a completely different approach to input. After four years of prototype design, he finally produced the Stowaway unfolding keyboard. This costs about £60 ($100) and is invaluable for long writing sessions, including lectures or clerking. It is the size of your handheld, but unfolds (beautifully) into a full-sized keyboard. This trick will draw gasps from any audience.

where to buy your handheld?

Most high street electronics shops sell Palm-compatible devices, including chains such as PC World and mobile phone shops. They are, however, generally cheaper to buy online. So, if you are comfortable with buying on the web and confident that you have chosen the right model, take advantage of the price differences. Good UK internet sites include Amazon.co.uk (www.amazon.co.uk) and Dabs Direct (www.dabs.com), while the online deals available to US customers have always left me jealous. Apart from Amazon.com (www.amazon.com), a visit to CNET's handhelds section (www.cnet.com) is always good for comparing American prices.

However, if you are buying more than two handhelds, it is often possible to haggle with the high street shops. You can read more about this in the case study in Chapter 14.

Finally, do not forget that buying the handheld is only half the story – you need to buy additional software that makes it perfect for a doctor. For this, I would budget at least £60 (about $100), and the next chapter tells all.

further information

- Amazon UK – www.amazon.co.uk
- Amazon USA – www.amazon.com
- CNET – www.cnet.com
- Dabs Direct – www.dabs.co.uk
- Palm platform – www.palmsource.com
- Pocket PC platform – www.pocketpc.com
- Think Outside keyboard – www.thinkoutside.com
- TrueTip stylus – www.truetip.com

three

choosing software for yourself

Computers are only as good as the software that runs them, and handhelds are no exception. In fact, one of the key reasons for buying a Palm-compatible or Pocket PC rather than any other handheld is the range of software available. The Chief Executive Officer of Palm likes to refer to the Palm Economy – a bustling cottage industry of thousands of developers, each contributing their own unique solutions for Palm machines. This includes big healthcare companies, which target the Palm and Pocket PC as the most important platforms for doctors.

Once you have overcome the initial pleasure of all this software, there soon follows confusion over how to deal with it. The rest of this part of the book will look specifically at the best applications for the most common tasks on the wards. For those who want to get started straight away, there are three principles to bear in mind.

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1 find a guide you like

In the old days of the internet, two Stanford students made their internet bookmarks available to the rest of the world. They were shocked at how popular this list was. In classic California style, however, they recovered and made a company out of it. Yahoo! remains the number one internet site worldwide. Now, whenever a new area of expertise arises on the internet, it takes very little time for similar bookmarks to arise. These should be your starting points whenever you want to find software.

My favourite is Handango (www.handango.com). Apart from looking the most polished, it is also the most user friendly. In Yahoo! fashion, it provides a hierarchy of good software. It also has numerous reviews written by people who have bought the software. On other sites, it is quite easy to arrive at a list of over 50 programs, simply because they have not been subclassified. By contrast, Handango's hierarchy is much deeper and usually avoids this situation.

PDAMD (www.pdamd.com) is a much smaller website, but focuses on the needs of doctors. The reviews are by clinicians, and you can subscribe to their e-mail newsletter to keep up to date with good software.

If you would like information specific to your own handheld platform, two websites are worthy of an honourable mention: Medical Pocket PC (www.medicalpocketpc.com) and Ectopic Brain. A small group of doctors who wanted to provide information for the significant minority of Pocket PC users created the former, whereas the latter (http://pbrain.hypermart.net/) looks at Palm-compatibles and is a solo effort. Both sites are excellent because of the authors' knowledge about and passion for the technology.

Finally, if you would like to discuss your handheld with other doctors, two recent forums have gained a lot of attention. The first is PDA Consult (www.pdaconsult.co.uk/bbs/index.php), which is the British Medical Informatics Society's official website on handheld computers. The second (www.doctorsgadgets.com) is Doctors Gadgets. Both are free to join and can provide you with hours of entertainment.

Have a look around these sites, and find ones that you are comfortable with.

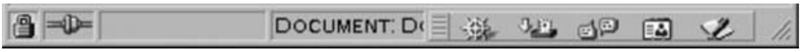
2 there's lots of free stuff out there . . .

Many programmers make their work available for free. It is fun to play with and there is some real quality out there. Even better are the free documents available. Once you have bought document readers or databases, some doctors make incredibly high-quality content freely available to their colleagues. From paediatric calculators to information about common drugs, to the inevitable lists of diseases – if you need it, someone is likely to have provided it for you. You can gradually build up a library of information you need for your speciality. The best thing about this is how easy it is to share it with others – once one doctor has downloaded it, 'corridor encounters' allow it to be beamed to the entire team.

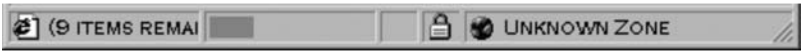
3 even the programs that cost money are free to try

Do not buy any programs. At least, not immediately. Most handheld programs have at least a 30-day trial. If you do not like the program at the end of that, just delete it. There is no obligation to pay and no one will chase you for money. This is part of the reason you rarely find negative reviews of handheld software – not having to part with your money makes the whole thing very amicable.

When you do find software you like, do not give your credit card number to any website that is not secure. In other words, if you are using Netscape, you should have the following locked icon at the bottom of your window . . .



. . . and likewise for Internet Explorer.



That's it really. Go out there and find the good work. And don't forget that once you start to create handheld content yourself, you too can share it back with the Palm Economy.

further information

- Doctors Gadgets – www.doctorsgadgets.com
- Ectopic Brain – http://pbrain.hypermart.net/
- Handango – www.handango.com
- Medical Pocket PC – www.medicalpocketpc.com
- PDA Consult – www.pdaconsult.co.uk/bbs/index.php
- PDAMD – www.pdamd.com

four

organising your life

Napoleon was one of history's most successful workaholics, and he expected similarly high standards from his generals. Only a busy man, he would tell them, can have spare time. Depending on your mood, you can look at handhelds as helping you organise your busy work around the hospital, or your spare time outside of it. Either way, Napoleon would be proud. When you buy any handheld computer, it includes at least four applications. The Palm operating system's designers have named these the Date Book, Address Book, To Do Lists and Memo. Microsoft uses different names for the Pocket PC, but the Calendar, Contacts, Tasks and Notes are almost identical to their Palm counterparts. For simplicity's sake, I shall use Palm's naming when referring to either platform.

These four basic applications are the heart and soul of your machine. Although several advanced extensions exist, this suite does a surprising amount while maintaining simplicity.

date book or calendar

Click on the Date Book (Calendar on a Pocket PC) button and you arrive at your schedule for the day. To add a new event, tap the

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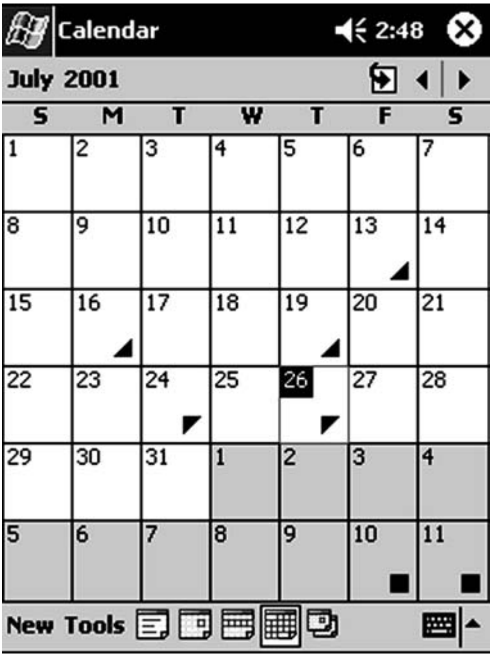


Calendar 2:48

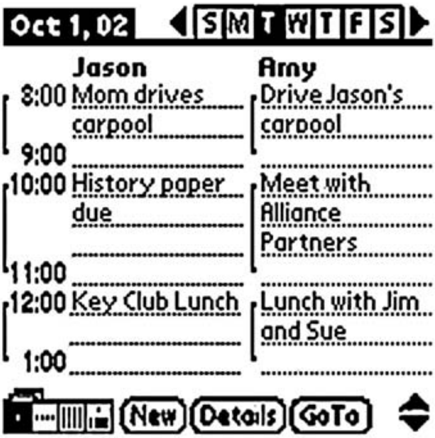
July 2001

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	1	2	3	4
5	6	7	8	9	10	11

Pocket PC Calendar

screen for the time you want it to begin. You can then specify the end time, add an alarm, or 'repeat' the event. I found the latter most useful for regular lectures or clinics. This also works well for anniversaries and events, especially when you take advantage of the alarm to remind you two weeks in advance to get a present. This is great for relationships.

For Palm users, here is another tip for couples: get DualDate. This program is freely downloadable from the Palm website, so get a copy for your machine, and your partner's machine (www.palm.com/support/dualdate). Then you can beam your diaries to each other. DualDate shows both these diaries side by side. In other words, you can keep track of your partner's schedule.



	Jason	Amy
8:00	Mom drives carpool	Drive Jason's carpool
9:00		
10:00	History paper due	Meet with Alliance Partners
11:00		
12:00	Key Club Lunch	Lunch with Jim and Sue
1:00		

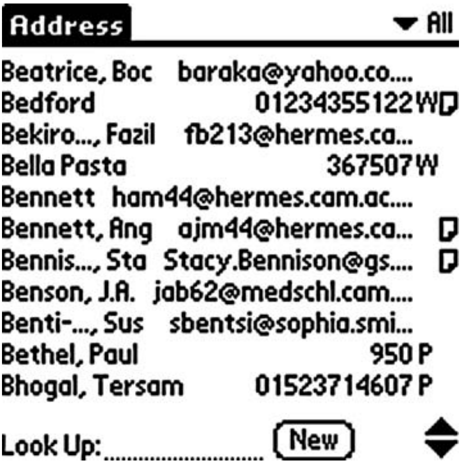
Palm DualDate

address book or contacts

I write everything down in my Address Book (Contacts on a Pocket PC). No scrap of paper escapes this fate: the name of every person whom I meet, often with short notes, contact details of any administrator whom I deal with or directions to any place that I visit. It only takes a minute, and it has paid back immensely. When it came to organising supervisions for finals, I knew which doctors were friendly and, therefore, whom to ask for help.

I do **not** recommend storing your private numbers, such as bank details, and passwords ‘ad hoc’ on your handheld. Many people are tempted to use their Address Book for this. Even when the information is stored in a private address record (one that can only be read when the handheld has been unlocked), it is easy to forget to lock your handheld at the end of a session. The problem is worse when you think about your data backed up on your main computer – security there is not so good, especially with Palm-compatibles.

I do recommend using a program like eWallet (www.iliumsoft.com). It works on Pocket PCs and Palm-compatibles and has foolproof but convenient security. I trust it with all my credit card details.



Address ▾ All

Beatrice, Boc baraka@yahoo.co....
Bedford 01234355122W
Bekiro...., Fazil fb213@hermes.ca...
Bella Pasta 367507W
Bennett ham44@hermes.cam.ac....
Bennett, Ang ajm44@hermes.ca...
Bennis...., Sta Stacy.Bennison@gs....
Benson, J.A. jab62@medschl.cam....
Benti-...., Sus sbentsi@sophia.smi...
Bethel, Paul 950P
Bhogal, Tersam 01523714607P

Look Up:........................ New

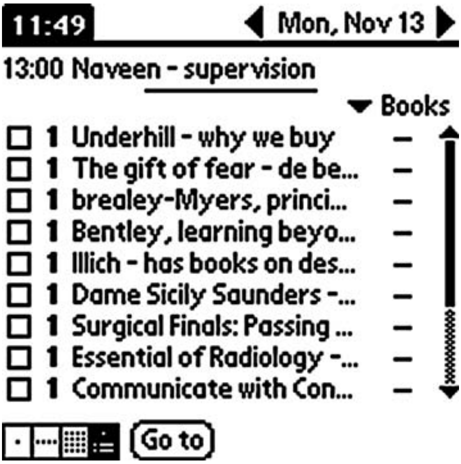
Palm Address Book

to do lists or tasks

With the To Do List (Tasks on a Pocket PC), you can keep track of all the jobs you have to complete. Of course, these can include the daily activities for the wards.

There are also more creative uses for this software. Take books, my other passion. I keep a note of every good book I read about. I give it a rating using the program's Priority function. If ever I am in a library, I check whether they have any of these titles. After a while, if I have not been able find the book free of charge, I can decide whether to buy it from a bookshop. If I did manage to borrow a book from the library, I can store the date of return and set up an alarm a couple of days earlier.

One other feature to mention is the ability to look at your day's appointments and tasks on one screen. In fact, as you will read in Chapter 12 about the haematology department, highly organised doctors such as Dr Keidan would not leave their paper diary behind until they saw this in action.



11:49 ◀ Mon, Nov 13 ▶

13:00 Naveen - supervision

▼ Books

☐ 1 Underhill - why we buy –
☐ 1 The gift of fear - de be... –
☐ 1 brealey-Myers, princi... –
☐ 1 Bentley, learning beyo... –
☐ 1 Illich - has books on des... –
☐ 1 Dame Sicily Saunders -... –
☐ 1 Surgical Finals: Passing ... –
☐ 1 Essential of Radiology -... –
☐ 1 Communicate with Con... –

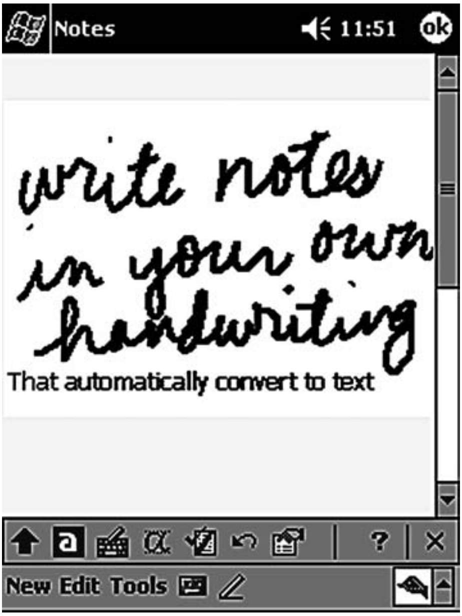
Global Date Book diary view on a Palm

memo or notes

The Memo (Notes on a Pocket PC) is great for writing scraps of information. Do not underestimate the power of this feature. Pocket PC users can go even further and use the handhelds to record speech.

My favourite use of the Memo/Notes feature is to record gems picked up from ward rounds. It is then easy to share these with other students. During exam time, most of my machine becomes devoted to medical snippets.

If you take one thing from this chapter, it should be the importance of the Find function. Use this to search for anything, anywhere on your handheld. Chapter 13 goes over this point further, but consider this simple example. Suppose that, during my revision, I wanted to look up the British Thoracic Society (BTS) guidelines on asthma treatment. If I had only paper, I would pray that I had stored these notes in a sensible place, so I could quickly find them again. On the handheld, however, I would simply write 'BTS' into the Find program. Within in a few seconds this would


Notes
11:51
ok
write notes in your own handwriting
That automatically convert to text
New Edit Tools

Pocket PC Notes

bring up all the memos that I had written about the topic – as long as I had included BTS in my text.

But there's more. After a few more seconds, the program would identify any upcoming lectures that I had concerning the topic. If I waited longer, it would then find the contact details of a respiratory professor teaching at my hospital who is also a member of the BTS. The Find program is no slouch – it will search through the whole of my handheld to make sure I can find the answer I need.

taking it further

As I mentioned in the previous chapter, the Palm Economy allows extensions to your handheld in every way imaginable. For example I use DayNotez (www.natara.com) as a journal, recording all my daily memories. It will not take you long to find needs that your machine does not perform by default, but you will no doubt enjoy the search for the solutions. Happy hunting.

further information

- DayNotez – www.natara.com
- DualDate – www.palm.com/support/dualdate/
- eWallet – www.iliumsoft.com

five

taking lecture notes

Lectures are the process by which a speaker's notes become the student's notes, without passing through either's brain. With a handheld, it is now easy to transfer these notes to other students, also bypassing the brain. As ever, you have a wide choice.

memo or notes

The Memo is great for little scribbles. As I mentioned in Chapter 4, I used the program extensively for ward rounds. I also wrote down lists I picked up from various sources, such as the ten diseases against which smoking protects, provided by a conspiratorial respiratory physician. Finally, I wrote down my examination sequences for all the systems, so I could quiz myself after I had seen patients. My learning curve improved rapidly after this because there was no longer a separation between what I needed to do in an examination, and what I actually remembered to do. Best of all, the Memo comes free with your handheld.

Nevertheless it does have its limitations. The length of each note is only a few screens, which will not last you a whole lecture.

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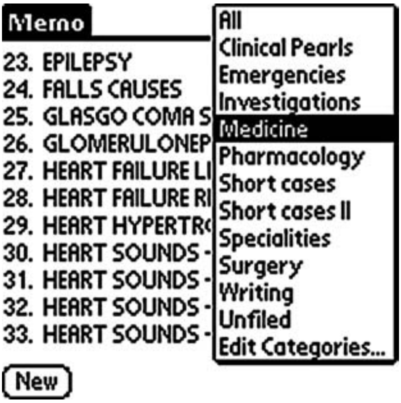


Memo

23. EPILEPSY
24. FALLS CAUSES
25. GLASGO COMA S
26. GLOMERULONEP
27. HEART FAILURE LI
28. HEART FAILURE RI
29. HEART HYPERTR
30. HEART SOUNDS -
31. HEART SOUNDS -
32. HEART SOUNDS -
33. HEART SOUNDS -

All
Clinical Pearls
Emergencies
Investigations
Medicine
Pharmacology
Short cases
Short cases II
Specialities
Surgery
Writing
Unfiled
Edit Categories...
New

Palm Memos

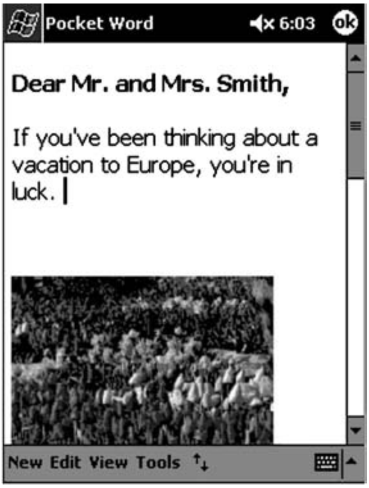
Moreover, the closest thing to a heading possible is writing in capitals.

word processors

Pocket PC users have a program called Pocket Word. Both this and Pocket Excel are included free with every machine. Most Palm-compatible machines also come with equivalent software, called Documents To Go (www.dataviz.com).

For a little more money, you can extend these programs to edit your PowerPoint documents. Palm users also have a range of more powerful alternatives for their Microsoft Office documents. In fact, some of these, like Quickoffice Pro (www.cesinc.com), are better at dealing with Microsoft Word documents than is Microsoft's Pocket Word. This is why, in Chapter 2, I said that you do not need a Pocket PC to ensure Microsoft compatibility.

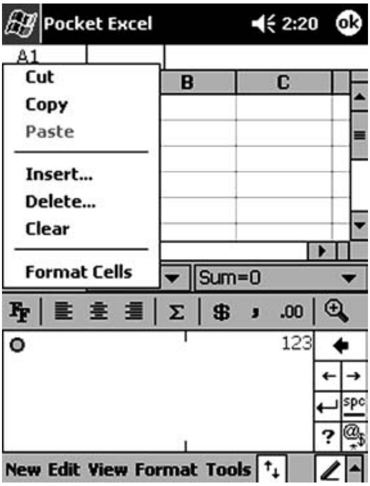
If you regularly create documents in Microsoft Office (Word or Excel) then these are the programs for you. Their integration with both of these Office programs is powerful and professional and the display is a delight – just look at the pictures below.


Pocket Word
6:03
ok
New Edit View Tools

Dear Mr. and Mrs. Smith,

If you've been thinking about a vacation to Europe, you're in luck.

Pocket Word


Pocket Excel
2:20
ok
A1
Cut
Copy
Paste
Insert...
Delete...
Clear
Format Cells
B
C
Sum=0
123
spc
New Edit View Format Tools

Pocket Excel

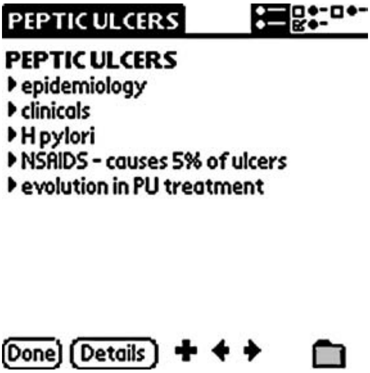
My colleague, Laura, has used this software to store her notes during medical school. She loved having a word processor on her handheld, as do many millions of other users. However, linear notes are not to my taste. Instead, I use outliners.

outliners

If you like the outliner tool on Microsoft Word, then Thought Manager (www.handshigh.com) is the program for you. It works in the same way as in Word and is an extremely elegant, structured and compact way of making notes.

Most doctors have not used an outliner and they initially find this way of note-making strange. However, if you have ever been to medical school, you have likely picked up the outliner way of thinking, even though you might not know it.

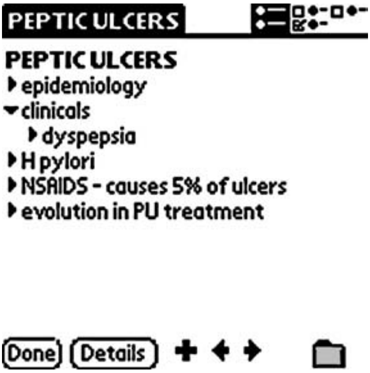
Think back to pathology classes, when you tried to memorise the aetiology of disease states. Do you remember learning to classify all the lists? Do you remember subdividing each list into congenital versus acquired, then dividing further into cardiac causes,



PEPTIC ULCERS

- ▸ epidemiology
- ▸ clinicals
- ▸ H pylori
- ▸ NSAIDS - causes 5% of ulcers
- ▸ evolution in PU treatment

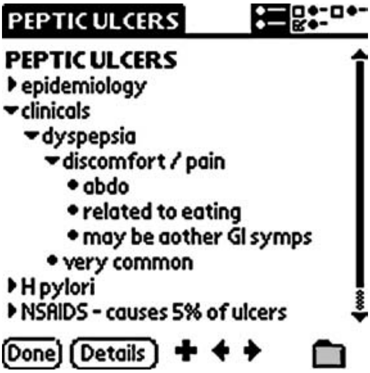
Start with the headings . . .



PEPTIC ULCERS

- ▸ epidemiology
- ▾ clinicals
  - ▸ dyspepsia
- ▸ H pylori
- ▸ NSAIDS - causes 5% of ulcers
- ▸ evolution in PU treatment

Expand the clinical features . . .



PEPTIC ULCERS

- ▸ epidemiology
- ▾ clinicals
  - ▾ dyspepsia
    - ▾ discomfort / pain
      - • abdo
      - • related to eating
      - • may be aother GI symps
    - • very common
- ▸ H pylori
- ▸ NSAIDS - causes 5% of ulcers

Expand all the way

respiratory causes and so on? Like most medical students, I underwent a eureka moment as I realised how this system simplified the learning of so many lists.

Outliners make use of this power of classification. The screenshots above are taken from my lectures notes on peptic ulcers. The structure of the document helped me learn the details. The first screenshot also shows an extra advantage – you can see all the major headings on one screen. Given the small screen of some handhelds, this is a great feature.

Therefore, in contrast to Laura, I chose this method for writing all my lecture notes. You should decide for yourself. As with all other handheld software, ThoughtManager comes with a 30-day trial period, so you can try it before opening your wallet.

joy machine

It is worth remembering how useful a keyboard is for speeding up note taking. And that the true aim of gadgetry is a feeling of smug superiority. So, when the lights dim for the overhead projector and your friends abandon their pen and paper . . . switch on your machine's backlight.

further information

- Documents To Go – www.dataviz.com
- Quickoffice Pro – www.cesinc.com
- ThoughtManager – www.handshigh.com

six

keeping track of patient details

My patient kept looking towards a spot behind me while I asked him about his health. He was on the respiratory ward, with an acute infection over a background of bronchiectasis. He was a charming gentleman and we had been getting on famously, but for the past few minutes I did not seem to have his attention. Finally, I gave up and turned towards the spot behind me to see what all the fuss was about. I saw my registrar and senior house officer (SHO).

You have to picture the childlike glee with which they stared back at me. Their faces were poked through the curtains. They made it clear that they had been spying for quite some time. First, the registrar had spotted me, then he brought the SHO to have a look. The reason for their bemusement – I was clerking the patient using my handheld and keyboard.

This delight and amusement is a common reaction to using handheld computers on the wards. I can vouch for how useful they are at the patient's bedside. So how can you go about using them in this way?

memo or notes

As with taking lecture notes discussed in Chapter 5, the Memo is only your experimental starting point. It is limited in the length of

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note possible and also lacks the heading structure that paper can offer. I predict that you will soon want to graduate to greater things.

do it yourself

For those willing to tinker, consider using a database. Basically, this is the electronic equivalent of a form. Think of all the forms that you fill out every day for audits, administration and prescriptions. A clerking sheet is also a form, with headings such as ‘history of presenting complaint’, ‘past medical history’ and ‘examination findings’. You can easily convert all of these paper forms into a database.

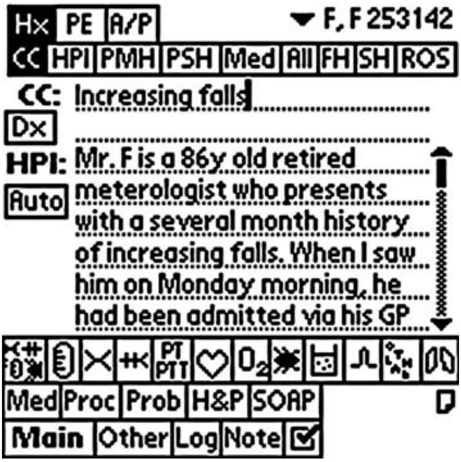
Databases are so useful that all the case studies of Section II have used this type of software for one purpose or another.

You are welcome to use the clerking database we developed, which is described in Chapter 14, and it is freely available on this book’s website. But, as a student, I found it a useful educational exercise to design the templates myself. It focused my mind on the clerking process. Most people find it relatively easy and painless to set up fields in a database with clerking headings such as PC (presenting complaint) and FH (family history).

Many database programs are available for Palm-compatibles and Pocket PCs, and most are excellent. Pocket PCs even include a program called Pocket Access. However, I am a great fan of HanDBase (www.ddhsoftware.com). In my opinion, no other program is so easy and powerful to use, or works with so many handheld computer types and databases.

specialist software

There are some excellent clerking solutions already out there. For example, Handheldmed makes Patient Tracker, a fully functional charting application for Palm-compatibles and Pocket PCs. The free version is quite functional, and the company’s Desktop, Professional



CC: Increasing falls

HPI: Mr. F is a 86y old retired meterologist who presents with a several month history of increasing falls. When I saw him on Monday morning, he had been admitted via his GP

The history view in PatientKeeper

and Enterprise versions provide additional features for higher budgets (www.patienttracker.com).

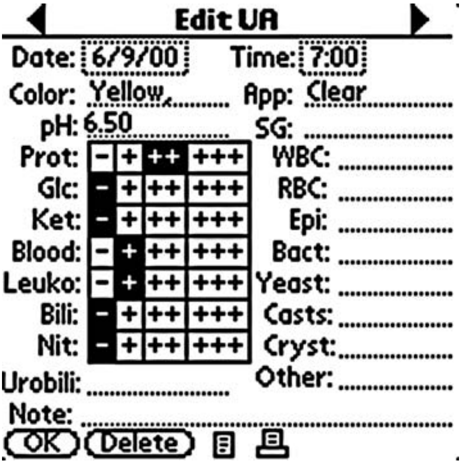
My favourite software for the wards, however, remains Patient Keeper. This is the program that the SHO and registrar caught me using that day on the ward (www.patientkeeper.com).

The latest version of PatientKeeper is free and allows you to do a full clerking, as you can see from the history view above. Given the legal requirement for paper-based documentation in the UK, inputting clerking information into a handheld becomes a duplication of your work. Instead, you should concentrate on its ability to store the results of investigations. This can significantly speed up a consultant ward round.

The forms available are very quick to input, and powerful to access. My favourite is the urinalysis form.

Ideally, you should not have to fill out these forms, because the results should come straight from the laboratory computers to your handheld. Indeed, this is the case in many American hospitals, and PatientKeeper is designed to fit into their computer systems. UK hospitals' budgets are not supporting this yet.

Dr Anatole Menon-Johansson used this software for morning handovers. You will read more about him in Chapter 7. For now,



Edit UA

Date: 6/9/00 Time: 7:00

Color: Yellow, App: Clear

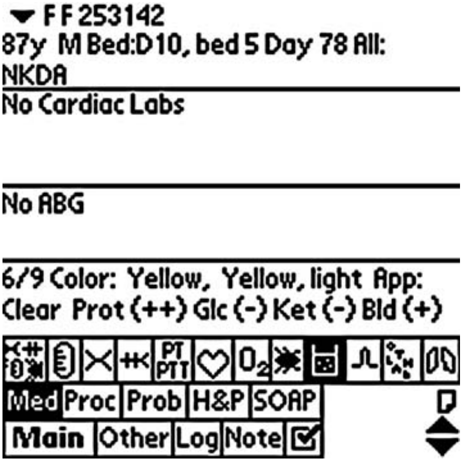
pH: 6.50 SG:

Prot:	-	+	++	+++	WBC:
Glc:	-	+	++	+++	RBC:
Ket:	-	+	++	+++	Epi:
Blood:	-	+	++	+++	Bact:
Leuko:	-	+	++	+++	Yeast:
Bili:	-	+	++	+++	Casts:
Nit:	-	+	++	+++	Cryst:

Urobili: Other:

Note:

A urinalysis form in PatientKeeper



F F 253142

87y M Bed:D10, bed 5 Day 78 All: NKDA

No Cardiac Labs

No ABG

6/9 Color: Yellow, Yellow, light App: Clear Prot (++) Glc (-) Ket (-) Bld (+)

PT PTT
O2
Med
Proc
Prob
H&P
SOAP
Main
Other
Log
Note

Investigations summary view in PatientKeeper you should understand that while other firms' house officers were furiously scribbling the details, his team had a rather civilised tea drinking session having beamed the information from one machine to another.

However, none of these programs can match HanDBase when it comes to handovers. Chapter 14 describes how to take advantage of its mysterious-sounding peer-to-peer synchronisation feature. But I digress.

For those who like anecdotes, Patient Keeper was written by Dr Maulin Shah while he was a medical student. After he posted it on the internet, over one hundred people downloaded it on the first night. You can read more of the story in my interview with him for SurgicalSieve.com (www.surgicalsieve.com/id66.htm).

ensuring confidentiality

Perhaps the thing that worries people most about using a handheld in clinical practice is the risk posed by storing medical information on it. There are three points to make here. First, I use the security software (TealLock on Palm-compatibles, and SafeGuard PDA on Pocket PCs). At 2 am every morning, my handheld locks itself. Only by writing my password, can I gain access. The software is very flexible – it could have locked up 15 seconds after I had switched the machine off or at 5 pm every Tuesday, if I had chosen this. I find the 2 am schedule to be the best compromise between security and convenience.

Second, I do not store any identifying information on the handheld. I store the patient's hospital ID and their initials, but nothing else. The hospital ID allows me to check the latest investigation results on the hospital computer system, and the initials and diagnosis are all I need to jog my memory for the patient's history. If you really feel the need to store identifying information, make sure you read Chapter 14 carefully first and consult the Data Protection Officer at your hospital or practice.

Finally, a note on legality. The European Union's Data Protection Act includes considerable legislation on databases, including medical records. The USA has passed the Health Insurance

Portability and Accountability Act, a highly ambitious and comprehensive piece of legislation (http://cms.hhs.gov/hipaa/). Many other countries have their own analogous laws. Thus before you store this information on your handheld, a mini-discussion with your hospital bureaucrats is likely to be useful.

The UK's Data Protection Register (www.dpr.gov.uk) makes the process of registration simple and clear and costs a reasonable £35.00 per database.

Even with these caveats, there is much that you can do on your handheld. If you are still not sure of the benefits, consider a morning handover session where you just sip tea thoughtfully. This vision has convinced many a doctor to make the switch.

further information

- Data Protection Register (UK) – www.dpr.gov.uk
- HanDBase – www.ddhsoftware.com
- HanDBase clerking templates mentioned in this book – www.handheldsfordoctors.com/book
- HIPAA (USA) – http://cms.hhs.gov/hipaa
- PatientKeepr – www.patientkeeper.com
- PatientTracker – www.patienttracker.com
- SafeGuard PDA – www.utimaco.com
- Surgical Sieve interview with Dr Maulin Shah – www.surgicalsieve.com/id66.htm
- TealLock – www.tealinfo.com
- WardWatch – www.torlesse.com

seven

medical references

I once annoyed an obstetrics registrar by using my handheld in front of him. The consultant had asked me to wait outside his clinic while he was dealing with a sensitive case. My short attention span soon had me rooting for my machine. Given the patient's history, I started reading about endometriosis. The registrar saw me and suggested that I do some work. I replied that I was, but he just thrust an information leaflet on contraception in my direction. I thanked him for this and said I would read it as soon as I had finished the chapter. Two minutes later, he was back and more annoyed that I was ''not doing work''. I was now presented with a leaflet on fertility. It was the leaflet on endometriosis that broke me and I asked him why he insisted on this. He said clinic was no place for a ''Game Boy'' and that I should be doing some work.

He calmed down after seeing my handheld's chapter on endometriosis.

the free stuff

There is an incredible amount of freely available medical reference information out there. From paediatric drug lists to body mass

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index calculators, you can find them all on the handheld portals mentioned in Chapter 3.

One stunning example is ePocrates (www.epocrates.com). This is a formulary of US drugs and medications. The interface allows you to flip quickly between drug doses (adult and paediatric), indications, contra-indications and interactions. The company's staff keep the information constantly updated and these updates come to your handheld automatically through the software. Contrast this with the *British National Formulary*'s (*BNF*) three-monthly schedule. Sadly for UK users, the *BNF* (www.bnf.org) does not have a handheld version yet. Some bright brains are working on this as we speak, apparently, but in the meantime, ePocrates is still useful for non-Americans.

Much of the other free material comes as documents requiring a special document reader. You pay for the reader and the price is at the usual level of about £13 ($20). There are three basic categories: DOC[1] readers, such as TealDoc (www.tealpoint.com); databases, such as HanDBase (www.ddhsoftware.com); and web page readers, such as iSilo (www.isilo.com). So which reader should you get?

As ever, if you are not sure, then just download one and try. More importantly, look at the kind of documents available for each type of reader and decide which gives you the best set of options. It may well turn out that you need more than one reader to fulfil your needs. It is worth considering which one you would use yourself to write your own reference information. For this purpose, I found HanDBase most useful, but everyone has their own preferences.

And when you do write this information, be sure to share it. It is only fair to give back to the community that you have benefited from.

list lovers

Physik's List got me through my pathology exams and then my clinical finals (www.physik.co.uk). It is a set of 1083 lists, covering every aspect of medicine. Dr Mark Bailey, a specialist registrar in

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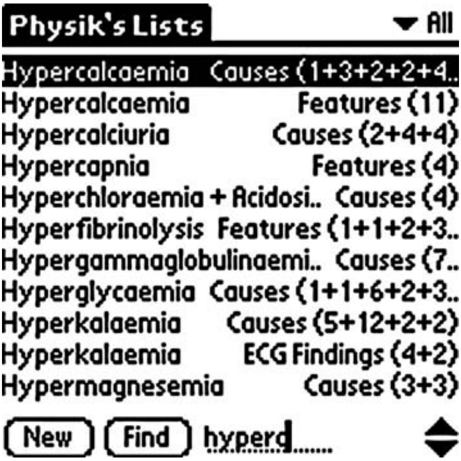
[1] DOC is a document format sepcific to handhelds. It is different from Microsoft Word's format.



Physik's Lists ▼ All

Hypercalcaemia	Causes (1+3+2+2+4..
Hypercalcaemia	Features (11)
Hypercalciuria	Causes (2+4+4)
Hypercapnia	Features (4)
Hyperchloraemia + Acidosi..	Causes (4)
Hyperfibrinolysis	Features (1+1+2+3..
Hypergammaglobulinaemi..	Causes (7..
Hyperglycaemia	Causes (1+1+6+2+3..
Hyperkalaemia	Causes (5+12+2+2)
Hyperkalaemia	ECG Findings (4+2)
Hypermagnesemia	Causes (3+3)

Physik's List

infectious diseases, compiled these while training for his Membership of the Royal College of Physicians exams.

What is truly astonishing is that he had written all these on his handheld by hand, in the days before unfolding keyboards. At just £10 ($15), I think it is a bargain. Certainly, he has had good sales, including customers from the US Navy.

want the *oxford handbook*?

As a UK medical student, my dream was to have the *Oxford Handbook of Clinical Medicine* on my handheld. I hated having the paper version flapping in my coat pocket. Things became worse when I got the *Oxford Handbook of Specialties* (although it proved a useful counterweight). Sadly, this was not to happen in my time.

Today's generation is luckier. Oxford University Press has teamed up with Franklin (www.franklin.com/medical) to produce a version of their textbook for a handheld computer.

Of course, Americans have had their choice of electronic medical textbooks for quite some time. The *Five Minute Clinical Consultant* is similar, although it does not have the charisma of the Oxford Handbooks. On the other hand, Lippincott Williams & Wilkins have gone much further and provided medical books for many specialties in a handheld computer format (www.lww.com).

The problem with many of these is their cost. The usual selling price starts at about £40 ($60) and some books have shockingly high prices. Furthermore, few trial versions are around. I do not think this is good practice, but so far, it seems to be good business. Folks, you have to vote with your wallets.

medical approaches

As a junior doctor, I found another disadvantage with textbooks. Most of these tell you what to do when you know the diagnosis, but little about the initial management of a clinical presentation. In other words, there was no mention of how to approach a medical problem.

Fortunately, I knew Dr Anatole Menon-Johansson, the star beamer of Chapter 6. He introduced me to Dr Gareth Owen and Dr James Bailey. They had just written *Medical Approaches*, a medical textbook that was freely available on their website. It was exactly the kind of textbook I wanted to read. Moreover, it was exactly the kind of textbook I wanted to have on my machine.

The four of us soon started on the project and you can now download the latest copy of the textbook for your handheld. The book also has a greater mission, but I shall simply pique your curiosity with the promise that the website (www.medicalapproaches.org) reveals all.

Whichever medical reference text you settle on, the result is the same. For my exams, I was able to revise everywhere: between ward rounds, waiting for the anaesthetist in theatre, waiting by the bus stop, even in supermarket queues. Obsessive I admit, but desperate times called for desperate measures.

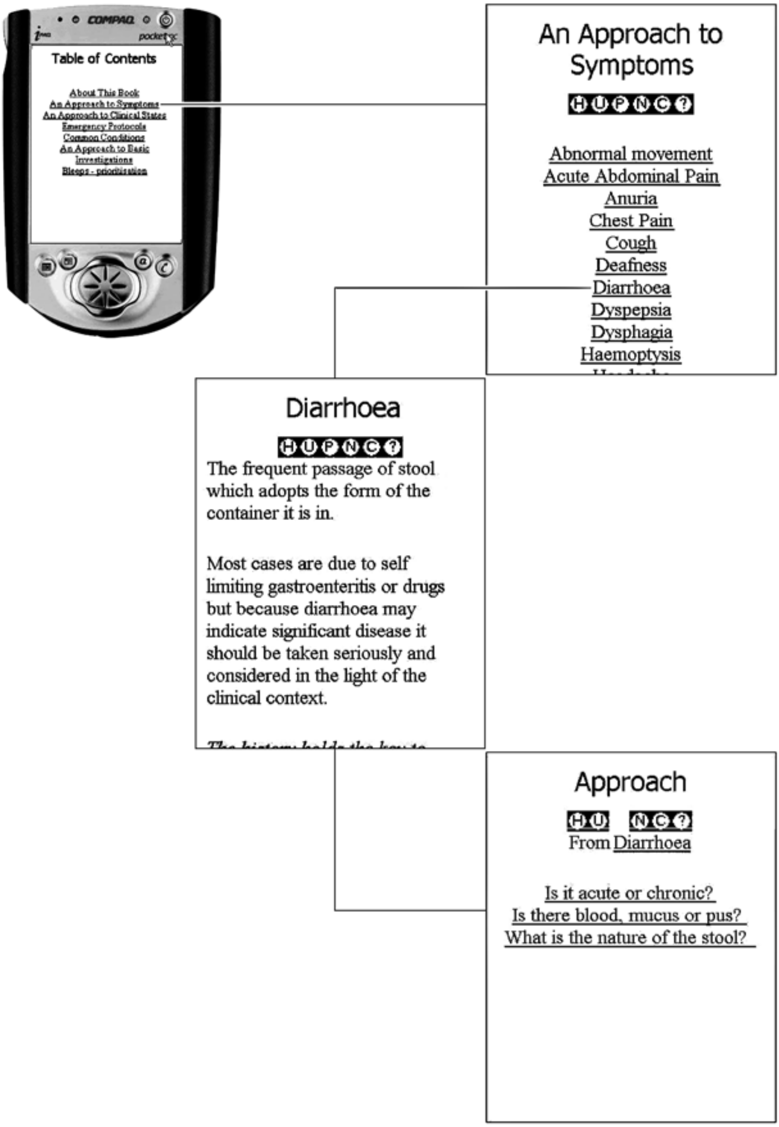


Table of Contents

About This Book
An Approach to Symptoms
An Approach to Clinical States
Emergency Protocols
Common Conditions
An Approach to Basic Investigations
Bleeps - prioritisation

An Approach to Symptoms

Abnormal movement
Acute Abdominal Pain
Anuria
Chest Pain
Cough
Deafness
Diarrhoea
Dyspepsia
Dysphagia
Haemoptysis

Diarrhoea

The frequent passage of stool which adopts the form of the container it is in.

Most cases are due to self limiting gastroenteritis or drugs but because diarrhoea may indicate significant disease it should be taken seriously and considered in the light of the clinical context.

Approach

From Diarrhoea

Is it acute or chronic?
Is there blood, mucus or pus?
What is the nature of the stool?

Medical Approaches

further information

- *British National Formulary* – www.bnf.org
- ePocrates – www.epocrates.com
- Franklin Medical – www.franklin.com/medical
- HanDBase – www.ddhsoftware.com
- iSilo – www.isilo.com
- Lippincott Williams & Wilkins – www.lww.com
- *Medical Approaches* – www.medicalapproaches.org
- Physik's List – www.physik.co.uk
- TealDoc – www.tealpoint.com

eight

reading electronic books

I once read a business plan to create a magazine for insomniacs. The genius idea was in advertising on TV at night, when advertising charges are low and insomniacs are many. As one such sufferer, I am in need of reading material at night. Even when shattered after a long shift on-call, I cannot sleep without reading.

You know what is going to come next. My handheld computer does indeed offer a solution to this problem. Using the backlight, I can switch off all the room's light sources and get myself comfortable with an electronic book. This experience is ten times better if you have a colour machine and is another reason I recommended getting one in Chapter 2.

a small press for a small book

I am addicted to Peanut Press. The company publishes both current bestsellers and classics for handheld computers. Palm bought the company and a key ingredient of their success is the Palm Reader. This freely available program allows you to read their books on Palm and Pocket PCs. It also reads the DOC format, in which a lot of reference medical information is stored. Elegantly simple, much

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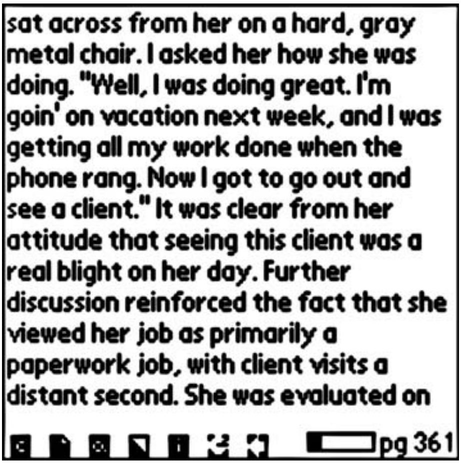

sat across from her on a hard, gray metal chair. I asked her how she was doing. "Well, I was doing great. I'm goin' on vacation next week, and I was getting all my work done when the phone rang. Now I got to go out and see a client." It was clear from her attitude that seeing this client was a real blight on her day. Further discussion reinforced the fact that she viewed her job as primarily a paperwork job, with client visits a distant second. She was evaluated on

An excerpt from *Making a Difference*, on the plight of social workers

thought has been put into how reading on a handheld computer differs from reading paper. You can change the font size, add bookmarks or annotations and, best of all, the book automatically returns to the page you were last at. This is quite important for the continuous interruption environment of a hospital.

What of the books themselves? Every week, 10–20 books are added and the company has been going for a while. There is something for everyone. I got hooked on the biography and business section. Most compelling is a book I read on how the welfare system in Illinois was radically reformed by a McKinsey consultant – I know, I know, but trust me, you have to read it.

Dr Laura Dean, by contrast, loves the classics section. She is pleased by the rise in her cultural quotient and is doubly smug because the books are cheaper bestsellers.

This brings me to price. As a rough guide, the cost is similar to Amazon's prices (with its reductions), but without the delivery charges of course. That means if a book is currently available in hardback, you will pay hardback prices for an electronic version. This bodes badly for those who predicted electronic books being cheaper than print.

cool britannia

Enter Online Originals (www.onlineoriginals.com). A British publisher, it is a pioneer. Its efforts produced, as early as 1998, the first solely electronic book to be nominated for the prestigious Booker prize (www.bookerprize.co.uk). This is a remarkable achievement, given that most other electronic publishers have stuck to republishing printed books as the only way to assure good content. Somehow, Online Originals manages to find high-quality original content. They are also fanatical about the promise of the medium and charge no more than £6 (about $9) per book. This is, I think, a very fair price from a very talented publisher.

However, I still buy more books from Peanut Press than all the others combined. It is partly because I do not read much fiction. But most of all, it is because their reader makes books a true pleasure and I hope that other publishers take note from this. At any rate, do judge for yourself.

the future?

Electronic book technology is evolving rapidly to make it easier for anyone to create books for everyone. In fact, Chapter 19 explains how to go about publishing your own e-book. Traditional publishers can find this a threat.

You might have heard a lot about Napster during its heyday: the company that gave away tools for sharing music files and most people used these for music piracy. A highly amusing set of lawsuits followed as music companies tried everything in their power to shut down Napster and all their attempts at sharing music. They succeeded with Napster, but the internet sprouted other imitators. The battle continues. Most recently, the major five companies have come to their senses and decided to use similar technology themselves.

Every other provider of content is desperate to avoid being ‘‘Napsterised’’ and book publishers are no exception. As such, all the big players have pumped millions into developing attractive electronic books that they sell themselves, to lure consumers away from pirate versions. The year 2002 saw a flowering of this medium and book lovers everywhere are key beneficiaries.

And insomniacs with backlit screens.

further information

- Booker Prize – www.bookerprize.co.uk
- Book Locker – www.booklocker.com
- Fictionwise – www.fictionwise.com
- Mobipocket – www.mobipocket.com
- Online Originals – www.onlineoriginals.com
- Peanut Press – www.palmdigitalmedia.com

nine

games for ward rounds

The registrar who told me off for playing with my ‘‘Game Boy’’ was impressed to discover that it was actually a handheld computer with a chapter on endometriosis. I have to say it was a lucky escape. My machine has its fair share of games, which I have put to use on plenty of other occasions. So, for all those illicit moments in the hospital, here is a list of my favourites.

technicolor glory

I cannot resist a program that uses the handheld’s colour screen. And there are some great ones out there, especially for the Pocket PC.

games for thinkers

Of course, some people prefer a more cerebral approach to gaming (not I). A friend of mine plays a weekly game of chess on his Palm. He ponders every move over several hours as he goes about his jobs on the wards. Although the game has only a tiny amount of code, it

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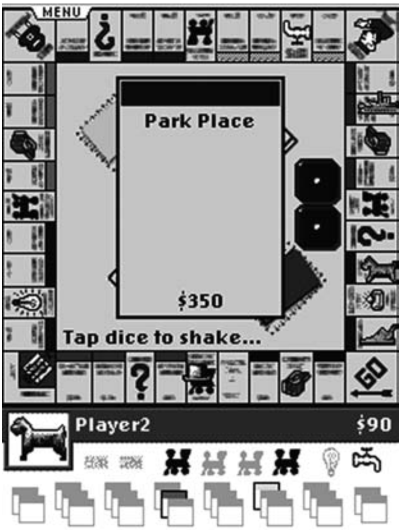
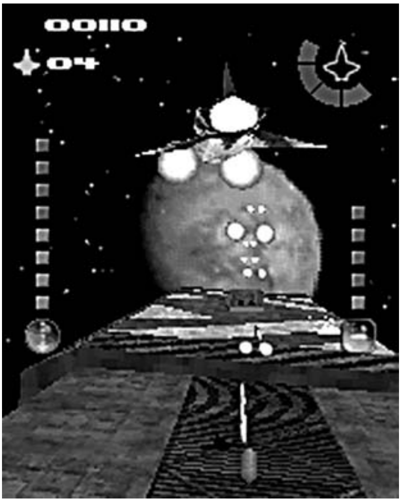

MENU
Park Place
$350
Tap dice to shake...
GO
Player2
$90

Monopoly by Handmark is still good after all those years (www.handmark.com)



Interstellar Flames by Xen Games is a more modern game (www.xengames.com)

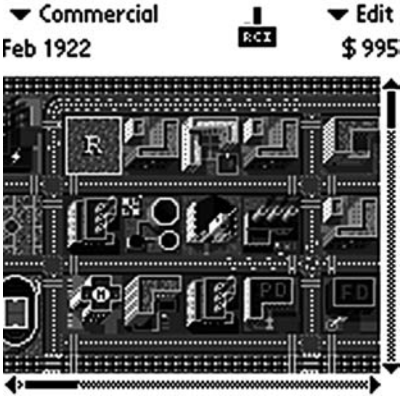
Chess Tiger
(www.chesstiger.com)

consistently beats him. And most infuriatingly, the game responds to his moves almost instantly.

There is also a version of SimCity. That's right, a complete game of SimCity can be played in your hands. It's rather pricey at about £20 ($30), but, then again, you get what you pay for. If you are a fan, consider this very seriously (www.ateliersoftware.com).

SCORE 930
BONUS

If you liked Tetris, you will love bejewelled
(www.astraware.com)


Commercial
Edit
Feb 1922
RCI
$ 995
R
PD
FD

SimCity

race fever

One of the best aspects of a handheld computer is the ability to beam, yet very few games take advantage of this. Race fever is an important exception – you can have a two-player race using the infrared beam (www.digital-fiction.com). My friends and I are finding this addictive.

RACE FEVER
©2000-2001 Digital Fiction Inc.

Race Fever

Do be warned, however, that it is not quite as easy to pretend that you are doing work: the sight of two medical students struggling to stay within beaming distance while shouting abuse at each other fools no registrar.

further information

- Bejewelled – www.astraware.com
- Chess Tiger – www.chesstiger.com
- Interstellar Flames – www.xengames.com
- Monopoly – www.handmark.com
- Race Fever – www.digital-fiction.com
- SimCity – www.ateliersoftware.com

ten

carrying the web with you

Arthur C Clark famously said that ''any sufficiently advanced technology is indistinguishable from magic''. I have saved the best until last – and my friends truly thought this was magic.

Take my friend who was doing a PhD on insulin signalling. It is a very molecular science, making it consistently above my head. Nevertheless, the work is still fascinating and it is always a pleasure talking to her. Once, I asked what had caught her eye recently in *Nature* (www.nature.com), her bible. She showed me a paper in the journal, about an insulin mouse model – or rather, she showed me an editorial about it. The original paper was actually in the *New England Journal of Medicine* (www.nejm.org), my bible. Instantly, I took out my handheld computer and showed her the paper.

She was gob smacked.

introducing avantgo

On the face of it, AvantGo (www.avantgo.com) is a very simple concept; it keeps a copy on your handheld of websites that you like. Later, you can read as much or as little of those sites as you like,

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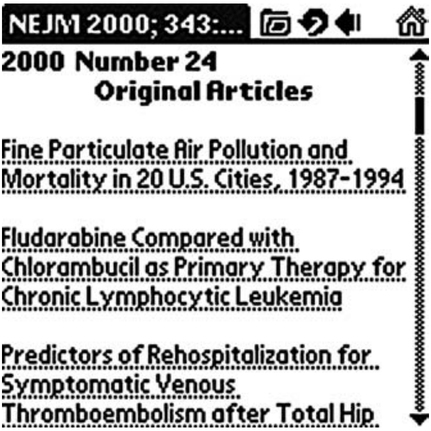


NEJM 2000; 343:...

2000 Number 24

Original Articles

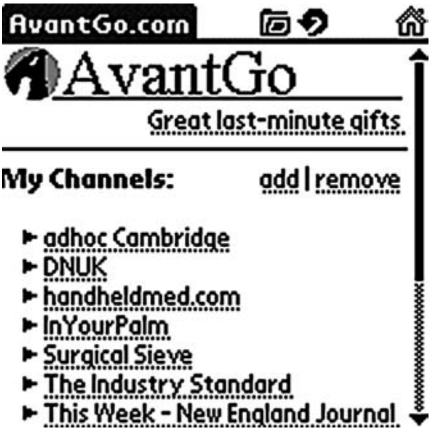
Fine Particulate Air Pollution and Mortality in 20 U.S. Cities, 1987-1994

Fludarabine Compared with Chlorambucil as Primary Therapy for Chronic Lymphocytic Leukemia

Predictors of Rehospitalization for Symptomatic Venous Thromboembolism after Total Hip

The *New England Journal of Medicine*

without needing an internet connection. But the company has done a lot of work to extend this. For you and me, they have made the process of acquiring these pages ridiculously simple. For the website designers, they have provided tools and advice on how to design sites specifically for small machines.



AvantGo.com

AvantGo

Great last-minute gifts

My Channels: add | remove

- adhoc Cambridge
- DNUK
- handheldmed.com
- InYourPalm
- Surgical Sieve
- The Industry Standard
- This Week - New England Journal

Some of my channels on AvantGo GP Notebook

avantgo channels

When you visit the AvantGo website, there is a simple sign-up procedure. It takes you through step by step as you download the software for your handheld, install it, then pick the information you want to take with you. They call this information ‘channels’. Then, every time you back up your handheld onto your PC (i.e. synchronise it), AvantGo checks whether you have an internet connection open. If you do, it picks up the latest updates to the channels you had asked for.

It is always a surprise what you find when you explore the list of channels. There are more cropping up everyday and one quarter of the non-American ones are actually from the UK. Most impressive is *The Guardian*’s offering.

Take the selection from my machine. I have *adhoc Cambridge*, for local happenings and cinema listings. More recently, I found *InYourPalm*, a similar channel that covers Bahrain. So, on the plane to Bahrain, I was already deciding what I was going to do the next day. To keep up with technology, I have *Wired News*. The crown jewel, though, is the *New England Journal of Medicine*. Imagine every week receiving ‘‘The Journal’’ in your machine.

However, the *New England Journal* is no longer freely available this way. Now, you must have a subscription to the paper version.

O2
Internet Explorer
18:34
GPnotebook:
Search
View Tools
xda
Pocket PC

wirelessGPnotebook is brought to you by:

Drs Jim McMorran, Damian Crowther, Stewart McMorran, Steven Youngmin, Ian Wacogne, Clive Prince, Jon Pleat, Gary Crotaz

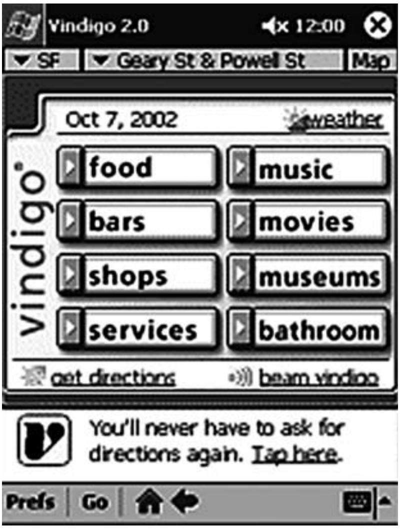
GP Notebook

Unfortunately this represents a trend, because many new medical publishers are selling special versions of their textbooks or journals designed for AvantGo. One of the most comprehensive, and fairly priced, is GP Notebook (www.gpnotebook.co.uk). Their content has won them awards in the UK and inclusion in the National Electronic Library for Health (www.nelh.nhs.uk). They have divided their text by specialty into several channels, with three months' subscription costing £5 ($7.50) per channel.

And then, there's Vindigo.

vindigo

Bill Gates' proudest achievement with Windows XP is that his parents can use it. Mr and Mrs Gates could not be reached to confirm this claim, but it is certainly a useful marker of a technology's maturity. A similar milestone marked my recent holiday in Chicago. I installed some new software, Vindigo (www.vindigo.com), onto my handheld. Using this, I navigated the neat streets of the enormous city. Within four taps, I could tell


Vindigo 2.0
12:00
SF
Geary St & Powell St
Map
Oct 7, 2002
weather
vindigo
food
music
bars
movies
shops
museums
services
bathroom
get directions
beam vindigo
Prefs
Go

You'll never have to ask for directions again. Tap here.

Vindigo

Vindigo my current street. One tap later, it would tell me the location of anything I wanted and the way to get there.

Bookshop? "Walk two blocks forward, turn left and walk four blocks ahead." That is a quote from the software's instructions. Coffee shop? A simple yet powerful map was the alternative for those who prefer to see their route. What time was Moulin Rouge playing? A complete listing of cinema locations and showing times was available.

It did not take my mother long to seize upon the utility of this. She is now looking forward to using the London version of Vindigo.

further information

- AvantGo – www.avantgo.com
- GP Notebook – www.gpnotebook.co.uk
- National Electronic Library for Health – www.nelh.nhs.uk
- Vindigo – www.vindigo.com

eleven

handhelds for patients

Guest chapter by Dr Laura Dean

No matter how good the doctor, or how sound the medical advice, patients have great difficulty in making lifestyle changes. The diabetic fights a war against the glucose monitor. The dieter has to avoid the demons of fast food. When everyone faces a daily battle for health, how much can a seven-minute consultation with the GP help?

My mentors, Dr Andrew Sherwood and Dr Keith Redhead, taught me an important lesson: patients do not do what you tell them.

On reflection, I have never completed a course of antibiotics. So why do patients behave as badly as their doctors? People hate having no choice. What truly good doctors do is to empower the patient by giving them options. They allow the patient to decide the best solution for their own problem. With good advice from you,

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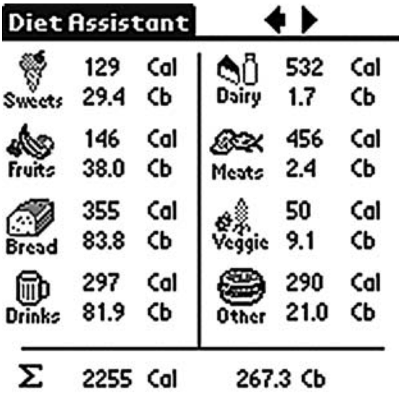
not only can your patient choose the best solution, but they will also be more likely to reach their goal. And they respect you more for it.

A handheld computer can help with every step of this way. First, you can use your handheld to help provide information to your patient. Second, the patient can use a handheld to help them in the very difficult stages in making changes to their lifestyle. Here are some examples of such software, classified in a way that would have brought tears to my pathology teacher's eyes.

primary prevention

A perfect use of handheld computers is to keep the patient healthy by helping them maintain a healthy lifestyle. One of the most popular programs is Diet & Exercise Assistant (www.keyoe.com). It gives sound advice on how to achieve a healthy balance by eating a varied diet and exercising.

The patient fills in some personal information – their age, sex and weight. Then it is up to them to decide what weight they would like to reach and over what period. The program calculates how much of an "energy deficit" the patient needs to maintain to reach their goal.

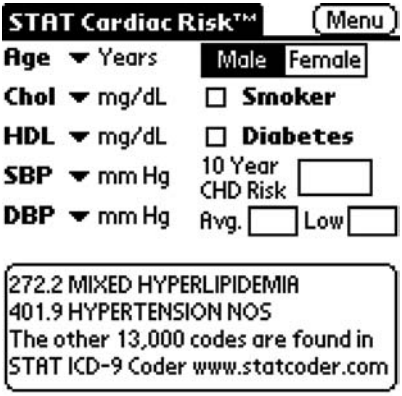


Diet Assistant

Sweets	129 Cal	29.4 Cb	Dairy	532 Cal	1.7 Cb
Fruits	146 Cal	38.0 Cb	Meats	456 Cal	2.4 Cb
Bread	355 Cal	83.8 Cb	Veggie	50 Cal	9.1 Cb
Drinks	297 Cal	81.9 Cb	Other	290 Cal	21.0 Cb

Σ 2255 Cal 267.3 Cb

Diet & Exercise Assistant (www.keyoe.com)



272.2 MIXED HYPERLIPIDEMIA
401.9 HYPERTENSION NOS
The other 13,000 codes are found in STAT ICD-9 Coder www.statcoder.com

Cardiac Risk Calculator (www.statcoder.com)

Each day, the patient uses this program to keep a food diary. On paper, this is notoriously difficult to do and patients often cheat at the end of the week by just guessing at what they have consumed. However, this program simplifies the chore because it comes with pre-filled lists of nutritional information for many foods. Moreover, the patient can add in other food. So it is relatively easy to choose the meal they have just had from a list.

Now, depending on what he or she weighs, and how busy their job is, the machine calculates the patient's basal metabolic rate (BMR). Finally, the patient enters the details of any exercise they have done.

The program calculates the balance of energy. A deficit of energy will lead to weight loss, while a positive balance will eventually lead to weight gain. This type of program gives the patient the power to decide how to improve their health. By viewing the numbers, it becomes much simpler to balance input (food eaten) with output (BMR and exercise).

Another use of handheld computers is in risk assessment, an area that the human brain is not very good at tackling. For example, when assessing the chances of winning the lottery, people are happy buying a ticket because the outcome can be positive. Negative outcomes, such as the chances of smoking leading to a heart attack, are played down. Perhaps that heart attack will happen to another smoker instead.

A cardiac risk calculator is useful when faced with this type of problem. The patient enters their current details: age, sex, weight, cholesterol level, blood pressure, family history and smoking status. The program gives the probability of having a cardiac event in the next ten years. The patient can then see what would happen if they were a non-smoker or had lost weight. You can certainly discuss the effects of taking blood pressure pills. Information is power.

There are also many programs targeted at women, including menstrual trackers (www.catsmeowsoftware.com) and fertility calculators (www.catsmeowsoftware.com).

secondary prevention

Handheld computers are excellent tools for monitoring chronic diseases such as diabetes.

Healthengage Diabetes (www.healthengage.com) is a good tool for diabetics. Again, the user of this program is in full control. First, the program asks for the target blood sugar level. Then the user customises the program by adding the foods he or she normally eats, any regular exercise and current medications. All hospital test results can also be stored.

The patient, therefore, keeps track of food intake, as well as the exact time and units of insulin administration. Instead of mysterious, random and isolated blood sugar results, the user and physician have access to meaningful accurate data. At a glance, each reading can be related to the time it was taken. A high value could have been just after a carbohydrate-rich meal or perhaps the patient had noted feeling unwell that day; low values, in contrast, could be due to exercise being taken.

This detailed logbook of the control of diabetes can then be printed out or emailed to the GP or consultant.

Healthengage have many other similar products to help patients monitor their disease and stay well. These programs are for people with conditions ranging from diabetes and asthma to HIV infection and depression.

Being overweight, asthmatic or a 'diabetic pincushion' is not fun. Being told what to do about it can be even less fun. But using a handheld computer gives the patient a powerful tool for actively managing their disease and maybe teach their doctor a thing or two in the process.

about dr laura dean

Laura graduated as a doctor, with an honours degree in pharmacology, from Cambridge University. On entering undergraduate medical school, she had never used a computer before. By the time she had entered clinical medical school, she was already teaching her colleagues. She was entirely self-trained. A co-founder of and teacher at handheldsfordoctors.com, she is now a Visiting Research Fellow at the National Institute of Health's National Center for Biotechnology Information (www.ncbi.nlm.nih.gov).

further information

- ActiveECG – www.activecenter.com
- Calorie King – www.calorieking.com
- Diet & Exercise Assistant – www.keyoe.com
- FreeStyle Tracker – www.therasense.com
- Healthengage – www.healthengage.com
- Menstrual Track – www.catsmeowsoftware.com
- PetVet – www.pdacellar.com
- Pregnancy Assistant – www.arkelproducts.com
- Profile MD – www.e-medtools.com
- On-Time-Rx – www.ontimerx.com
- STAT coders, including cardiac risk calculator – www.statcoder.com
- Workout Tracker – www.standalone.com

SECTION TWO

WHY TWO HANDHELDS ARE BETTER THAN ONE

This section shows examples of handheld computers at work.

I have deliberately not mentioned the model of the handhelds bought. First, this is because handheld models improve constantly, therefore reading about an older model might confuse. More importantly, however, I have tried to avoid the Palm versus Pocket PC debate. As debates go, this is an old and often heated one. It is also, I think, an irrelevant one. You should choose the machine that you like the most from within the budget that you have. Then, to ensure long-term viability of your project, you should choose software that works on both types of handhelds.

Most of the software chosen in this section works well on both Palm-compatible and Pocket PC handhelds.

The examples draw upon the experience of Dr Laura Dean and myself in our hospital. We provided formal training, which we considered essential for success. In your own efforts, online resources and this book (Chapter 18) include the tools to give informal training to your team.

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twelve

case 1 – the haematology department

Working as junior doctors in the Queen Elizabeth Hospital in King's Lynn, Laura and I were constantly impressed by the organisation of the haematology department. A team of six coordinated the management of all the haematology patients in the region. Even more challenging was the responsibility of ensuring that junior doctors knew how to give the best care to these patients. The team rose to the occasion with clear, idiot-proof protocols and guidelines, which they placed on every ward and within easy reach. Perhaps what impressed us the most was just how well they organised this information using paper.

It was therefore an interesting day when the haematology consultant asked to borrow Laura's textbook. Dr Peter Coates had a patient with hiccups and wanted to look at a list of causes. Naturally, Laura was not carrying a paper textbook, but she did volunteer to search through several of those that she carried on her handheld. Curiosity about hiccups became curiosity about handhelds as Laura produced a comprehensive list of causes.

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the team . . .

The department consisted of six professionals: one full-time consultant, one part-time consultant, one staff grade doctor and three specialist nurses. Three interesting points are worth making here.

First, one of the specialist nurses, Sister Claire Atterbury, already had a handheld computer. She was the 'champion' who pushed for using these machines and starting the handheld project. Crucially, her experience was a greatly calming influence on colleagues. When anything went wrong with the machines or the software she was not perturbed but appeared confident that the problem would be solved. Such trust was invaluable as the rest of her team began using the technology.

Second, Dr Jane Keidan, the part-time consultant, had compiled a legendary filofax. As well as being reliable and comprehensive in organising her schedule and tasks, this paper-based organiser contained essential information for getting her work done. Over the years, she had painstakingly collected and condensed papers, protocols and clippings. In fact, this information was the basis of many of the protocols on the wards. By contrast, her PC often crashed, slowed her down with complicated clicks of the mouse and it had taken her a long time to learn how to make the best use of it. Why, she asked, would she consider swapping her filofax for a computer-based solution?

Finally, the team worked magnificently together. They had fostered an environment of successful information sharing. It was informal but constant and comprehensive. Later, during our training, it was striking how often they thought of their colleagues and how it would benefit them whenever we showed them a new feature or tool of our handhelds.

the problem . . .

At first sight, there was no problem to solve. The team was organised and efficient. However, following the hiccup incident and a lecture we had given, the team invited us to teach them how we used our handhelds. Behind all this was Sister Atterbury's desire for her team to take full advantage of handheld technology.

A discussion with the team was illuminating and important. First, we asked them to name occasions on which they found difficulty in getting the right information at the right time. As perfectionists, they produced a long list. As pessimists, we picked three items for which the handhelds were most promising:

1. Organiser functions, such as keeping track of the individual's schedule and carrying the hospital's directory of phone numbers.
2. The ability to carry all the latest protocols at all times.
3. The ability to consult multiple and comprehensive medical reference texts.

In addition, we wanted to teach the members of the team to be confident and independent with the machines.

A key part of the discussion was over Dr Keidan's filofax. She was understandably sceptical that any computer-based solution could match her existing paper-based methods, let alone improve on them. We naturally wanted to convince her of the power of the technology; we needed to know what features she demanded of it and what fears she expected to be realised. Only then could we all feel safe in proceeding.

the solution

a. hardware

One handheld computer was required for each team member. The machines chosen had two important features:

- A colour, high-resolution screen allowed comfortable viewing of the protocols.
- Their expandable external memory allowed storage of the maximum number of protocols. However, we advised the team not to buy the memory until the day it was necessary, because of the constant improvements in power and price.

Total cost: £1800 ($2400) for six team members.

b. software and reference texts

1. The organiser software that was included with the handheld, which was able to synchronise with Microsoft Outlook. Cost: free.
2. Existing protocols on the ward were converted to Adobe Acrobat format and installed onto the machine's Acrobat Reader. Cost: free.
3. Numerous free medical references texts found on the web, including *Medical Approaches* and haematology texts (www.medicalapproaches.org). Cost: free.
4. Dr Coates bought a copy of the *Oxford Handbook of Clinical Medicine* (OHCM) for his machine. Cost: £40 ($60) for one copy.

c. training

To start with, we ran a two-hour workshop that all six members of the team attended. During this time, they learnt the basic handheld skills. These included writing on the handheld, entering information into the organiser applications and beaming information to their colleagues.

In addition, we offered each team member two hours of one-on-one teaching. The aim of these sessions was to get the individual competent with the details of the basic applications, but also build confidence in exploring other applications for future uses.

Finally, Dr Keidan opted for an additional six hours of individual teaching. She used this time to develop highly advanced skills, which she then taught to her colleagues.

d. results

It is interesting how many extra lessons Dr Keidan requested. It was not because she was struggling with the machines. In fact, she had very quickly become very competent with her handheld. Rather, she was so pleased with the return on her initial time investment, that she felt investing further time would yield further rewards for her team in the future.

i. the organiser software

One of the most important features of the diary software was the display of the day's appointments and tasks on one screen. The feature was so important because it confirmed to the part-time consultant that the electronic diary was as good as her filofax. Just as importantly, the handheld proved to be as reliable as paper: the machines all came with backup software, which gave the team a simple duplicate of the data. Constant and quick backups ensured the data was safe.

Like all computers, there were occasional crashes and the software did not always respond perfectly. Over time, however, the consultant began to trust that her machine's data would survive such incidents.

The team was now ready to take advantage of the features that improve on paper. First, the handheld integrated fully with Microsoft Outlook, which is not possible with a paper-based system. This allowed the doctors, nurses and secretaries to have constant access to the team's up-to-date diary. Thus, changes to the diary could travel from a secretary's desktop computer to a doctor's or nurse's handheld computer and vice-versa.

In addition, the team's first experience of the handheld's address book instilled the important habit of beaming. During the first seminar on handheld use, I beamed the hospital's directory to one of the specialist nurses. She then beamed her data to her neighbour, and so on. From then on, the team members used beaming for all their data, including diary events, task lists and journal abstracts. Beaming is in fact more addictive than Pringles.

ii. protocols

From the start, the team could see clearly the advantages of storing the protocols on the machines. Less clear, however, was how to do so, because there were several options available. The three under consideration were:

1. The handheld's built-in memo program.
2. The handheld's bundled Microsoft Word-compatible software.
3. The freely downloadable Adobe Acrobat Reader.

Chapter 19 has a full discussion of the difference between these and other options, but for now it is enough to know that the team picked Adobe Acrobat.

There are several reasons for this choice. First and most crucially, once the document is in Acrobat format, it cannot be changed. In other words, a decimal point cannot be deleted accidentally, making it safer to include dosages, etc, in protocols. Second, the Reader is available for all major handheld platforms, as well as normal PCs. Third, the team was already familiar with the format of the paper-based protocols. Having developed and used these protocols over several years, they knew their way around the protocols by sight. They remembered that the dose in protocol 5 was on the second page in the bottom right-hand corner. By duplicating the spatial arrangement of the paper protocols, the handheld version of Adobe Acrobat Reader allowed the team to continue relying on their visual memory for navigating around the protocols.

Finally, Acrobat is a common multiplatform program. In this example, only six handhelds were purchased and, therefore, the impact may seem very small. However, other departments and a large GP surgery soon invested in their own machines. A large number of junior doctors had also bought their own handhelds. On an optimistic note, we expect the percentage ownership to increase.

In other words, because the department chose Acrobat as their standard format, it was possible to take advantage of future investments. To quote Field of Dreams, 'If you build it, they will come'.

iii. confidence and competency

Many of the team members were initially hesitant when dealing with the new machines. In the first seminar, much fun was had by all as beaming was introduced. But following the seminar, the machines were not used much. We find this is a typical reaction because clinicians are extremely busy and tend to avoid anything that slows the clinical workflow. The catch-22 situation of being slow with the machines because they have not become used to them therefore ensues.

However, after the first one-on-one teaching session, the clinicians became competent enough to use their handhelds quickly. After the second session, we saw the competence develop into confidence. Once they understood how to download and try out software, their mindset changed. They began to think of how the machines can help speed up clinical practice and they sought out the software to make this happen.

Now, whenever we meet the team's members, they usually excitedly beam us the latest application they have downloaded. They have enjoyed increasing their productivity.

lessons learnt

- A project champion is necessary.
- Potential users know what they want to do; the handheld tutor knows what they can achieve.
- Only suggest a solution that is simple and reliable.
- Calm confidence is great for getting the user through a machine's malfunctioning.
- Everyone on the team must be involved and supplied with both machines and training.
- Training is important to get the full value out of the hardware and software bought.
- Train for long-term confidence, not short-term competence.
- Train for teamwork.
- Often the people who benefit the most are those who saw the least value of leaving their paper behind.
- 'Build it and they will come': if you invest time in preparing reference material, people will start to use it.

thirteen

case 2 – the general practice surgery

Our junior doctor post was a one year general practice[1] (GP) Vocational Training Scheme, so both Laura and I spent four months working at a GP surgery. Laura's trainer, Dr Keith Redhead, saw her using a handheld computer and wanted to know more. It was not long before he got one himself. And it was not long before he began using it for beaming. However, none of his colleagues in the surgery had the machine, so he was not able to take full advantage of beaming.

Could there be a way of bringing this technology to the surgery?

the team . . .

Dr Redhead was part of a large surgery with 11 doctors and a variety of supporting staff. There was a spectrum of IT literacy, but all the doctors had become proficient in using the practice's computer system. It provided a powerful and integrated method of managing the electronic patient records (EPRs). We were keen to ensure that even those who were uncomfortable with computers still had the opportunity to use the handhelds. The team also had a talented practice manager, Elizabeth Batstone, and we were keen to involve her.

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[1] General practitioners are the primary care providers in the UK, equivalent to family physicians in the USA.

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the problem . . .

The first question the GPs asked was whether they could use the machines with the practice's EPRs. Such a feature usually tops every GP's wish list because it provides such a clear, easy advantage and return on investment. In fact, it was only a couple of weeks earlier that a representative from the EPR provider had visited the surgery to demonstrate such a product; it would allow the doctor to access and amend the patient's details on a handheld computer during a home visit. Once back at the surgery, the amendments would be transferred to the central system. By 2002, all the major EPR providers in the UK had begun developing handheld versions of their software that integrate into the central system.

We, therefore, predict confidently that in a few years, every GP in the UK will carry a handheld computer with such software on home visits. We also believe that it will take a few years before the software fully matures.

To take this particular EPR provider's example, despite its early promise the handheld had several disadvantages. First, the price at the time was about £600 ($900) per machine. Second, the machine was a little heavy and cumbersome to use and not as user-friendly as we would have liked. Finally, we were worried that it carried the practice's entire records. Rather than focusing on just those that would be necessary for the home visit, the machine held over 12,000 patients' details. We were not yet comfortable in dealing with the security and confidentiality risks of carrying so much data. The company should be congratulated on how far they have progressed with the technology but, at the time of starting this project, we felt its solution was not appropriate.

In fact, the doctors had decided not to invest in any handheld technology until the EPR-linked application was ready. We thought otherwise.

We discussed with the GPs instances when the practice's reliance on paperwork was most irritating to the doctors. Three areas became apparent:

1. The personal development plan.

2. Tracking of expenses.
3. The cataloguing of useful clinical literature.

a. personal development plan

Most GPs have now become familiar with personal development plans[2] (PDPs) as part of their career and practice. The PDP consists of three parts:

1. At the beginning of the year there is a planning stage, when the GP assesses his or her own strengths and weaknesses, then decides how to improve on them.
2. The next stage occurs throughout the year and involves documenting all the learning opportunities and their contribution to the plan.
3. The final stage, at the end of the year, is a reflective process.

Because of that last stage, I rather like PDPs. They are a means of getting credit for all the continuous work and learning that a GP goes through. It never ceased to astonish me as a pre-registration house officer GP how educated and educational my tutors were. Nevertheless, many disliked the PDPs because of the second documentation stage. It is a shame that the pain of documentation should overwhelm the pleasure of taking credit. Handheld computers can ease this pain.

b. expense tracking

In a similar way, the pain of documentation of expenditure often overwhelms the pleasure of receiving money for expenses incurred. Doctors dislike keeping track of the expenses to be refunded or those that can count as tax-deductible. For simple principles of managing personal money, check out books by Alvin Hall[3]. For keeping track of money, my recommendation is naturally for a handheld.

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[2] The Eastern Deanery has an excellent website (www.pdptoolkit.co.uk), which explains the principles and practice of PDPs.

[3] *Your Money or Your Life*, Alvin Hall, ISBN 0340832194.

c. clinical literature

As part of their daily routine, GPs access huge volumes of information from a wide variety of sources, including journals, books, internet sites, lectures, colleagues and patients. It is difficult finding time to file such information, but it is often impossible to find the time to access it later. A common example is the GP who cuts out an abstract from the *British Medical Journal* (*BMJ*) and stores it in a folder. A year later, how will they find it again amongst all the other clippings? A handheld computer is ideal for such storage and retrieval.

the solution . . .

The GPs at the surgery were excited about the potential advantages of using a handheld computer, but did not want to make a financial commitment from the practice budget until the technology allowed secure storage of patient details. In the meantime, they were interested in using a handheld for personal and professional use. We suggested to them an opt-in policy. Anyone from the surgery could buy a machine using their own money, to suit their own budget. We would advise them on the technical aspects of making sure the hardware and software worked together and provide training for one doctor. This doctor would then teach the second, and so on.

Seven of the eleven GPs took up the opt-in scheme, as well as Mrs Elizabeth Batstone, the manager. We were keen to involve her because, given her position and expertise, we knew she would make a unique and valuable contribution to deployment of the machines.

a. hardware

The team bought a variety of handheld models, ranging in price from £100–£300 ($150–$450). Most chose the most expensive machine because they wanted a long-term investment in a handheld computer with a high-quality screen. However, all the models were able to run the same software and beam to share data with all the other models. It is worth making a note here about the machines' ability to back up onto the GPs' desktop computers. Many of these PCs had older operating systems (such as Microsoft Windows NT 4.0), which were not supported by the handhelds. This was not, however, a great problem because the practice was about to upgrade to the latest version of Windows. The type of operating system is certainly something to bear in mind because the handhelds will be much more useful if they can be backed up on all of the surgery's desktop computers.

Total cost: £2,200 ($3,300) for eight team members, but £800 would have been enough to buy the minimum specification machines.

b. software

1. The organiser software included with the handheld and the software for synchronising with Microsoft Outlook. Cost: free.
2. Additional purchase of one copy of HanDBase software (£20/$30) for each handheld and one copy for a single PC (£28/$40).
3. One copy of SplashData (£14/$20) for each handheld.

Total cost: £300/$440 for eight handhelds and one PC.

c. training

The team chose cascaded training. Dr Redhead had already learnt a great deal about handhelds, but we would also be available to provide support as he spread the skills to the rest of the surgery.

d. results

One way of classifying the GPs' use of handhelds is by looking at their IT literacy. This produced a rather polarised picture, with two of the GPs being highly computer-savvy, while the remaining doctors were understandably sceptical given their past experiences with computers. The former group were delighted to learn that the handheld computers were powerful enough to meet their demands, despite their low price. The latter group were pleasantly surprised by how easy and reliable the machines were. This is a common reaction, which is in stark contrast to the installation of new desktop equipment and software.

i. personal development plan

We used HanDBase to design a PDP logbook. There are several points worth making about the reasons for this choice of software.

First, although we got the GPs started by designing the logbook for them, HanDBase is simple enough for anyone to be able to quickly design their first database. Second, although it took a bit of time to perfect the database, it was quick to enter data into it and thus gain credit for every learning opportunity. Third, HanDBase is one software package I recommend unreservedly for its ability to work with so many other technologies. There are versions for the Palm and Pocket PC handhelds, as well as Microsoft Windows. Furthermore, the handheld versions beam information back and forth excellently (Chapter 14 showcases this fully). Finally, the data can be exchanged with Microsoft Access and other standard databases. The advantage of all this compatibility is that in the future, as the GPs change their handhelds, change their PCs and change their software, they are safe in the knowledge that their data will not be lost.

To understand what all of this means to GPs in practice, compare two fictional doctors: Dr Papercut documents his PDP using paper, while Dr Digitalis uses a handheld computer[4].

> As Dr Papercut attends a lecture, he makes notes on a piece of paper. Dr Digitalis naturally uses the machine for her notes. Like all inquisitive doctors, they ask the speaker many questions

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[4] My thanks to Dr Laura Dean for her inspired choice of names. She created Dr Papercut and Dr Digitalis for a sketch she had written, directed and starred in at a presentation to GPs interested in PDAs.

> at the end of the lecture and discuss many of the topics with their colleagues. All in all, there is much learning to be documented in the PDP and reflected on at the end of year.
>
> Dr Papercut must wait until he goes home that night, however, before he can fill out the forms. Indeed, he might wait until tomorrow, because he keeps the forms in the office. Then again, he might hate filling the forms out so much that he leaves them for the weekend when a glass of wine and some Bach can ease the burden. Unless, that is, he is on-call this weekend and will have to put things off further, to the next week. You get the idea.
>
> Dr Digitalis, by contrast, used her handheld to document her attendance of the lecture during the first minute as the speaker was being introduced. She also used the machine to document the informative answers to her questions and the fascinating discussion with her learned colleagues. Naturally, she used the handheld to make notes on the lecture itself. When back at the surgery the next day, a colleague asks her about the lecture, as he was unable to attend it. Because they both have a handheld computer, Dr Digitalis beams over the lecture notes and discusses the main points and interesting details as they sip tea. Finally, because PDPs give credit for teaching as well as learning, she makes a note of the fact that she taught her colleague what she had learnt the day before.

If this example inspires you, read to find out how to obtain a free copy of the PDP database we designed.

ii. expense tracking

There are many accounting programs available and every practice and accountant has their own preferred system. When it comes to handheld computers, the variety continues. Some of the handheld programs are designed to work easily and directly with the accountant's PC program, but many do not. The problem is that there is no standard format for exchanging accounting data between all the different programs.

On the other hand, this is nowhere near as great a problem as if expense information is lost, inaccurate or incomplete owing to the sheer inconvenience of filling out all the paperwork. You should bear two principles in mind. First, the handheld software you buy must be easy and quick enough that you actually make use of it at all times. Second, the software must be able to exchange data with at least Microsoft Excel, Intuit Quicken or Microsoft Money on your PC. That way, you can know that the accountant will be able to make use of it. If in doubt, ask your accountant for their opinion. They will be delighted that you are making their job easier.

In this case, we recommended Splash Money (www.splash data.com) for Palm-compatibles, and PoQuick Money for the Pocket PC (www.mastersoftmobilesolutions.com). We liked these programs because they gave such good features at low cost. There are many other good programs available and all come with 30-day trials.

iii. cataloguing information

As described in Chapter 12 , the organiser software that comes with all handheld computers is a great advantage. Both the clinicians and secretaries made extensive use of the diary and address book. But in the case of cataloguing information, the most useful feature is the Memo Pad. This humble program allows the making of short notes of only a few screens' worth of text per memo. Much of the information that a clinician wants to keep for future reference is of just such length. The real strength of using the Memo Pad comes from the ease of retrieving information. Again, it pays to look at how Dr Digitalis and Dr Papercut approach the problem.

> In one week, both read an informative paper in the *BMJ* that discusses new guidelines on the management of asthma. They know that the fine details of this paper will be extremely useful for dealing with some of their asthma patients. They look forward to being able to apply the paper's teaching and want to have that information to hand when next dealing with these patients.
>
> Dr Papercut removes the relevant pages from the journal to place in his reference folder. Let us ignore any injuries he might have sustained in the act – there is no need to mock the

man for his name. Nevertheless, he is certainly handicapped by his filing system. For example, he finds that placing the entire article in his folder means that he is soon using many folders, all bulging with information. On the other hand, if he were to focus on just the information that is new to him and important for reference, it is likely to be a very small part of the article. Fortunately, the *BMJ* is very good at providing boxes of information that summarise the take-home messages from each paper. Unfortunately, it takes time to cut out these boxes, as does the labelling of the cutouts. Finally, when Dr Papercut encounters the relevant type of asthma patient, it will no doubt take him a long time to seek out the correct article or box.

Dr Digitalis has no such difficulties. First, she restricts the notes she makes in Memo Pad to the parts of the article that she will need in future. No extra information is stored. Second, although she can make these notes by writing directly on the machine, she has access to an even quicker way. The *BMJ*'s website includes the text of all published work. Using the web browser on her PC she can copy the parts of the article that she needs, then paste them into Microsoft Outlook's Notes. The next time she backs up her handheld, the note she made in Outlook will be copied automatically from her PC. Finally, when she encounters the relevant asthma patient, she taps ''Find'' on her handheld to quickly access the information. She is unlikely to remember exactly where she had stored the note, but this does not matter. She remembers that her note included guidelines by the British Thoracic Society (BTS), so she taps in ''BTS'' when performing her search. The handheld shows her several notes that she made that include ''BTS'' and one of them is entitled *New Asthma Guidelines*. This took less than 10 seconds to find. The search also uncovers a note she had made about BTS guidelines on referrals of lung cancer patients to tertiary centres; the address of the BTS; and a meeting she will be attending in two weeks' time, when a lecturer from the BTS will be speaking. She, therefore, makes a note of any questions she has after her consultation with the patient today, so that she can discuss them with the lecturer during the meeting.

lessons learnt

- Involve everyone in choosing the technology.
- General Practice electronic patient records will integrate well with handheld computers in the next few years.
- GPs do not have to wait until then to take advantage of handheld technology for personal and professional use.
- Not everything that is possible on a handheld is desirable: just because you can carry 20,000 patient records, it does not mean that you should.
- Opt-ins allow greater flexibility in purchasing.
- Check that your handheld works with your computer system because you will want to back up your handheld's data.
- Use multi-platform and future-proof programs such as HanDBase.
- Start storing your personal development plan on your handheld today.
- The Find function is an extremely powerful way to retrieve notes made, e.g. clinical guidelines.

fourteen

case 3 – the acute medicine department

This chapter discusses several issues, including the matter of how to store clinical data on a handheld. Protecting patient confidentiality is critical and complicated in an electronic environment.

the team . . .

This chapter deals with the acute medical department in a district general hospital in the UK. It is typical of many hospitals worldwide in that teams are organised by pairs of consultants, with three junior doctors per team. There is usually at least one member of the team on the ward at any one time, while the other members are either in clinic, admitting patients in the medical assessment unit, on night duty or on their annual leave. Furthermore, the junior members of the team change every three months as they rotate around the specialities.

This trial of handheld computer use involved two such teams, i.e. with four consultants and six junior doctors.

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It is interesting discussing the consultants for two reasons. First, while one team's consultants had owned and used handhelds for several years, the consultants on the other team had never used the machines, nor did they intend to. Nevertheless, all the senior doctors involved understood the potential of the technology in helping the juniors and they pushed very hard for the project.

The second point of interest is how they converted that enthusiasm into funding for the project. They very quickly assembled a budget from multiple sources, based on the multiple roles that the machines would play. Handheld technology is new and every hospital has a limited budget. However, funding is still possible because a business case can be made; for example, some money came from educational funds. Where there is a will, there is a way.

the problem . . .

Like many hospitals in the UK, this one has been trying to cope with the reduction in junior doctors' hours. Reducing hours means increasing reliance on the shift system; more shifts mean more handovers; and handovers carry the risk of reducing continuity of care. The consultants asked whether handheld computers could assist in providing this continuity.

The hospital had an excellent small manual for the staff, called the *Red Book*. It detailed important information: the local telephone directory, key protocols and other small nuggets that helped the clinician get the job done. Unfortunately, in an informal survey of the junior doctors, scarcely any had heard of it and none used it. People simply did not carry it. Although it was available on every ward, the location was always different and not all the staff were aware of how to find it quickly. The hospital has an excellent librarian, who ensured a copy of the text was available on the high-quality internal website; however, few of the wards had yet been equipped to be able to access it. Overall, the availability of good information was not good enough. Again, the consultants asked whether handhelds had a contribution to make.

the solution . . .

Simplicity was important because only one of the junior doctors had used a handheld before. The aim was to equip the junior doctors with the tools for easy handovers and easy access to clinically relevant information. It also had to be easy to add new details about the patients.

Furthermore, because clinical data was involved, high-security and easy to use software were essential.

a. hardware

The teams bought six handheld computers, one for each junior doctor. The handhelds were the most basic model available, with just 8 MB of RAM and a monochrome screen. In our experience, you do not need flashy technology to make a difference in your hospital.

There is an interesting lesson on the purchase process. As usual, the per-item price was a little cheaper online than in the high street shops. However, because six machines were to be bought together, and because the local retailer was trying to get rid of these older models, we struck a deal. They matched the online price and threw in a three-year warranty.

Online retailers rarely do this and hospitals' normal suppliers are no better. If you take control of the project, you can thus make some savings by bargaining.

Total cost: £600 ($900) for six handhelds.

b. software

As usual, we focused on three simple applications:

1. To replicate the hospital's *Red Book*, we used the machines' address book to store the local directory and Adobe Acrobat Reader to read protocols in Acrobat PDF files. Cost: free.
2. HanDBase to store clinical information. We bought five basic licences, at £20/$30 each, as well as a professional licence for

£26/$40, because it included a copy that could be used on a PC.

3. Security Software – TealLock Corporate costs £12/$18 for each Palm-compatible machine and SafeGuard PDA costs £34/$50 for each Pocket PC.

Total cost: £214/$321 for six handhelds and one PC.

If you have read the previous two case studies, details of the organiser software and Acrobat should be familiar to you, so I shall not dwell on them. However, HanDBase and the security software merit a little more discussion.

i. the HanDBase software

I have already mentioned HanDBase in Chapter 13 because it is so powerful and also multi-platform. With the introduction of version 3.0 in early 2002, the program accumulated another must-have feature. The technical name for this is peer-to-peer synchronisation. This means that the program can compare the information on two handhelds and update each with the other's new data. It does all this through infrared beaming. By contrast, other programs do the synchronisation centrally. In other words, everyone backs up his or her handheld to the same desktop PC, using the synchronisation cable. The PC then compares the data on the handhelds and updates them at the next synchronisation.

In practice, this difference is very important. It is similar to the difference between the way doctors and nurses handover.

As a junior doctor, I looked at the organisation of nursing handovers with a mixture of amusement and jealousy. They would all sit down for half an hour that overlapped the end of one team's shift and the beginning of another. They departing team's nurses would discuss every patient with the new team's nurses. The latter nurses would write down the details of this discussion. At the end of the thirty minutes or so, everyone around the table would be aware of every patient's problems and the outstanding jobs.

By contrast, doctors handover individually in corridors. The process is random and hurried. Anything that slows this process down decreases the likelihood of the handover happening in the first place.

Peer-to-peer synchronisation is perfect for this environment. It does not require the clinicians to meet in a specific place, for example next to a particular PC, because infrared beaming is entirely adequate. The clinicians can perform this as often or as rarely as they would like, because the software keeps track of changes and necessary updates. Obviously, the more frequently the synchronisation is performed, the more likely the data is to be up-to-date. On the other hand, because the clinicians can synchronise more quickly than writing notes, they are likely to do so more often.

ii. the HanDBase database

More important than how easy the clinicians find synchronising their data is how easy they find entering the data in the first place. This would determine how much they relied on the machines and software to keep track of their patients. In other words, if data entry slows a junior doctor down, the junior doctor will stop entering data.

Making software easy is rather difficult. As one marketing manager explained, it is easier to convince customers that your software is simple to use, than it is to make it simple to use. There are many books written on the topic, with many making interesting and useful reading. In this case, I found three rules to be particularly useful:

1. *Don't make me think* – this is the title of an excellent book by Steve Krug[1]. The principle is simple. Every form that the clinician has to fill out must be self-evident or at least self-explanatory.
2. "Less is more"[2] – electronic databases are powerful and flexible enough to record an incredible amount of information. You must resist the temptation to take full advantage of this ability. Such resistance takes effort, as summed up by a wag who said, "I wanted to give a shorter speech, but I didn't have time to prepare it." By investing this time,

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[1] *Don't Make Me Think*, Steve Krug, ISBN 0789723107.

[2] Ludwig Mies van der Rohe (1886–1969).

however, you ensure that your colleagues only have to deal with useful information. As they struggle to fill out ever more forms to comply with government mandates, they will thank you for your restraint.

3. "Test your theories" – no matter how clear and quick your database may seem to you, your colleagues will surprise you when they actually come to use it. The only way to find this out is by testing early and testing often[3].

With these principles in mind, the resulting database was composed of three simple tables:

1. **Patient details** – for identifying the patient, this table includes the hospital number, first name and family name. As an extra option, the doctor can enter the patient's date of birth, ward and bed. The table includes a list of all the hospital's wards and thus allows choosing a ward within two taps. This feature is known as a "pop-up list" and is a great time saver.
2. **Problem list** – for keeping track of the patient's problems, this table simply requires the title of each problem. As an extra option, the doctor can enter the problem's start and end dates, priority and comments. The problem's title has a pop-up list because it is such a time saver and it is up to each doctor to add to this list. With time, each team can thus customise the list to include the commonest problems on the ward.
3. **Jobs list** – for keeping track of the tasks for each patient, this table simply requires the title of the job. Again, the doctor can enter extra information, including the job's due date and priority. Each team member is thus able to look at all the tasks outstanding for that day and carry them out according to priority. When they complete a job, they can tick it as such and the database hides it from view.

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[3] Jakob Nielson is a great advocate of usability testing, a technique he pushes heavily in his classic book *Designing Web Usability*, Jakob Nielson, ISBN 156205810X.

iii. security software

There are many ways to secure the clinical data. HanDBase itself comes with some good tools; it is important to note that if the security measures slow the user down, the user will switch them off. Good security must thus be quick security.

To achieve this, we needed a security program that presents the user with a keypad. This is because tapping a number is faster and more accurate than writing it.

The security lock would come into play if the doctor had stopped using the software for 15 minutes. On a ward round, for example, putting the handheld down for a few minutes while writing a prescription would not lock the machine. When the doctor picks the machine up again, it will be ready for action. On the other hand, if the doctor forgot the machine somewhere on the ward, or it was stolen, the software would lock the machine after 15 minutes. To unlock it would require either the password or a complete resetting of the handheld. The latter effort would delete all the data, including the clinical information.

There is not yet a single program that works well on both Palm-compatibles and Pocket PCs, so for this project two programs had to be chosen. TealLock Corporate Edition worked on the machines bought from Palm and SafeGuard PDA would work on the Pocket PCs of any doctors who would join the project in the future. Both programs performed admirably.

The rest of this discussion will focus on TealLock, but SafeGuard PDA is an excellent program and it is important to think of other platforms becoming part of your project.

Apart from being quick, TealLock Corporate has a couple of extra features. First, the quick-entry password feature speeds up the process of logging on by accepting the first four digits in a password. This does not compromise security, because if these digits are entered incorrectly, the software insists on the full digits for all subsequent attempts. Second, the Corporate feature allows an administrator to unlock the machine if the user forgets the password. Finally, only the administrator can change the security settings. In other words, although it is important not to irritate the doctors with slow passwords, it is equally important that irritated doctors cannot switch off the password feature.

c. training

Arranging training on busy wards is tricky.

For the project to work best, all the doctors had to start using the software at roughly the same time. That way, they could begin beaming patient details to each other from the first day. On the other hand, each had a different and busy schedule and there was no way that they could attend a group lecture. My greatest fear in initiating this project concerned the first ward round. How would the juniors manage with the new machines when the busy consultant was quickly identifying problems and planning task lists? After five minutes, I predicted, all the doctors on the team would revert to paper.

In such cases, a little flexibility is particularly useful: I set up a three-day training program.

day 1

On the first day, happily, there was no consultant ward round, temporarily avoiding my nightmare.

I spent one hour with each junior doctor. During this time, he or she learnt how to write onto their machine, how to work with the security software and how to use the database. We spent most of the hour on the latter task, in particular discussing the typical scenarios of a junior's day. In other words, what would they do in a ward round by themselves; if they were with the rest of the team; or if they were handing over to colleagues?

At the end of that hour, each doctor thus knew a little bit about his or her machine and a lot about the good habits of using the machine. I then set them the task of entering the details of their patients. When each doctor on the team had done their share, they would be able to beam the data and pool the team's efforts.

day 2

The second day included a consultant-led ward round. By this time, however, each doctor had had at least a day to play with the machine and explore the software. They were competent, if not confident and quick.

Speed is important. So, on this day, I spent two hours with each team, accompanying them on the ward round. Each of the juniors was entrusted with the care of some of the consultant's patients. As we arrived at each patient, the relevant doctor would be in charge of using the handheld and I would shadow that doctor. The other doctors would take care of writing the paper-based medical notes.

In other words, each doctor had some time to use the machine within the ward round, without any time pressure. My role was to answer any questions they had about the use of the handheld and help them if they got stuck.

day 3

The third day was a safety net. By this time, I expected that the doctors would be quick and confident in the use of their handheld. By spending an extra hour with each doctor, we would have the chance to go over advanced queries and discuss any problems with the software.

d. results

By November 2002, we had been running for two months. So far, the feedback is promising.

i. training

The junior doctors found the handheld training basic but sufficient. It was basic because I did not show them all the applications on the handheld, just the three that were necessary for the project.

However, it was sufficient because they felt safe playing with the machines. This, in turn, allowed them to rise to a very high standard quickly. On the day of the consultant ward round, most juniors were already surprisingly quick and efficient. By the third day, all the juniors had learnt all the tasks and were enthusiastically asking for more programs for their machine.

ii. data entry

Early on in the training, the doctors grasped an important point: the database software is only as useful as the data entered into it.

Entering the patient details for the first time is a slow process. However, once the team had got us over this hurdle, adding jobs and problems while on the ward round was reasonably quick. Because the team also found the database to be so useful, they were more than happy to continue entering data into it.

iii. handovers

What the team found most useful about the software was the ability to synchronise the handheld patient database through beaming. In a time trial, it took just under seven and a half minutes to perform a written handover. A handover of the same patient details through beaming, on the other hand, took just one minute and seven seconds. It goes without saying that beaming meant all the data was accurate and legible.

Still, even this seems too long in a busy ward. Beaming three tables of patient information in the database requires two stages. First, one doctor beams each of his or her three tables individually to the other doctor. Then, the latter must beam back each of their three tables.

One way to get round this would be for future versions of HanDBase to automate the synchronisation of multiple tables. More interesting will be the development of wireless technology. Technologies such as WiFi and BlueTooth allow the synchronisation to occur wirelessly to a central computer. In other words, instead of the doctors constantly beaming the data between handhelds to make sure they are up-to-date, the machines would constantly maintain a link to the central database. The data that the doctors view would therefore always be the latest data, pooling information from all the clinicians around the hospital.

As of November 2002, we are not quite there yet, but wireless technology is rapidly getting more affordable, energy efficient and secure. This brings us to the next point.

iv. security

Securing information requires encryption. This transforms the file containing the information using a secret code so as to be unintelligible to unauthorized parties. The history of encryption[4] is a fascinating one and the latest techniques are a little complex[5], but what matters the most is that the strength of encryption is measured in bits. 1-bit strength encryption is half the strength of 2-bit, which in turn is half of 3-bit strength.

TealLock uses 128-bit strength encryption, which is sufficiently powerful and the current industry standard. The doctors also found it fast and convenient.

There are still some holes though. For example, within the 15-minute window, if someone steals the machine before it locks, they can freely look at the clinical data. When compared to paper, this seems a tolerable risk. In other words, most hospitals' paper records are relatively easy to access by anyone walking onto the ward and have no password protection. On the other hand, the doctors are likely to take the machines out of the hospital, where the risks of theft are more significant. Furthermore, many people consider electronic information more risky because of the volume of information potentially accessible: not just one paper-based file, but thousands.

Overall, this risk is limited by the fact that after 15 minutes, the machine will lock by itself and the thief has no way of changing the password or security.

As any hacker will tell you, however, the greatest software security risks derive from human error. During this project, two major aspects were apparent and the best counter to them is education.

First, choosing a simple number-based password is dangerous. Others can guess it and bypass it. The training included an explanation of this and we asked the junior to choose a non-obvious combination of at least eight numbers and letters.

Second, there was nothing to stop the doctors beaming the clinical data to a handheld that did not have security software. This is perhaps the greatest worry and again the training included an explanation of this fact and repeated reminders **never** to do this. A discussion of the legal implications of such an act is also a useful aide-memoir. Doctors are legally responsible for the safety of data.

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[4] *The Code Book*, Simon Singh, ISBN 1857028899.

[5] For more information on the techniques, visit the excellent How Stuff Works site at www.howstuffworks.com/encryption.htm.

A similar risk arises if the doctors synchronise the handhelds with their PC, using the cradle. If they used a PC at home, or an unsecured hospital computer, the data would be available for free access. For this reason, we did not give the cradles that came with the handhelds to any of the team members.

Naturally, many doctors asked for the cradle, especially as they became more confident with and excited about the machines' capabilities. Again, we explained the risks involved and convinced them of the need to forgo the advantages of the cradle. One advantage that they did not have to forgo, however, was the ability to back up their information. This is because their colleagues' handhelds act as backups. In other words, if one machine were to lose all the data, the other team members could beam the security software, the address book, HanDBase and the patient details.

Again, the adoption of wireless technology should bypass many of these problems. In the future, we predict a central computer in a hospital holding all the data, with handheld computers accessing that data wirelessly. As long as the handheld is within the hospital's premises and the user is logged in with security, it can display this clinical data. As soon as the handheld travels outside the boundaries defined by the wireless technology, it loses all the sensitive clinical data.

Whatever happens to the technological details, security will always be important and difficult. Our strong advice is not to attempt to store any clinical data on your handheld without discussing the matter with your hospital's computer department. This is not to scare you, but to show you that it is possible to find a way to use your handheld in your clinical work if you have the right help and advice.

v. a taste of the future

One other outcome of this project to mention is that all the doctors in the pilot developed a different method of thinking about their work methods. They soon understood the potential of the handheld machines and wanted to see their use rapidly applied. They particularly wanted to be able to use the cradles to enable them to explore the other handheld software available. When they could not do so because of the security issues, they bought or planned to buy their own personal machines.

We believe their approach to clinical work has changed as a result of this project, and changed for the better.

iso 17799 and bs 7799

This pilot project highlighted to the team some of the security issues involved with handheld computer technology. As they consider expanding it to the rest of the hospital, the team is updating its practices and protocols to meet the Government's standards for confidentiality of healthcare information.

Fortunately, there is much good information already available. In particular, the comprehensive international standard, ISO 17799, spells out the requirements for assuring the integrity, availability and confidentiality of clinical information (www.iso17799software.com). Its UK equivalent is British Standard (BS) 7799 and compliance is achievable with a little thought and planning. As your IT officer may already be aware, the NHS Information Authority (NHSIA) provides further information on their website (visit http://nww.nhsia.nhs.uk and click on the link to ISO 17799).

The very helpful Tom Lillywhite (tom.lillywhite@nhsia.nhs.uk) is the Security Risk Manager and BS 7799 lead at the NHSIA. His group has produced two toolkits, one for primary care and one for secondary care, which guide clinical teams through the standard. Both are freely available on request and **I strongly recommend consulting these for any project involving clinical data.**

lessons learnt

- For funding the purchase of hardware and software – where there is a will, there is a way.

- You do not need expensive technology to make a difference, particularly with handovers in busy wards.
- When buying handhelds in bulk, do a deal.
- Make things easy for users.
- Plan to allow colleagues to join your project using their own machines.
- Be creative with your training schedule – you will need to fit around busy clinical schedules.
- Focus initially on good habits in your training.
- Security is critical. Talk to your IT staff about compliance with standards such as ISO 17799 or BS7799.

SECTION THREE

ON BEING A PROJECT CHAMPION

Of all IT projects attempted, 50% fail, often because the department itself sobatages it. In other words, for your project to work, you absolutely must convince others to join you. On the other hand, the quality of success achieved in the three case studies of Section II was greatly enhanced by having an enthusiastic champion for the technology. By reading this book, you are likely to become the most informed member of your team on the topic of handheld technology. In other words, you are ready to become the champion.

This section is about the skills and tools you will need as you convince and coordinate your colleagues in a project involving these machines.

Handheld Computers for Doctors. By Mohammad Al-Ubaydli
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fifteen

making change happen

Sales skills are about convincing someone to do something. In the medical profession they are often sneered at as the province of pharmaceutical company reps. But if you would like to convince your patient to stop smoking, to persuade your manager to spend money on the more expensive brand of equipment, or to negotiate with your healthcare trust on the best working hours, then you need good sales skills.

As a junior doctor, I wanted to see how much change I could make in one year in the IT usage habits of my hospital. This chapter describes how I was able to convince doctors and departments to invest money, time and effort in this technology. In particular, I hope to show how any doctor can make change happen without having any managerial power or insider influence. ‘All you need is love’ . . . and good sales skills.

all you need is love

It is important that you care about what you are trying to sell. People will not care about your argument any more than you do.

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Therefore, if you are half-hearted in your attempts at persuasion, it is only correct that you are not taken seriously.

practice makes perfect

However, competence is more important than just enthusiasm. If you learn best by reading, then I recommend you look at *Selling the Wheel*[1] and *Public Speaking for Dummies*[2]. I found both to be educational in the principles of communication.

But the most important was, to my surprise, Patch Adams' autobiography[3]. Put the Hollywood interpretation out of your mind and focus on Adams' central skill: how to connect with anyone, instantly. He did this by constantly practising and putting himself in unusual situations. He conducted his favourite "assay" in lifts. How many floors would it take for a conversation with a complete stranger in the confines of an elevator to arrive at a personal and meaningful topic? By putting himself in such situations and trying many different techniques, he developed his own highly effective style.

In my case, I practised on patients with a cold. The first four months in my post were as a GP and coincided with the winter months. Thus, every GP's "heartsink" patient – stricken by the common cold and demanding antibiotics – became my favourite assay. I tried everything on everyone. In fact, I looked forward to my next case so I could test out my latest technique. Mother with a sick child? Express concern for their child and stress the side effects of the antibiotics. 25-year-old professional? Show your admiration for their soldiering on within the tough working environment. 40-year-old who is worried about that horrible sore throat they had last year? Buckle under and give them the prescription but predict that the cold will get better by this Sunday. And if it does not, then they can take the antibiotics immediately on that day . . . but not before.

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[1] *Selling the Wheel*, Jeff Cox, ISBN 0671033107.

[2] *Public Speaking for Dummies*, Malcolm Kushner, ISBN 0764551590.

[3] *Gesundheit!: Bringing Good Health to You, the Medical System and Society Through Physician Service, Complementary Therapies, Humor, and Joy*, Patch Adams, Maureen Mylander, ISBN 089281781X.

Back in the hospital, I improved my persuasion skills by actually volunteering to be involved in difficult situations: patients who want to self-discharge; patients who refuse to take medication; family members angry about the care the patient has received. I saw these learning experiences as equally important as performing my first lumbar puncture or my first audit. They are all part of being a good doctor.

become a model citizen

Getting your first handheld computer is a little like getting your first car – you never really understand what it can do for you until you actually have it. However, whereas almost everyone expects to own a car as they get older, no similar expectation exists for handhelds. So how can you possibly explain to someone their need for such a machine when they are so comfortable in their current state?

I decided to start by highlighting examples of functions that no other doctor in the hospital could achieve without a handheld. In the first few weeks, I asked for everyone's name, phone number, room number and email address. I also became involved in the Doctors' Mess. Thus, when it came to organising any social event, other doctors always had to go through me. I made sure they all knew that this was possible and necessary because I had that machine in the palm of my hand.

Even more powerfully, I had the good fortune to meet the outgoing junior doctor, who already had one. He transferred to me the phone numbers of all the wards and departments, which formed the basis of the hospital directory that was used in subsequent case studies.

I played on the situation in two ways. First, all the doctors soon realised that the fastest way to get the phone number for a ward was to ask me to look in my handheld rather than to wait for switchboard to answer. Second, I explained to everyone how easy it was for my colleague to transfer all his information using beaming. I promised doctors who bought a handheld that I would transfer the information to them in the same way.

repetition, repetition, repetition

Every year, advertising awards are given to the funniest and most innovative adverts. So why do so few advertisers actually invest in innovative campaigns? Because the industry has known for a very long time that repetition beats innovation every time. A company will sell far more product with a cheap but heavily repeated advert than it will with an expensive novel one.

Thus, I nagged people continuously about using handhelds. I used every possible situation to remind people how much better their life could be with a handheld computer. I like to think that my reminders were always different, intelligent and witty. Nevertheless, I fully understand that frequency was their most important attribute.

understand every customer

In a recent survey on the impact of health information, GPs placed TV as the most influential medium and saw their own contribution as minimal. When patients were asked, however, they named GPs as by the far the most trustworthy source and TV one of the least. Why do patients value the doctors' opinions so highly? It is partly because the doctor presents the advice in a way that is tailored to that patient's problem.

In the same way, it is important to match your sales pitch to the person you are trying to convince. After a few months in the hospital, I got to know everyone, their style and their needs. Thus, I understood how best to approach every doctor about buying a handheld computer. For the surgeons, I demonstrated how to make a HanDBase surgical logbook, whereas for the physicians, I highlighted the usefulness of ePocrates. The academics liked to hear about the range of medical textbooks and journals, while the socialites just wanted to see the games. Only with the tiny minority of technophiles did I discuss the specifications of the actual machines.

start low, go slow

My vision is for the Government to provide every doctor with a handheld computer as they arrive at their hospital. A hospital that would not do this would appear as silly as one that expects its doctors to pay for their own pagers. That is for the future. In the meantime, my aim was to convince just one doctor to buy a handheld computer.

After four months, I made such a breakthrough. My consultant, Mr Nick Packer[4], agreed to buy a handheld because I promised to teach him how to use it during my seven weeks with him.

Four whole months to yield one user for just one handheld computer? It soon became apparent that this was time well spent. Mr Packer quickly took to the machine and began using it everywhere. Moreover, because I had spent so much time teaching him how to perfect his use of the handheld, he told everyone about me. Now, whenever I have a doctor who is still wavering about making the purchase, I recommend they speak to Mr Packer. They always end up investing in a handheld.

follow the leader

For Christmas, I bought a card for the Doctors Mess' cleaning lady. I signed my name at the bottom then asked every other doctor to sign their name as well. What I saw was amusing and educational. The first doctor signed underneath my name, the next doctor signed underneath there, and so it went. When space began running out, the other doctors began shrinking their handwriting rather than making use of all the other bare areas on the card. Even when I pointed at where the doctor should sign, I could see how troubled they were by switching away from the path that their colleagues had chosen.

This exemplifies one of the biggest problems you will encounter in the NHS when it comes to making change – everyone does what everyone else is doing.

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[4] In the UK, doctors take on the prefix Mr or Ms after they pass their surgical exams.

On the other hand, it can be an opportunity. We are arriving at the point where the vast majority of doctors have heard of handhelds and many know someone who owns one. Showing this book to your colleagues could be the final proof they need that other doctors are considering the technology to be a useful and trustworthy tool of the trade.

the end?

As I came to the end of my year, I felt proud of what had happened in King's Lynn. Many doctors had bought handhelds and departments were making institutional purchases. Most importantly, many of the key educators and decision makers had bought one. A virtuous circle has started, whereby it will soon become the norm for doctors to have a handheld computer. Furthermore, nurses and their managers are also asking to buy handhelds, triggering another wave of enthusiasm and changes in working practice.

However, the achievement I am proudest of is that colleagues have started to think differently about what they can achieve at work. Rather than often feeling discontented and impotent about the state of affairs, they see that it is possible to bring about change. They are not waiting for the Government's next Plan to fix things – they have asserted their own power to change.

sixteen

talking to the IT department

Hospital clinicians have some level of access to their IT department. The staff of this department can be a great help as you push your handheld computer project. However, all too often, doctors misunderstand and misuse this resource. This chapter explains three principles to avoid misunderstandings and proposes three practices for dealing with your future allies.

principles of understanding

In most UK hospitals, finding the computer support staff requires a trip to the basement. Not only does this location (accurately) symbolise the importance that the hospital gives to these people, it also creates a distance from normal clinical practice.

1. pity the people

NHS IT staff are underpaid and overworked. In other words, they are just like the doctors, nurses and other clinicians. However, whereas many complaints of clinical staff can command a lot of

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respect from friends, family and the media, computer workers have no such outlet. The situation is worse when you consider how lucrative private sector IT jobs often are[1]. Every year, the average wage for computer graduates goes up, as the economy becomes more and more dependent on these skills. The NHS should be no exception in needing these people, but the wages and contracts it offers are often terrible.

Furthermore, the clinical worker in the NHS is at best snobbish and at worst abusive towards members of the IT department. I have seen consultants' secretaries shouting down the phone because the computer was not being fixed fast enough and the waiting list for assistance was too long. These same secretaries are themselves driven to tears by abusive patients angry at their surgical waiting lists. In both cases, the person being shouted at has little contribution to or control over the problem. However, whereas every clinician will try to understand the secretary's plight, no one will hear the IT department's woes, let alone understand them.

2. the it staff should be your friends

It is important to realise that good medicine requires good information management, which in turn requires good computers. The IT department is there to help you in this respect. Like other NHS staff, the vast majority are hard working and keen to help. If you understand where they are coming from, it is possible to make great use of their knowledge and expertise.

3. but they are still geeks who like cool toys

It is also important to realise that computer staff like computers. They are passionate about technology and all the cool things it can do. ''Cool'' is important here. Many cool things are clinically useful, and vice-versa. But not always. It is thus helpful to be somewhat on your guard when dealing with the boys (and it is usually boys) and their toys.

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[1] Things were not always so bad. Many medical computing technologies were pioneered in the UK. For example, in 1975, Ottery St Mary Health Centre became the world's first paperless GP surgery. For a fascinating description of the process by which the British government wasted this lead, read the paper by Tim Benson *BMJ* 2002; 325: 1086–9.

Take the example of choosing a handheld computer. Pocket PCs are cool. For example, they can surf the web better than most Palm-compatibles. Such capabilities are commendable to be sure, but rarely clinically useful. That's because the surfing is done using either a mobile phone or a wireless network card. Naturally, the former is not an option in a hospital, but in most UK hospitals, neither is the latter. The hardware required for wireless networks is still too expensive for most institutions. So buying a machine so powerful that it can surf the web wirelessly is certainly cool, but an unnecessary expenditure if the network will not reach your hospital for another three years.

practices of working

So, how do you put these principles into action? Having understood these colleagues, you must also do a little work with them.

1. understand what you want to achieve before you speak to them

Mr Turner, my secondary school economics teacher, taught us much more than economics. One of his favourite pieces of advice was that you should ''Be careful what you ask for. You get what you ask for, not what you want.''

In other words, think carefully about what simple problem you would realistically like to solve. The more detailed you are, the more useful the advice will be. For example, if you ask to be able to carry all your patient records with you, the answer will have to be a computer system that will replace all your paper notes. While this is desirable, and all hospitals are working on it, the solution will take up large amounts of money and time.

A little thought and you might decide that what you actually need is a problems and jobs list for every patient on the wards. This need is much easier, cheaper and faster to solve, as shown in Chapter 14.

2. make sure they are able to support you

Discussing your desired purchase with your computer support team before purchase will avoid nasty outcomes and permit smooth transitions. An example of a common risk is the compatibility between the handheld computer you want to buy and the desktop computer you already own. Most handhelds today require a USB connection, but some old desktops to do not have this socket. Pocket PC handhelds and those made by Sony will not work with a Macintosh desktop or laptop. Nor do Sony handhelds work with some versions of Microsoft Windows. The list is rather long and technical, but easily digestible by your support staff. Take advantage of this great resource.

More importantly, even if the new handheld computers will not work with your existing PC, the IT department will often surprise you by how flexible they are willing to be. Their teams are constantly upgrading computers around hospitals and may happily adjust the scheduling to meet your needs. In other words, just because you currently have an old computer, it does not mean you will always have an old one.

3. make sure you are able to support yourself

Many computer problems can be solved with a little bit of knowledge. Yet many clinicians are too scared of technology to try to acquire this knowledge. This leads to delays as they wait for the IT support staff to come and solve the smallest problem.

This is most amazing given that doctors learn new skills every day by applying the ''see one, do one, teach one'' principle on living patients. Learning on a computer is usually far easier (and safer).

There are many ways to improve these skills, from reading books to taking courses, but perhaps children can teach us the most powerful method: playing. One of the reasons youngsters are so good at picking up new technology is because they do not find it scary, but rather delight in pressing all the buttons.

Reassure your colleagues that handheld computers are simple to use and difficult to damage. Encourage them to play and learn; you will be surprised at how many problems you are able to solve by yourselves. Remind them that handhelds are a portable extension of their desktop PC and if they delete data or programs, it is usually easy to replace these by either beaming or synchronising.

seventeen

choosing software for the team

The great thing about handheld computers is the range of software available. As discussed in Chapter 3, you can have a lot of fun choosing the software with the features you want at the price you can afford.

When it comes to buying software for use by the whole team, however, you must consider a few other aspects. These include simplicity, industry standards and multi-platform readiness.

focus on three simple uses

With time, you and your team will find an increasing number of uses for your handhelds. Indeed, as you will read in Chapter 20, this aspect of the machines eases the process of getting funding.

Nevertheless, when you start the project, I urge you to keep things simple.

A good rule of thumb is to stick to three simple applications for each project. This rule of threes is not as restricting as you may think. For example, count the organiser functions of the machine as

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one application. In other words, the Date Book, Address Book, To Do Lists and Memo are so simple and powerful that I lump them together.

There are several reasons for restricting yourself. First, when it comes to training the team, the learning curve will be gentler. Second, the software itself is more likely to work: complexity makes for crashes. Finally, it is good financial discipline. When making the business case for the purchase, if it is not justified based on simple software that simply works, then you should not try to base it on lots of software that might work.

stick to industry standards

Technology is constantly improving and advances in hardware and software continue to impress me. Usually, your team will upgrade or expand their equipment. But you will soon discover that your most valuable investment is the time you have spent collecting and inputting data.

The only way to protect this is to ensure that you store the data in an industry-standard format. In other words, you must choose a format that the computer industry will continue to support even as new technologies arrive. To understand this, think about your hospital or GP surgery's patient record system. What would happen if today you moved to a new computer system that had none of the patient records you had accumulated over the past 10, 20 or 30 years? This example is particularly frightening to GPs, who have long since taken advantage of, and become dependent on, computer technology for recording patient data. This data is perhaps far more valuable than all the money spent on buying the technology.

Do not be fooled into thinking that you will never upgrade. Even if you plan to use the same type of handheld computer and software, the hardware will eventually break and you will need to buy a new one. You must ensure the old data travels smoothly to your new system.

So, how can you tell if your choice today is also the industry's choice tomorrow? Of course, you can never predict with certainty.

Nevertheless, there are a few rules of thumb to guide you. For example, the industry standard software on your PC is likely to become the industry standard on the handheld. In other words, if you are buying word processor software, make sure it works with Microsoft Word; for accounting software, go for Intuit Quicken compatibility; and for databases, easy integration with Microsoft Access is an absolute must, even if you do not own or use the latter.

Another rule of thumb is to find out what other people are using. Ask your colleagues in other institutions or countries what software they have selected.

Perhaps the most powerful way to do this is to find out the sales figures directly. Handango (www.handango.com), for example, includes a league table of the top selling software in every category. If your software is in the top three, it is clearly a market leader and thus a safe bet. This is particularly useful in cases where there is no PC-industry standard or if several handheld versions work with the same industry standard. Go with the herd.

Incidentally, this does not mean you should avoid buying a Pocket PC. It is true that Palm-compatible handhelds are the industry standard and have more software titles available than Pocket PCs. However, the latter still represent a significant minority of users and the power of the machines ensures that medical software developers usually make a Pocket PC version. Again, both Palm and Pocket PC are safe bets and you should just go with the machine you enjoy the most. This brings me to my next point.

be ready for multi-platform

The software you choose must work on both Palm and Pocket PC. For electronic books and some other applications, you can even include compatibility with other handheld platforms.

This is important even if your project begins with buying machines of the same type. This is because in the future it is highly likely that a machine of the other type will be added. Perhaps the machine will be bought by your existing team as you are tempted by new technology. Alternatively, perhaps a new member of the team will have their own handheld computer and would naturally like to use it within your own existing efforts. Either way, you must prepare for the eventuality.

Even if you never go down this path, knowing that your data is safe brings peace of mind. Look after it and it will look after you.

eighteen

training

At a recent conference, I heard an interesting figure. Apparently, for every dollar spent on buying new computer equipment and software, eight dollars are spent on training the clinicians. Do not be scared of this. The point is that training should be an important part of your plan. In fact, one of the best reasons for choosing handheld technology is how easy the machines are to use. Nevertheless, as project champion, you must budget time, money and effort towards training to get the full value out of your team's investment.

The first step is to convince your colleagues that the training is a good use of their time. The next step is to make sure that the training actually is a good use of everyone's time. Through our work on handheldsfordoctors.com, Dr Laura Dean and I have picked up a few pointers on how to make training work. Here is our list of top ten training tips:

1. Brevity – the first thing a user must learn is how to input data on the machine. This is particularly the case with Palm-compatible handhelds, which use a form of handwriting recognition called Graffiti. The key aspect of this tutorial is that it must be short. Spend no more than five minutes going over the technique of handwriting.

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2. Activity – people learn by doing. Encourage the user to practise their data entry with useful tasks. For example, let them write their own address into the handheld.
3. Creativity – you can have a lot of fun designing tasks. Don't just tell them about the ''Find'' function. Instead, challenge them to find that paper on cholesterol you hid away on your own machine.
4. Relevance – to ensure that your student has fun, make sure that every task is relevant to their clinical practice, at least to start with. Often the clinician is busy, sceptical and hence impatient. Only by starting with tasks that highlight the handheld's ability to save time will your student want to spend more time exploring the machine's full potential.
5. Beaming – at a recent conference at which we spoke, over 90% of the audience already owned and used a handheld computer. This was not surprising, because the conference was about electronic health and filled with computing professionals. However, as we mingled with them later on, we found out that no one had used beaming before. Not only were they missing out on a huge amount of functionality for which they had already paid, but they were also missing out on a lot of fun. Do not let your student miss out. After he or she writes their first address, ask them to beam it to you. Then beam them the other phone numbers, protocols and jobs lists that you have. They will quickly see the advantages.
6. Confidence – as the clinician who is most experienced with a handheld and acutely aware of your own department's needs, you are supremely qualified to help train your colleagues. Have faith in your ability to lead the way and to set the curriculum.
7. Support – it is always good to have help from your IT department, especially during the first session, because they can help you deal with any machines that crash. As mentioned in Chapter 16, make friends with your IT staff and involve them in your plans early on.
8. Flexibility – as shown in the three case studies, there are many ways of gradually phasing in the training. With a little thought, you can find a way that matches the schedule of your colleagues.

9. Simplicity – at the start of your project, pick three simple ways that a handheld computer can help your department. This simplicity ensures that only a small amount of time and effort are necessary for success, but greatly increases everyone's confidence that the problems are being solved.
10. Independence – at the end of your project, make sure your colleagues know enough in order to learn on their own. Show them how to find, try and buy software. Combined with the confidence of seeing your three simple applications working successfully, the members of your team will be inspired to tackle other problems in the department. *Be prepared for your former students to teach you new solutions.*

nineteen

electronic documents

Each handheld computer can carry an enormous amount of clinical reference information. As mentioned in Chapter 7, many medical textbooks are already available to download from the internet and your team will find these useful. However, often the most relevant type of reference information is that generated locally. This includes locally produced articles, lectures, protocols, papers or any other information you want to carry with you and share with your colleagues. This chapter begins by showing you how easy it is to make these documents available to your colleagues.

If you enjoy the ease and power of sharing small documents and are feeling adventurous, you might even want to learn about making your own electronic books. With this in mind, the second half of this chapter looks at the history of publishing and discusses how you can publish your own electronic book.

how to share documents

There are many ways to share documents with your colleagues; examples include using Memo, word processors and readers. Each has its own strengths and weaknesses. Often, clinicians choose reader programs because they ensure that the document cannot be

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changed. For example, as discussed in Chapter 12, whoever is reading the Adobe Acrobat document cannot accidentally delete a decimal point from a drug's dose. Therefore, in this chapter, I shall discuss all three types of document-sharing methods, but focus on Acrobat.

a. the humble memo

If you have beamed a memo from your handheld computer to a colleague, then you have already shared a document. Yes, it really is that simple. Part of the simplicity is because all Palm-compatibles and modern Pocket PCs can accept beamed memos.

With time, however, you will come up against limits. First, the memos are quite limited in length. This is fine for an abstract of a paper, but no good for a detailed protocol. Furthermore, apart from writing in capitals, you have no other formatting tools. No bold, no large writing and certainly no tables.

Not everyone finds these limits a problem. I, for one, still depend on the Memo program for most of my notes. In fact, the discipline imposed by sticking to such short snippets of information is of great benefit to the end user. In other words, reading a concise summary is much better than scrolling through vast amounts of detail on the small screen of a handheld.

b. the flexible word processor

Usually, the lack of formatting on a handheld computer drives clinicians to use word processors. This transition is particularly easy because the vast majority of local documents have already been created in Microsoft Word. These files can be easily and quickly imported onto the handheld using Word To Go on Palm-compatibles and Pocket Word on Pocket PCs.

But be aware of two important issues: first, just because it is easy to import a file, it does not mean it is easy to read the file. What is clearly readable on paper or a large PC screen can involve agonising scrolling on a handheld. You must try to divide your document into smaller chunks to make it usable on your handheld.

Second, you must ensure that your colleagues also have the word processor program. On some of the older or lower-end Palm-compatibles, this is not the case. Nor is it possible to beam Word To Go files to Pocket Word, or vice-versa. As mentioned in Chapter 17, forcing your team into a single platform is not good practice.

In summary, I do not like these programs, but do try them to see how your team gets along.

c. the safe adobe acrobat

Adobe has two products that deal with document sharing: Acrobat and Acrobat Reader (www.adobe.com/acrobat). Acrobat allows you to create read-only documents that look the same on any copy of Acrobat Reader. Acrobat costs money and runs on PCs and Macs. The Reader is free to download and runs on PCs, Macs, Palm-compatibles and Pocket PCs, as well as allowing users to print on paper.

The idea is that you can import any document in Acrobat and your colleagues can read it on paper, PC or a handheld computer. That is why Adobe calls it a Portable Document Format (PDF). This is a nice idea and it was the reason that Dr Keidan, consultant haematologist, chose the software in Chapter 12. She quickly converted her existing Microsoft Word protocols into PDF.

The trouble with Acrobat is that the idea does not work so well in practice. This is especially true on handheld computers. Trying to represent an A4 page on a tiny screen is particularly irritating because version 2.0 of the Acrobat Reader is so slow. Worse still, beaming several documents is time consuming. To share a whole set of protocols with your colleagues, you have to beam each document individually.

Nevertheless, the security of unchangeable documents is attractive to many clinicians. Furthermore, the handheld version seems likely to improve. By the time you read this book, it is quite possible that my quibbles will have been overcome.

buying acrobat

Adobe sells Acrobat, which is necessary for making PDF files, for $249.00. If you are going to use the software for many documents in your department, this seems a fair price to pay. Moreover, you will discover many other applications of the program as you begin using your Acrobat documents for PC and paper, as well as on your websites.

In fact, the software is so useful that your local IT department is likely to have a copy already. Take advantage of this. If you ask nicely, they might even agree to convert your documents for you.

Adobe also operates an interesting pay-per-use policy. The first five files are free (http://createpdf.adobe.com/), after which you can pay $9.99 per month or $99.99 per year. This is a great way to try out the software if no one in your organisation owns a copy.

a brief history of publishing

In the 1450s, the nations of Europe were undergoing a massive increase in complexity, with developments in science, commerce, law and warfare. In many cases, the bottleneck for further development was the ability of scribes to produce written documents. No matter how many new entrants to the profession, society still needed more.

Enter Johannes Gutenberg – inventor, goldsmith and businessman. Like any good businessman, Gutenberg was constantly on the lookout for market opportunities. He diagnosed the market's need to mass-produce written texts. Also like any good businessman, Gutenberg borrowed money to research a solution for this gap in the market. He produced the printing press and innovated in the use of movable metal type. Again, like any good businessman, he was also good at marketing: his first printed title was the bible, the world's first and still greatest bestseller. However, Gutenberg had an eye on where the real money was – indulgences. These were rich people's way of buying forgiveness from God for their sins and the Church's way of funding religious wars. Gutenberg wanted to mass-produce these indulgences for the Church – in effect, he wanted to establish a licence to print money.

Sadly for Gutenberg, he never got that far in his business model, because he was unable to pay off his creditors in time. His printing press and patents were confiscated. Nevertheless, he had still unleashed a revolution: publishing.

d. modern publishing

Future historians might decide that Harry Potter was the pinnacle of publishing in the 20th century. The book that became a brand reminded millions of children of the joys of reading and contributed to mass literacy. To me, however, the contents of my college library exemplify the pinnacle.

As an undergraduate medical student, I was frustrated initially by the books held in this library. None of the major textbooks that I needed were available when I needed them most. Eventually, I grudgingly bought the textbooks and made peace with the library. I was then free to explore its other books with an open mind. These books were obscure. Really obscure.

One book, for example, was devoted to the six muscles of the eye. Not vision, not the eye, but the six muscles of the eye. Another book was entitled Queuing Systems. Queuing theory, I discovered, is an expanding science, with applications from computer networks to aircraft control.

Each year, the publishing industry produces thousands more such books, ever larger, ever more specialised and ever more obscure. Yet every year, the industry manages to make money from such books, allowing further investment. The miracle of modern publishing is that it is still cost effective to produce obscure texts.

e. electronic publishing

With the advent of electronic books, there is the possibility of further bringing down the costs of publishing. Moreover, the price of handheld computers, the platform for electronic book readers, is falling. Prices are already low enough to allow anyone to publish to everyone. The UK medical publishing industry had originally held back from taking advantage of the new possibilities, waiting to see the results of the US experience.

As a clinician with specialist knowledge, you can still push ahead with using the technology. Think about it. You can easily and cheaply produce an electronic book that contains your articles, lectures, protocols, papers or any other information colleagues may find useful. In addition, the cost of distributing the content is close to zero. Put it on a floppy, email it to a colleague, post it on your institution's website or beam it to your team. The knowledge is available for others to read and use.

publishing your own electronic book

There are three steps to publishing your own electronic book:

1. First, you must create the text.
2. Second, you need to convert this text into an electronic book, or e-book, format.
3. Finally, you can distribute this e-book.

The first step is by far the most difficult, but involves the same technology you deal with every day, a word processor. Any word processor will create a .doc or .txt file. To make an e-book though, you will need to convert this into webpage language: HTML (hypertext markup language).

You can do this in Word by choosing ''Save as Web Page . . .'' from the ''File'' menu, but the ideal medium to work with is a web page editor such as Macromedia Dreamweaver or Microsoft Frontpage. Web page editors create files in HTML format.

Using HTML is good for two reasons. Superficially, this is because all electronic book converters are HTML ready, whereas only a few are Microsoft Word savvy (and none works with other word processing programs). More importantly, the principles of making good links between sections underlie the design of a good electronic book. Making an e-book friendly web page from a long text document is best done by splitting the document into digestible chunks, then creating links between them. Otherwise, your users will need to scroll down long sections.

Having designed the set of web pages that constitute the book, you then have to convert them into a single document – an electronic book. So far, there are many players in this market, with many competing formats. This is unfortunate, but it does not mean that you have to commit to one format now. As mentioned above, all the software vendors depend on a starting file being in HTML. Furthermore, the conversion process takes minutes (and can be automated), meaning that you can easily publish your document in a form that is suitable for all formats. Simply drag the web pages into the window of the conversion program and press the publish button.

In 2002, there are four major players in the market to choose from. You have already read about Adobe (www.adobe.com/acrobat), but Microsoft (www.microsoft.com/reader), MobiPocket (www.mobipocket.com) and Palm Digital Media all have their own product. It is not yet clear which the winner will be. Palm Digital Media (www.palmdigitalmedia.com), formed by Palm's acquisition of PeanutPress, has the highest earnings from book sales. On the other hand, even these earnings were only just over $11 million in 2001, meaning the market is in its infancy. Adobe's Acrobat Reader has an installed user base of 140 million worldwide. However, the vast majority of these are on PCs. The Microsoft Reader is the default reader in Pocket PCs and Windows XP, giving it a growing user base. This still means that many potential customers are excluded, including the 70% of handheld computer owners who use a Palm-powered device.

If there is one take-home message from this chapter, it is that you should not use Microsoft Reader. For all its features, it is not multi-platform and you should not consider it for any handheld project.

Instead, you might find that the most attractive solution comes from MobiPocket (www.mobipocket.com). A small and innovative French company, it is expanding at a rate that has surprised its competitors. First, it makes its reader software freely available for all handheld computing platforms, including Franklin, Psion and Symbian. No other company is doing the same yet. Furthermore, its publishing software is free for personal use. Upgrading to the Standard or Professional versions allows faster and more powerful document creation, but this is by no means necessary. For these reasons, we choose MobiPocket to deploy *Medical Approaches*, described in Chapter 7.

The final step in the publishing of your electronic book is distribution. If you do not want to encrypt your document, then distribution is easy. Post it on a website, email it to colleagues or copy it onto disks. For most cases, this is the ideal, easy and affordable solution.

If you would like to sell the book, or at least control its distribution, then encryption is necessary. Encryption costs money, either in the form of an expensive software suite or licensing fees. Thus it is usually reserved for commercial texts. In addition, the encryption allows quite a sophisticated degree of control, including restricting the book to a single handheld computer and blocking all attempts to copy it to another computer. The block is in place even if the same user who paid for the book owns the other computer. This policy has proved controversial, with most users resenting the restrictions. In the USA, such issues are being debated in, where else, the courts.

It will take time to resolve the issues of competing multiple formats and the intellectual copyright controversy. Nevertheless, it is already possible to use the technology to create specialised medical texts available to all. So, the next time someone discusses making their lecture, paper or textbook available to students or colleagues – think of using electronic book technology.

twenty

getting the funding

If you have read this far, then congratulations are in order. I hope that you feel excited and educated about handheld computers. All that remains is the small matter of money.

Handhelds are cheap, but not free. As discussed in Chapter 13, it is possible to convince colleagues to make a personal investment in the technology. This is certainly laudable and, most importantly, tax deductible. Nevertheless, you should not have to pay for such things yourselves. After all, when you join a hospital, you are not expected to buy your own pager.

A key part of the UK's NHS Plan is to double the amount of IT investment within the healthcare system. The UK Government has realised the importance of such technologies to providing good medical care and is keen to provide the money. So, over the next few years, UK-based doctors should see the current trickle of funding become a steady stream of investment directly from the NHS. However, even now, there are several ways of getting small sums of money for innovative projects. This chapter aims to inspire you to pursue the money to make your own local schemes happen.

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sources of funding

Apart from the NHS and your own pocket, there are several sources of grants:

- Pharmaceutical companies – talk to your local drug company representative about funding. They are surprisingly happy to get involved, especially if the project can include collecting data for audits. To put it another way, this is a far more satisfying use of the company's money than taking everyone out for (yet another) meal. For example, a diabetes team gained funding to equip all its members with handheld computers as long as the machine included software that audited the patients' disease progress and management.
- IT companies – you can often persuade computer manufacturers and software developers to provide their products for free or at a reduced price. The trick is to convince the company that you will help them perfect or market the product for UK doctors. Companies are particularly pleased if they can see positive published papers as the likely outcome. On the other hand, you must be wary that the technology for these trials is usually new and untested. In other words, be prepared to put in extra work making sure things function as you want them to. For example, IBM funded a large UK medical school in a trial to see how medical students would put the technology to use.
- Research grants – even if you cannot convince the IT companies to pay for your trials, consider applying for a research grant. For this, you need some clear measurable outcomes and, ideally, comparisons among multiple interventions and a control group. There is growing interest in the rigorous assessment of the technology's clinical efficacy.
- Charitable foundations – the UK has a highly active charity sector, raising money nationally and locally. A business case for using handheld computers to improve the management of clinicians' time and patient data can always be made. For example the Acumen Fund, a US non-profit organisation, funded the work done by SATELIFE in Ghana. Their project

(http://pda.healthnet.org/) provided the clinicians with handhelds to collect a huge amount of epidemiological data.
- Educational grants – universities and postgraduate medical educational units can consider supporting you in your project if it contributes to the education that they provide. However, make sure your project integrates closely into their syllabus and is clearly auditable. For example, part of the money for the acute medical department's trial in Chapter 14 came from educational grants because the handheld computers were to be used in teaching.
- Innovation funds – the increasing IT budgets available to NHS healthcare Trusts has produced increasing innovation funds. The key word here is innovation, which greatly favours handheld computers, as long as you can show a clear contribution to clinical care. For example, an orthopaedic department applied for a grant to use handhelds in ensuring accurate handovers between nurses. This was to help overcome the language difficulties of a new intake of overseas nurses.
- Statutory requirements – the UK's NHS Plan involves increasing targets for care delivered and healthcare Trusts have an increasing number of legal obligations. If you can understand your managers' anxiety over these targets and obligations, you can think of a way to help them. For example, a London hospital bought handheld computers to allow the tracking of and compliance with junior doctors' hours.

find out what the funders want to fund

During my last month as a medical student, I had the pleasure of meeting Mr Andrew Goldberg, an orthopaedic surgeon. He invited me to help start a new company, Medical Futures. The next six months were an eye-opening roller coaster ride as we rushed to launch the Medical Futures Innovations Awards. The event was a great success, but most impressive was the speed with which it was pulled together. A large part of this was due to Andrew's talents.

Andrew quickly learnt what every participant wanted from the project and arranged for them to get it.

Read the last sentence carefully, because every word contributed to the success of his technique. In other words, that is how he managed to get so many participants involved so quickly. In particular, he did not magically know what people wanted; rather he *learnt* what they wanted. On several occasions, I watched in amazement as he simply asked a doctor, manager or businessman what it would take for them to join in the competition. They, in turn, simply replied with the truth. He would think of how to carry out their request and they would agree to join in. Of course, because Andrew was so skilled and practised at this, the whole exchange happened in minutes.

The rest of us can still try out this simple technique at a slower pace to gain funding for projects. In fact, funding agencies often make things even simpler because their application forms describe exactly what the funding is designed to support. Take advantage of this information.

First, you can ensure that you are not wasting your time applying for money that cannot be given to you. For example, some grants are only available to nurses, so a doctor's participation might not be advantageous. More powerfully, you can change your proposal to allow success. In the example above, you could expand your project and collaborate with the nursing team. Everybody wins.

there are many uses for your handheld

A key part of tailoring your funding proposal is to realise that your handheld has many functions. It is easy to come up with a way to satisfy the grant criteria. Note, however, that this does not mean you can use the machine only for the function for which it was funded. Take the diabetes team mentioned earlier. They wanted handheld computers for a variety of reasons, including sharing their diary and address books, carrying protocols and reading textbooks. To qualify for the pharmaceutical company funding, they added the task of auditing. After receiving the funding, they of course used the machine for auditing, but they also took full advantage of all the other features. Everyone was happy with this arrangement.

You can also push this principle to qualify for multiple sources of funding. The team could also have applied for a small educational grant if the machines were used to teach medical students about diabetes. They might have qualified for an innovation grant if the auditing project produced a database that was freely available for reuse by other diabetes teams around the country. Moreover, the audit could have been expanded into a clinical trial and thus attracted other research funding. With a little imagination, it is possible to get more funding than you originally needed.

how to sell pampers

If you have identified a need for the handhelds and a use that would qualify for a grant, now you must sit down to write the proposal. Understandably, many clinicians shy away from this task. This is partly because of the time and effort required within an already stressful workday. However, perhaps the biggest barrier is not knowing how to write such a proposal.

There are many ways of getting round this. First of all, talk to your colleagues who have received funding or, better still, those who work on grant allocation committees. They are usually happy to help and a little advice goes a long way. Second, you can read a book on applying for funding and many are available, including *Grant Writing for Dummies*[1]. Third, there are many excellent seminars and training courses. The more senior you are, the more likely it is that your employer will pay the fees for such a course.

In the meantime, you might like to take a leaf out of Proctor & Gamble's book on marketing.

proctor & gamble

It is highly likely that you are a customer of Proctor & Gamble (P&G). Looking around your house should produce several items that are made by the company. Pampers nappies, Head & Shoulders shampoo, MaxFactor make-up, Hugo fragrance, Sunny Delight juice and Pringles chips are just some of the brands that it owns. P&G is worth over $100 billion.

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[1] *Grant Writing for Dummies*, Ben Browning, ISBN 0764553070.

A large part of their success lies in their marketing skills. Over the decades, they have developed a formula that contributed to all their advertising efforts and ensures such consistently high sales.

This formula can help you, because a grant application form is, after all, a sales document. You are trying to convince someone somewhere to give you some money. But don't worry: this does not mean that you should insert photos of scantily clad women into your proposal or include cheeky one-liner jokes. Nevertheless, the formula's four principles – drama, promise, demonstration and result – can still provide a lot of guidance.

drama

In a Pampers advert, the drama is the fear that your baby's bottom will suffer from inadequate nappy support. Babies crying and bottoms afflicted with rashes are paraded before anxious parents.

The drama of your application form is the clinical need section. The aim is to convince the reader that there is a serious and urgent problem.

Do not hold back emotionally when describing this problem. Mention all the consequences of not having the equipment that you request. Include the impact on patients, relatives, staff, colleagues and anyone else affected.

As a clinician, you should also ensure you have the numbers to support your emotive case. For example, including a clinical incident form is a good way to support your anecdotes. Results of local audits and national studies take a little work to assemble, but are well worth it. Do not forget to enlist the help of your librarian. As well as helping you search the clinical literature, they can provide you with local demographic data that highlights your needs.

In some cases, it is worth adding legal and financial ammunition to your cause. This works particularly well when discussing with your managers the impact of the problem on meeting the statutory requirements. This is what they are paid to worry about.

Finally, it is worth mentioning that you must make the case clear to the reader. Do not assume that the person assessing your application will be a clinician or even working in the same field as you. Assume intelligent ignorance and you will avoid irritating your audience.

promise

There is no point discussing a problem that is insoluble or takes too long to attack. Thus, having scared and depressed your audience with the drama, you must now lift their spirits by promising a way out.

The Pampers advert promises cute cheerful children. This is an example of a goal for a product or, in your case, a project. A clinical version could be to ensure good clinical care for orthopaedic patients in the region.

The corollary of this principle is that you should not mention any woes in your drama that you cannot overcome with your promise.

demonstration

Nappies are so successful because of the great advances in absorbent crystal technologies. Pampers adverts often feature a demonstration of these crystals at work as they soak up surprising amounts of blue liquid.

Your own demonstration should thus include a clear explanation of how you plan to solve the problem. While television advertisers have very little time to explain themselves, as a clinician you are encouraged to spell out your solution in detail. Not only does this make life easier for the grant assessor, it also increases the chances of your project eventually working.

The latter is true because the person reading your application assumes that the more concrete your details, then the more thought was involved in coming up with this plan. The more thought you have invested, the more likely you are to be serious about the solution. You are not just asking for money indiscriminately, you are requesting fair support to solve an important problem.

You too will benefit from this intellectual investment. By thinking carefully and for long periods about your project, you will move quickly and effectively when the money finally appears.

What does this mean in practice? Do not just estimate that six handheld computers costing approximately £300 will do the job. Rather, pick the machine you like the best, print off its specifications and price and include them with your application form. Incidentally, with the constant drop in prices, the money that eventually arrives will be more than the actual cost of the machines. Feel free to use the extra money at your own discretion, e.g. for software.

Furthermore, use information from discussions you have had with your team and with other departments that will be involved in the project. Include a feasibility study from your IT department. Highlight positive outcomes from other teams around the country and abroad who have already blazed the trail.

Grant success is in the details.

result

Results are about objectives. Pampers might claim several hours of dryness and your proposal might claim a 50% reduction in clinical incidents.

It is important not to confuse objectives with goals. The latter is a desirable statement, while the former is a measurable outcome. Grants allow the pursuit of laudable goals, but are allocated based on measurable objectives. The money does not go to those who feel under resourced but to those who can demonstrate good spending plans.

In some cases, this may be the hardest part of the application form. This is because some things are difficult to measure. In the example of the medical department, improved handovers may be difficult to gauge, but a reduced duration for each handover is easily and reproducibly measurable. So, with a little creativity, you can always come up with a measurement, even if it is indirect.

Finally, long after you have received the money and carried out the project, do not forget to follow up on the results. Contact the provider of the funds and let them know how well you have got on.

Some providers will be expecting to hear of the results through the publication of a paper or report. However, even if they do not explicitly ask to be kept informed, a little effort to maintain contact will go a long way and the person who allocated the funds will feel good about their decision.

Besides, they might even suggest how you can receive more funding for your next project.

the beginning of the end, or end of the beginning?

Congratulations. You have reached the end of the book and hopefully the beginning of your project. I wish you great success, but I also offer my help. If you need any advice or encouragement, you are most welcome to contact me. And, when you have succeeded, it would bring me great pleasure to hear about it.

In the meantime, take care and good luck.

Dr Mohammad Al-Ubaydli, mo@idiopathic.com

appendix

accompanying website

Handheldsfordoctors.com provides further information and downloads to accompany this book:

1. To download databases and other files mentioned in this book, visit www.handheldsfordoctors.com/book
2. To look at my current list of the best handheld computers to buy, visit www.handheldsfordoctors.com/shop
3. To read my latest articles, hints and tips, visit www.handheldsfordoctors.com/learn
4. To contact Laura Dean or myself for help with your project, visit www.handheldsfordoctors.com/guru

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