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Evaluation of the competence and attitudes of primary care physicians towards information technology.

By

Barnabas Heinrich Vogelzang

Submitted to the University of Cape Town in partial fulfillment of the requirements for the degree of Master of Science in Medicine, in Biomedical Sciences.

August 2000

3. Questionnaires

I do appreciate the suggestion to change some of the questions in the questionnaires, but this is not possible at this late stage. The suggestion that was made is good and I will keep it in mind in future projects.

4. Tables

The tables that were incorrect have been corrected using the original data. The following tables were corrected: Table 1 p23, Table 5 p38, Table 15 p46, Table 16 p47, Table 20 p51, Table 21 p52 and Table 1 p93.

5. GP sample

The examiner suggests that the references to "South African GP's" should be changed to "GP's in this study". I feel that I went to great lengths to find a suitable sample of GP's that are representative of GP's in South Africa. In changing this part of the results I feel that I would be implying that the sample is not representative of GP's in South Africa. For this reason I left the quote as "South African GP's". The issue of bias is also covered in the text on page 30 and page 31. I decided not to repeat this in the summary.

6. Spelling and grammar

I apologize for all the spelling and grammar mistakes that were in the dissertation. They have all been corrected. I want to thank the examiner for sending me the copy with all the mistakes clearly marked. Spelling and grammar mistakes were corrected on the following pages: pIII, p1, p4, p7, p11, p12, p14, p17, p22, p24, p29, p30, p31, p32, p33, p34, p43, p53, p60, p62 and p64. I want to mention that "Shneiderman" is spelt like this in the literature.

Conclusion

I want to thank the examiners for their careful examination of the dissertation and also for their kind suggestions. I do intend to publish the results as was suggested by the examiner and will discuss this with my lecturers.

Report on corrections done and response to external examiner's report

By B.H. Vogelzang

1 April 2001

Introduction

I want to thank the external examiners for their constructive criticisms to this version of the dissertation. I apologize for the inaccuracies that were found in some of the tables and did correct them to ensure the accuracy of the results.

Response to external examiner report

I will discuss the examiner's report under the following headings:

1. Title

   The examiner suggests a new title that would be more grammatically correct and content specific. I considered the suggestion that was made and do agree that it would be a better title. The current title is not that much different from the new suggested title and I do not think that this difference warrants another change in the title. I decided to keep the current title.

2. References

   I regret that so many errors were found in the references. The following references were corrected: Gorman (1994), Johnston (1994), Nielsen (1994), Redmond-Pyle (1995), Rind (1998) and Shneiderman (1992). The two instances where referencing was required, were removed from the thesis to keep the information as scientifically correct as possible. I refer to the statement about the legality of electronic record keeping in South Africa (p63) and the referral to the Dutch system. (p5)

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To Anja, Waldo and Helmut

Acknowledgements

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Thanks also to you to Sunesi Clinical Systems for providing the funding for the project. They also provided a portable computer and printer to the author for use during most of the year.

Thank you to all the participating doctors who gave freely of their time in order to support this project. As a measure of appreciation, condensed copies of the findings were sent to all the participants.

"For this very reason, make every effort to add to your faith goodness; and to goodness, knowledge; and to knowledge, self-control; and to self-control, perseverance; and to perseverance, godliness; and to godliness, brotherly kindness; and to brotherly kindness, love. For if you possess these qualities in increasing measure, they will keep you from being ineffective and unproductive in your knowledge of our Lord Jesus Christ."
Christian Ergonomics? (NIV, 1985)

Abstract

The aim of this project was to produce some principles that would assist software developers (SD's) in the design of software for South African general medical practitioners (GP's). The author wanted to give SD's a cognitive model of general medical practice in the hope that this will improve the relevancy of future medical software. This cognitive model is in the form of a set of principles that SD's can keep in mind when developing software for GP's. An evaluation was done of the attitudes and competence of GP's towards information technology. This was done via detailed telephonic interviews, which were analyzed in order to deduce these principles.

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Chapter 1 - Introduction

1.1 Introduction

This project was done in order to assist system developers (SDs) in writing relevant software for general practitioners (GPs). The author wanted to improve the cognitive model that SDs have of the workplace, attitudes and competence of GPs in the hope that this will produce more relevant medical software in the future based on the needs of GPs.

1.2 Background

The way a SD sees the work of a GP is not necessarily a reflection of the way general practice really is. This can only be overcome by giving the SD evidence about what is happening in general practice and to give the SD a cognitive model of where doctors are at regarding information technology (IT). As the GP becomes more familiar with IT, it will be easier to gather information on a national scale via computers. This will then improve the health of the community as a whole, as the government will be able to trace the distribution of epidemics more accurately and will be able to take the necessary relevant steps to prevent the spreading of diseases.

1.3 Goal

The goal of the project is to set up some principles that programmers can keep in mind when writing software for GPs.

1.4 Literature study

As information ergonomics with regard to the GP is a very specialized field, the author attempted a literature study of related subjects in order to provide some background. The only article that directly addressed information ergonomics in this context was the project done by Nielsen in Australia in 1997 (Nielsen, 1998). His study was similar to that of the author except that his study focused on 2 groups of

GPs, being a Clinical user group and an Administrative user group. The author decided to evaluate South African GPs as one group.

1.5 Methodology

The scientific model used in this study was a knowledge, attitude and practice (KAP) instrument that was developed through the different phases of the fieldwork that are mentioned below. The structure for this KAP instrument was based on the evaluation form in Nielsen's study.

The fieldwork was divided into three phases. The first was the introduction phase in which 10 GPs were interviewed in order to gain interviewing experience. The second was the pilot phase, which was meant to establish credible procedures to the national phase. In the pilot phase GPs were interviewed using face to face interviews and telephonic interviews. These results were then compared to see if there was a difference. The national phase was done with representativity as the main goal. The author wanted the results to be relevant to GPs across South Africa.

1.6 Discussion

The results of the national phase were analyzed statistically and some principles were then derived from these results.

Chapter 2 - Literature review

2.1 Introduction

This literature review was done in order to give some background information in order to build a cognitive model of information ergonomics in the GP workplace.

2.2 Ergonomics

Compared to sciences like chemistry and physics, ergonomics is a relatively new science. This is probably because it was not called "ergonomics" in the past. To explain this point one has to look at a definition of ergonomics. Bridger (1995) describes the subject as follows: " Ergonomics aims to ensure that human needs for safe and efficient working are met in the design of work systems". The name "ergonomics" is derived from the Greek words "ergon" (which means work) and "nomos" (which means law). It can also be described as the subject that studies the interaction between people and technology and the factors that improve that interaction (Bridger and Poluta, 1998). In short it studies how to make the workplace more efficient by focussing on the worker, and not just the work environment. As making the workplace more efficient has always been a factor in the business world, this science is probably much older than what it would seem from the surface.

2.3 Information ergonomics

In this section of ergonomics the focus is mainly on information and on how to present it to the worker in a way that will improve his work. As the modern era is being infiltrated more and more by computers, it is understandable that a large part of information ergonomics centers on computers. One must keep in mind that information is spread in many ways outside the computer and these factors are also kept in mind. Here one can also look at man machine interaction, where the controls have to be designed in such a way as to minimize errors. The influence of ergonomics on computers is generally referred to as human computer interaction (HCI), but is often described as software ergonomics.

There are many sites on the Internet addressing this subject, which shows that ergonomics is infiltrating and affecting the computer world. The following are examples from the World Wide Web (WWW):

http://www.system-concepts.com/hsweek/software.html

http://www.humanfactors.com/home

http://www.swisschi.ch/Default.htm

http://www.redhill.net.au/ergonomics.html

(These sites were last accessed in August 2000)

Various papers have been written that gave some principles to guide programmers in the writing of relevant (ergonomical) programs. The author would like to refer to the "Eight golden rules of dialog design" (Shneiderman, 1992) and Nielsen's checklist of ten principles for usability evaluation (Nielsen and Mack, 1994). As mentioned in the introduction, there is also AC Nielsen's project in Australia in 1997. Some of Nielsen's findings will be discussed in the analysis of the results (see Chapter 6).

In the design of software for a specific user, it is important to have an idea of the perspectives, needs and competence of that user. This is called a cognitive model and serves to give the developer and the engineer an idea of where the user is at. When the SD has a clear picture of his users needs, he can develop software according to the real cognitive model of the user, and not just to the cognitive model that the developer has at the time. Those ergonomists who have a background in the social sciences, are mostly responsible for this section of ergonomics. Various experiments are done to test the workers thoughts and attitudes. In these experiments a variety of evaluation methods can be used. (Redmond-Pyle and Moore, 1995; Herbst , 1988)

In the same way that the human body consists of many different parts that all work together to let the body function, the workplace also consists of different parts. One has to look at the workplace as a whole, and even include the workers home situation (Bridger, 1995). An example would be a worker who complains of headache at work. One could go and measure the lighting in his office and redesign his table and chair to

try and overcome his problem. The solution could just be that the worker does not have contact with any of his coworkers during the day and this is causing a decline in his functioning. We all have a need to be accepted socially. This problem can be overcome by creating a central coffee drinking place where the workers can have contact with each other.

In the context of information ergonomics, this principle is also important. The fact that a user struggles to use a program could be due to his cultural upbringing and not due to a flaw in the program. An example here would be the way different cultures see colors. The color red is seen by the western civilization as meaning "danger", while some eastern cultures interpret it as "good fortune". This will explain why some users will tend to click on the "log off" button when they get stuck, even though the programmer didn't want the user to do that by making it red.

2.4 Information ergonomics in the GP workplace

In order to improve the flow of information in the medical setting, research is done to develop hospital information systems, laboratory information systems, primary care systems and many other aspects of medical informatics (Hripcsak and Sideli, 1995). Medical informatics can also be defined as: " the development, use, and evaluation of information technology in health care." (Smith, 1996). A lot of the information systems that have been developed for doctors have not been used by doctors because: "they have been designed without any close study of the information needs of doctors" (Smith, 1996). This was one of the core motives for this project.

The use of computers and information systems in the public health arena can dramatically improve the health sector by improving the flow of information. If more is known about the patients that are being seen in the private and government sectors, more can be done to prevent outbreaks of contagious diseases (Sandiford et al, 1992). This is possible if all GPs are connected to the same central database and the government has access to the individual GP's electronic records. IT can also improve referrals, as the GP will be able to send the complete patient record electronically to

the referral hospital. This will reduce the time spent decoding referral letters considerably, as the GP's handwriting will no longer be a factor. Furthermore, in the trauma setting IT can provide the trauma surgeon with background information on seriously injured patients via thumbprints or smart cards that can give access to the patient's record in a central database.

Community health information systems have to be culturally appropriate. As different communities have different needs the programmers have to keep the needs of the community in mind when writing relevant software. The role of health informatics is to support both the health workers and the community in correctly applying the relevant information. (Hull, 1994)

In the South African health system, a general practitioner (GP), functions as a primary care worker. GPs treat all the basic diseases of the specialities and then refer to a specialist if the case warrants it. It is an area of medicine where the doctors work very hard as the need is high in South Africa, as in many other developing countries. For this reason the author decided to focus on this part of medical practice. Various studies have been done on the ergonomics of the nursing station (McHugh, 1997) and also on the ergonomics of the surgical theatre (Helmreich, 2000). Studies that address the needs of the GP are rare and the author hopes that this project will stimulate further research.

2.5 Information needs of doctors

The amount of information in medical literature needs no introduction, but the availability of that information is a different matter. "Primary practitioners require substantial help in meeting current science information needs." (Williamson et al, 1989) It is interesting to note that most of the 47 physicians studied by Covell et al in 1985, preferred using other physicians to answer their questions. It was also interesting that only 30% of the physicians' information needs were met during the patient visits (Covell et al, 1985). In another study librarians were used to find the answers to specific questions that primary care physicians asked during clinical

practice. Only 28 of 48 questions could be answered using medical journals and the WWW. This selection process took an average of 43 minutes and cost $27,00 for each question! (Gorman et al, 1994).

Clinical questions were also analysed by Osheroff et al, and they found that it is difficult to answer clinician's questions effectively using medical literature (Osheroff et al, 1991). In his article, "Uses and sources of medical information", Jeremy Wyatt discusses the different forms of medical information that are available. He also comes to the conclusion that "new methods for storing and communicating medical knowledge are required to facilitate instant access to current knowledge" (Wyatt, 1991). From these references, it is clear that there is a great need for easy access to medical information. It is up to programmers to write the right software and up to ergonomists to teach them how to keep it relevant.

One of the ways in which IT can help GPs is through an electronic patient record system. An electronic patient record keeping system is a system in which the GP can keep his full patient notes in an electronic medium (computer). This will include the history, examination, lab results and all other relevant information. The aim is to replace the current paper based system with an electronic system. In the literature it is referred to as CPR (Computerized Patient Record). More than one article has been written to describe the importance of CPR. (Barnett et al, 1993; Detmer et al, 1995) Both these articles comment on the role of the government and the private sector in providing incentives and training for physicians to use CPR. In 1992, 38% of Dutch general practitioners had introduced CPR to their practices. 70% of these had replaced paper patient records with CPR. It was found that physicians were willing and able to integrate information technology into their practices, but that government and professional organizations had a definite role to play. (Van der Lei et al, 1993)

Another area where informatics can improve the ergonomics of the GP's workplace is via decision support systems (DSS). A DSS is a computer system that is designed to assist the doctor in making a diagnosis. It supports the doctor in the decision, but does

not make the decision for the doctor (Ekdahl et al, 2000). Classically the doctor will type in the symptoms and signs that he has found and the program will give a differential diagnosis of the possible diseases involved. The doctor is still responsible for the decision that is made and the treatment that is given. A DSS must contain relevant and up to date information that is at the level of detail that the specific doctor requires (Wyatt, 1997). A GP will not require the same amount of detail that a physician does, for example. There is strong evidence that some systems can improve physician performance. It must also be said that there is still space for improvement in some areas, of which cost-effectiveness is one. (Johnston et al, 1994)

2.6 Ethical considerations

All information has the potential to do both good and harm. In the medical field this is probably more the case than in many other workplaces. People that control medical information, have power over the people to whose information they have access. (Kluge, 1995) As this is the case, it is the responsibility of the clinician to prevent the disclosure of his patients' information at all costs (General Medical Council, 1993). The SD on the other hand is responsible for writing the program in such a way that it can do as little potential harm to the patient as possible (Gaunt and Roger-France, 2000).

In a survey conducted on computer abuse in the United Kingdom, the UK Audit Commission showed that healthcare was significantly affected (Audit Commission, 1994). A few suggestions have been made as to how one should address the issue of security in the medical setting. Furnell et al suggest a Healthcare-specific incident reporting scheme (HIRS). The HIRS is an information system that gathers information regarding security and processes it (Furnell et al, 1998). Bakker suggests that it is advisable to hire a person who is responsible for data security, and he should report to the head of the department (Bakker, 1993). Ross Anderson summarized some guidelines that were designed to help clinicians prevent some of the most common security mistakes made on computers (Anderson, 1996). All these principles are valid, and ideally, one should have them all implemented.

With the WWW becoming more and more a part of modern everyday life, it seems inevitable that this will penetrate the medical arena more and more. Already there is a lot of information available on the WWW, which was previously only available in libraries to those who knew where to look. Research has been done to see what the effects would be of sending medical records via the WWW (Kohane et al, 1995). This is also referred to as electronic referrals. When considering sending medical records over the WWW, one has to consider the ethical implications regarding consent and confidentiality. Rind et al suggest that a system be in place with which the patient can be informed every time that his record was drawn (Rind and Safran, 1998). In another publication Rind et al do state that they believe that the current security advances (that are in place for financial transactions over the WWW), are sufficient for health records as well (Rind et al, 1997). When considering this issue one must also ask when a patient is able is to give consent regarding his medical records. For a discussion on this subject, see Appelbaum, 1988.

2.7 Summary

In summary the author would like to emphasize the current need for better medical software that comes out clearly in the abovementioned discussion. This literature discussion was done to create a picture in the mind of the reader of the current shortcomings in medical IT. Information ergonomics aims at trying to meet these needs by focusing on the worker's individual needs (as mentioned before). A lot of subjects were mentioned, but they have to be seen in the context of information ergonomics. The subjects are all related and the author trusts that the reader now has a foundation from which the author would like to move to the "Introduction phase" of the research project.

Chapter 3 - Introduction phase

3.1 Introduction

In this phase the author intended to obtain some experience in interviewing different GPs regarding their knowledge and use of computers. As the author had not interviewed GPs on this subject before, it was decided to include an introduction phase to obtain some experience in interviewing. This phase also served as the first step in developing the KAP evaluation form for the national phase, from which the principles for the SDs were derived.

3.2 Method

An evaluation form was set up and 10 different GPs were interviewed. The GPs were chosen as GPs in the area in which the author lived and GPs that the author knew personally. Five GPs were interviewed face to face and 5 were interviewed telephonically. The GPs were not chosen with statistical significance in mind. The results are therefore merely an indication to the author on how to set up the evaluation form for later phases of the project and on how to interview a GP.

3.3 Evaluation form

The evaluation form was set up in such a way as to include as many different interviewing techniques as possible, in order to get significant results. (Bridger, 1995). The evaluation form can be seen in Appendix 1. The author spent a lot of time brainstorming on different questions that would enable the author to draw unbiased answers from the GPs. It was decided to divide the evaluation into different sections to achieve this goal. At the start 2 main groups were identified:

1. General evaluation
2. Structured interview.

3.3.1 General evaluation

The general evaluation was further subdivided into the following groups:

General information

Computer hardware

Computer software

Computer usage and training

3.3.1.1 General information

This section included basic information about the GP and his practice. They included the name, age, gender, home language, year of graduation, years in private GP practice, other qualifications, province, city/rural, type of practice, number of partners and the size of the practice. The author hypothesized that there would be a difference between when a GP graduated and when the GP started practicing in private GP practice. The aim with this section was to get an idea of where GPs are at in South Africa in terms of experience and to get some background on the structure of GP practices.

3.3.1.2 Computer hardware

The aim with this section was to get an idea of what the level of technology was that GPs were exposed to in their practices. This also included whether they had any computers at all.

3.3.1.3 Computer software

Here the author wanted to gather information on the software technology that GPs had on their computers to see how up to date they were

.

3.3.1.4 Computer usage and training

This section was aimed at the GP himself. The author wanted to see what the GP actually knew about computers and to which extent he used the computers in his practice. This is to exclude GPs that have sophisticated equipment in their practices,

but employ other people to operate them. The GP's level of computer competence was obtained by first finding out what kind of training the GPs had had in information technology and whether the GP had ever used a computer personally. The GPs were then asked whether they were willing to learn more about IT and how much time they were willing to spend doing this. The reason behind this was to test their attitudes towards the importance of IT in GP practice for the GP himself, and not just for the practice personnel. They were also asked how often they use computers in the practice.

In an attempt to evaluate what GPs know about computers, questions were then asked about some basic functions in computers. These were divided into hardware and software. The software was further divided into Word processors, Spreadsheets, Databases and Websites. This section was tested from 2 sides by first asking what the function was used for, and asking for an example of a program that could be used for this function. In each instance a list of options were read to the GP and he could choose which answer he thought was relevant. To further test their depth of knowledge they were asked whether they had ever programmed a computer before and if so in which languages.

Finally they were asked what they used their computers for most of the time. A GP who spends an hour a day on the computer is not necessarily competent if that hour is spent playing games. Here, and also in the section on how often computers were used, the author made a distinction between computers at work and computers at home. The fact that a GP does not use computers at work does not mean that he is not surfing the Internet at home.

3.3.2 Structured interview

In this section the GPs were asked questions about computers and software. They were then given model answers to stimulate conversation and to test which of the subjects covered were more important to the GP. The principles that were used to formulate these answers were taken from the 'eight golden rules' for user design by

Schneiderman (1992) and also the 'Usability Inspection Methods' that are recommended by Nielsen. (Nielsen and Mack, 1994). These principles were adapted to the clinical setting by the author. The author also took the liberty to add other subjects relevant to the clinical setting in line with the author's own experience. The following subjects were addressed in differing degrees and from different perspectives:

Medical aid and finances
Computers too costly
Computers make no difference
Management
Electronic record keeping
Don't use or don't want to use computers
Feeling of control over the computer
Reliability
Speed of access
Speed of access
Time
Willingness to learn
Experienced user
Consistency
Feedback
Learnability
Games
E-mail
Internet
Textbooks vs IT
Recognition rather than recall
Touch screens
Voice activation
Hand written referrals
Typing
Diagnostic support
Stocktaking
Specialist feedback
Academical information via IT
Electronic referrals
Breakage
Security
Cognitive overload

3.4 Results

During these preliminary interviews the author was struck by the range of experience that was encountered. Some GPs had a good functional knowledge of IT, while others knew absolutely nothing. For the latter reason it was not practical to ask a GP about the finer details of the computers in his practice. Most of those interviewed couldn't answer any questions about the hardware in their computer systems. The same went

for the software that was available. An alternative method of evaluating the computers in the practice had to be developed.

The section on computer training worked quite well, as did the section on computer usage. There was room for improvement here though, as some of the GPs didn't know enough to answer the questions or to give an opinion. This section had to be rephrased as well.

Of all the sections of the evaluation the structured interview created most problems. The main problem came with cognitive overload, as the GPs couldn't remember all the options that were offered. On numerous occasions, the author had to read the options more than once, before the GP could choose an answer. This was especially the case with the telephonic interviews.

Another problem that surfaced was the amount of time that the GPs had. A lot of phone calls were just cut short with the GP saying that he doesn't have the time to do an interview. The author found that there are a lot of companies that "waste" the GP's time with questionnaires and interviews that take the GP's time, but leave no advantage for the GP. The phrasing of the "opening address" had to be looked at to ensure that the right information was given at the right time. This was important for the GP to make an objective choice as to whether he wanted to be interviewed or not.

The unavailability of GPs for interviews was also a problem. Often the GP was doing sessions at a nearby hospital or was working at another practice for the day. This made it very difficult to get hold of GPs. A further problem was GPs that were on leave, overseas or not working as GPs anymore. The author realized that all these factors would have to be addressed in order to keep the bias of the national phase as low as possible. It was clear however that a significant bias was unavoidable. More than 20 GPs were contacted before 10 appointments could be made. The further fact that an appointment was made, did not guarantee an interview. Sometimes the GPs were called out before the interview or just forgot about it. This caused much

frustration for the author in unnecessary trips and phone calls. The time required to do 10 interviews was significantly more than what the author had thought due to these problems. This had to be calculated into the preparations for the pilot and the national projects.

The author found that GPs in general were quite cooperative when they realized they were speaking to a colleague and were keen to be of assistance. It was also noted that the answers from the GPs interviewed telephonically were very similar to those of the GPs interviewed face to face.

Originally the author wanted to differentiate between urban and rural practices, but due to the complexity of defining what exactly was rural and urban from the database, this section was discarded.

The evaluation form was found to be clumsy in that the author did not always have enough space to add comments that the GPs made on specific topics.

3.5 Conclusion

At this stage of the project the author realized that the evaluation form was inadequate for interviewing GPs and would have to be improved. Further research in this area would be necessary. As time and bias came out as significant problems during the interviews, these would have to be addressed as well.

Chapter 4 - Pilot phase

4.1 Introduction

This phase was done as an introduction to the national phase. The goal of the phase was to compare face to face interviews and telephonic interviews of GPs in private practice. This was done in order to see whether there was a significant difference in the results obtained from the two different forms of interviewing. The author would then incorporate this difference in the results of the national phase, which would only consist of telephonic interviews. It also served in gaining experience in interviewing GPs and in setting up a relevant evaluation form. As in the previous phase, the pilot phase served as the second stepping stone in developing the KAP evaluation form that was used in the national phase. The author also wants to remind the reader that the evaluation forms were set up with SDs in mind and with how one can ask the GPs questions that would assist SDs in having a relevant cognitive model of the workplace of the GP.

4.2 Method

Random samples of GPs in 2 South African provinces were compared. These were the Western Cape province and the Gauteng province. These two provinces were chosen for logistical reasons and are regarded by the author as two populations of GPs that are being compared. The GPs' information in each province was obtained from a definitive database, Medpages. The number of GPs interviewed are summarized in table 1.

Table 1

	Gauteng	Western Cape	Totals
Face to face interview	15	15	30
Telephonic interview	15	15	30
Totals	30	30	**60**

4.2.1 Criteria for GPs

The criteria for a GP were:

1. In general practice

   This excluded GPs who were registrars at hospitals and were busy specialising in a specific field. Specialists were also excluded.

2. In private practice

   This excluded GPs working in government or private hospitals. A clinic was accepted as long as it was not government controlled. This therefore included group practices of GPs.

The author interviewed all these GPs personally whenever it was convenient for the GP. The author felt that as it was the opinions of the GPs that were important, the GP could choose the surroundings that suited him. The author did not feel it was necessary to limit himself to only interviewing the GPs in their practices, as GPs work in their practices, from home and in remote clinics. The settings, in which the GPs were thus interviewed, were all "work" settings.

4.2.2 Database used for information

The Medpages database was used to get information about the different GPs. This database is compiled by the Medpages company by taking the database of the Health Professions Council of South Africa (HPCSA) and adding new data to it. This new data is obtained via faxes and phone calls to the different doctors in South Africa and through feedback from the 38 companies that are subscribed to the database. The database offers regular updates to its clients. The company considers the database to be definitive with regard to doctors in the South African private sector and to specialists that work in the public sector. The database was chosen, as it is a definitive database and would therefore offer the widest selection of GPs available in the two provinces. The population was drawn by limiting the search to "general practitioners" and to the two provinces.

4.2.3 Contacting the GPs

The author set up an "introduction procedure" to introduce himself to the receptionist and to the GP. The author wanted to cover as much relevant information as possible in the shortest possible time. This was vital, as time is very valuable to GPs.

The author also felt it important to introduce himself as a colleague and not as someone trying to manipulate the GP into giving him statistical information that would later count against him. The fact that others had created bad reputations for research among the GPs made it difficult to win the confidence of the GPs.

The "introduction procedure" for the pilot phase can be seen in the Appendix 2 (English) and Appendix 3 (Afrikaans).

4.2.4 Face to face interviews

For the face to face interviews in the Gauteng province, the list of GPs from the database was transferred to a Spreadsheet. A random list of 100 GPs was drawn and placed in a second spreadsheet. The author started phoning GPs from the top of this list downward. As a GP made himself (or herself) available, an appointment was made and the GP was subsequently interviewed at his/her practice. The same procedure was followed for the Western Cape GPs.

At this stage the author undertook various journeys across the Western Cape and Gauteng provinces in order to visit the GPs that were willing to be interviewed. 30 GPs were interviewed in this way. All these interviews were tape recorded for the author to have something to go back to in case the interview went too fast to get everything written down as the GP spoke.

All the GPs that were involved in the face to face interviews were now removed from their provincial databases. This included those that could not be contacted, were not interested or were not available. All the latter GPs were placed on a bias list, provided

that they fitted the above-mentioned criteria. The GPs on the bottom of the list that were not phoned were returned to their provincial databases. The GPs that did not fit the criteria were discarded, as it would not serve any use in possibly phoning them again. The databases without the GPs that had been contacted already were then used to select the GPs for the telephonic interviews in the two provinces.

4.2.5 Telephonic interviews

Random lists of 100 GPs were then drawn from the two remaining reduced databases. For each province these GPs were phoned from the top of the list downwards until 15 appointments were made and these were then interviewed. The criteria for GPs was the same as for the face to face interviews and those that were not available, not interested or could not be contacted were placed on a bias list. As in the face to face interviews, the GPs that did not fit the criteria were discarded.

The author did all the telephonic interviews personally. The author decided not to tape the group of telephonic interviews. During the face to face interviews all the relevant information was gathered without the author having to go back to the taped conversations.

4.3 The evaluation form

A new evaluation form was set up after the lessons learnt in the introduction phase. In studying Nielsen's evaluation form (Nielsen, 1998), a new evaluation form was set up that was relevant to GPs in South Africa. A copy of the pilot phase evaluation form can be seen in the Appendix 4.

The new form has a lot more space for comments than what the old one had. The basic structure is similar to the introduction phase, with a few differences:

A. Evaluation

1. General information
2. Computer usage
3. Computer hardware and software
4. Computer training

B. Structured interview

1. All GPs
2. Regular users of computers

C. Unstructured interview

The structured interview was split between questions that all the GPs should be able to answer, and questions that GPs with some computer experience can answer. An unstructured interview was also added.

4.3.1 Evaluation

The contents of the evaluation section was similar to that of the introduction phase, except that it was spaced differently in order to make it easier to write in the answers and to read the questions. A further question was added to ask whether GPs dispense or not. This was done in response to a request from SDs that needed the information for developing clinical software that included a stocktaking section. The author also divided the ages of GP into 3 groups. The first was for young GPs that were in their first few years of GP practice (25-34 years). The second is for experienced GPs (35-49 years) and the third for senior GPs (>50 years). This was done to see what percentage of GPs was in the different groups and whether GPs in the younger groups were necessarily more competent and interested in computers than GP's in the older groups. The author also wanted to see if the older GPs were willing to change their set ways of running their practices to a more computerized system.

4.3.2 Computer usage

Once again the structure of the questions was similar to that of the introduction phase, except that more space was provided.

4.3.3 Computer hardware and software

The structure of this section was changed completely. The author also added two questions. The one was for GPs that didn't have computers in their practices and was aimed at determining how important they felt it would be to computerize their practices. The GP was asked whether he intended computerizing his practice and when. The other question was whether the GPs had a computer on their desk or not. This was an indication of the GPs personal computer usage in the practice. The author decided to use Pentium computers as a measuring tool to measure the level of computer technology of the GP practice.

4.3.4 Computer training

This section was restructured to ask which form of computer training the GP would prefer. The author felt that this information would be vital in giving the programmers an indication of the time restraint that GPs have. It would also help in determining what form of training GPs prefer. This question replaced the question in the introduction phase that asked how much time the GP was prepared to spend learning to use a computer.

The section on GP computer competence was totally changed. The author felt to let the GPs rate themselves on a scale of 1 to 4 about their own competence with different parts of the computer. In this question "4" meant that the GP had never used that part of a computer before and "1" meant that he considered himself a confident user. The following objects were evaluated in this way:

1. Keyboard
2. Mouse
3. Word processor

4. Spreadsheet
5. Database
6. Practice management program
7. E-mail
8. Internet

GPs were also asked whether they preferred a mouse compared to a touch screen or roller ball.

The section was closed by asking the GPs where in the practice computers were vital. The different parts of a practice were read to the GP and the GP could then give his opinion. This was to give the programmers an idea of the areas in GP practice that the GPs felt needed computers most. In a GP program, these areas are then more important than the others.

4.3.5 Structured interview

As already mentioned, this section was split into two groups. The first section was asked to all the GPs, while the second section was reserved for those who (during the interview) showed that they knew enough about computers to answer these questions.

The section opened with a question about how the GP made his patient notes. This was to help the programmers with electronic patient record keeping. The rest of the structured interview was aimed at testing the GP's opinion on some statements. The GP was given a statement and could strongly agree, agree, disagree or strongly disagree with the statement (Nielsen, 1998). Additional comments made on statements were written next to the questions.

The questions were chosen in such a way as to cover as many of the principles that were covered in the introductory phase as possible. Some had to be left out as the interview was getting too long. The author also added some new questions that were raised during the introductory phase.

4.3.6 Unstructured interview

As many of the principles in the introductory phase could not be incorporated in the structured interview, the author added an unstructured question at the end. The aim of the question was to give the GP an opportunity to say what he wanted in a software program. Those issues that were mentioned spontaneously by most GPs had relevance for the programmers.

4.4 Bias

The reasons for non response of the different samples of GPs are listed in Table 1.

Table1 (GT = Gauteng, WP = Western Province)

Reason for non response	GT tel	GT face	WP tel	WP face	Total
On leave	1	2	3	1	7
No phone number	36	29	14	7	86
Broken phone	7	2	0	0	9
No answer after a few attempts	15	15	5	4	39
Not interested	12	3	5	3	23
Sick	1	0	0	0	1
Totals	72	51	27	15	165

The response rate in terms of the bias was 24%. The totals of the GPs that were phoned can be seen in table 2.

Table 2.

Reason	GT tel	GT face	WP tel	WP face	Total
Total GPs interviewed	15	15	15	15	60
Total GPs not in criteria	9	5	6	5	25
Total bias GPs	72	51	27	15	165
Total criteria GPs contacted	87	66	42	30	225
Grand total GPs contacted	96	71	48	35	250

4.5 Results

As the results of the interviews in the pilot phase were not statistically significant, the author will not discuss them all in detail. These results merely helped the author in planning for the national phase and gave the author an idea of what to expect in the national phase. These results were also used to determine whether there was a significant difference between the face to face interviews and the telephonic interviews. The only results that are of significance are those of the structured interview. These results can be seen below in the "Structured interview" section.

The tables with the other results can be seen in Appendix 5.

4.5.1 Face to face vs Telephonic interviews

The Structured interviews of the telephonic and face to face samples were compared using the Chi-squared method to produce the p-values seen below. To improve readability, the results were divided into tables as follows:

All GPs

- Reasons why GPs don't use computers (Table 3)
- GP computer competence (Table 4)
- Electronic referrals (Table 5)

Regular users of computers (Table 6)

The abbreviations used in tables 3-6 have the following meanings:

TG = Total GPs interviewed

%A+SA = Percentage Agree and Strongly Agree

%D+SD = Percentage Disagree and Strongly Disagree

The interview results are not discussed here and tables 3 to 6 are only to show the different p-values of the individual questions.

Questions asked of all GPs.

Table 3. Reasons why GPs don't use computers

	Telephonic interviews		Face to face interviews		
Question	A + SA	D + SD	A + SA	D + SD	p-value
Computers are too expensive for GP practice	3	27	3	27	1.0
GPs don't have time to learn to use computers	12	18	12	18	1.0
GPs feel unsure about how to use computers	24	6	25	5	0.74
GPs are afraid that other people may access their electronic records	5	24	11	19	0.09
Computers have to be updated too often	15	12	16	12	0.91
Computers break down too easily	10	19	8	20	0.63
Computers lead to longer consultations	9	16	16	10	0.07
Computers interfere with the doctor-patient relationship	16	14	18	12	0.60
GPs would prefer a portable computer that they can take with them when they go home or do house calls.	17	13	19	10	0.49
GPs will be keen to use computers if they were on a lease contract that will keep the doctor updated on the newest technology	18	11	20	7	0.34

Table 4. Computer competence

	Telephonic interviews		Face to face interviews		
Question	A + SA	D + SD	A + SA	D + SD	p-value
Computers are more for administrative than for clinical functions	19	9	22	8	0.65
Computers are a necessity in GP practice	27	2	25	5	0.25
Computers are ideal for giving GPs advise on tricky patients by suggesting some diagnoses	19	9	20	9	0.93
GPs need computers or else they will fall behind on current trends	20	10	20	10	1.0
Computers are more for secretaries and bookkeepers than for GPs	6	23	7	22	0.75
GPs have to learn to use the internet and e-mail to stay up to date	27	3	27	3	1.0
Computers can really improve GP practice by assisting in the collection of outstanding payments.	29	1	27	2	0.53

Table 5. Electronic referrals

	Telephonic interviews		Face to face interviews		
Question	A + SA	D + SD	A + SA	D + SD	p-value
It would improve patient care if there was a secure system in place, which would allow for patients to have access to some of their medical records via the internet with a password. Some information must be on higher security for doctors only and must not be accessible.	15	15	18	11	0.35
Electronic patient referrals will significantly improve referrals from GPs to Government hospitals	22	6	22	8	0.64
Electronic patient referrals will significantly improve referrals from GPs to Specialists and visa versa	24	5	23	6	0.74
Each patient needs to have a unique form of medical identification so their records can be traced electronically in case of an emergency, for example a thumb print that translates to a code	25	4	26	4	0.96
GPs will really use computers if they provided a simple form of remote access to the computer in the practice, while the GP is doing house calls or is working in a remote clinic.	19	9	23	6	0.33

Table 6. Regular users of computers

	Telephonic interviews		Face to face interviews		
Question	A + SA	D + SD	A + SA	D + SD	p-value
Computers create a good impression with patients	13	9	8	14	0.13
Computers significantly improve the quality of patient care	17	7	9	14	0.02
Computerized patient records are more valuable than paper records	13	10	12	10	0.89
Computers create faster prescriptions	14	10	17	5	0.17
Computers make it easier to retrieve and reproduce patient notes	19	3	19	4	0.73
Computers create easy access to journals and academic information	23	1	19	1	0.9
Computers improve patient education	19	4	18	3	0.78
Computers can produce more legible referrals	23	1	23	0	0.32
Computers save time	19	5	18	5	0.94
Computers significantly improve billing and account management	23	1	23	0	0.32
Computers improve patient summaries	19	2	17	1	0.64

The mean of all the p-values is 0.6 and the standard deviation is 0.31. In the light of these values and the fact that only one of the p-values was under 0.05, it was clear that there was no significant difference between the face to face and the telephonic interviews. On these grounds the national phase interviews were done using only telephonic interviews.

4.6 Problems encountered during pilot phase

The main problem encountered during the pilot phase was the high percentage of bias that was encountered when the author phoned the GPs for their interviews. The main problem seemed to be with the database that was used. As the author had used the database as it was, there were no restrictions to the GPs that were used as the population. The author felt that placing restrictions on the population would give more accurate results. The following problems were encountered with the database:

1. The database was structured according to GP practices and not according to GPs. This meant that the same GP could appear more than once if he worked in more than one practice or for more than one organization. As the research is aimed at the GPs themselves and not at the practices, these duplicates had to be removed for the national phase.
2. A lot of the GPs that were drawn for the random sample did not have any phone numbers in the database, which made it impossible to phone them. This came to 38.2% (86/225) of the criteria GPs contacted.
3. A further 8 GPs could not be contacted due to sickness and leave. More time would have to scheduled to the national project to take account of this problem.

4.7 Discussion

The GPs interviewed here seem to have a good general knowledge about what the computer could do for them and they were very keen to learn more. This was with specific reference to Internet and e-mail. A motive that came through strongly was that GPs wanted to focus on their patients. They did not want to struggle to figure out how a computer program worked.

Chapter 5 - National phase

5.1 Introduction

Both the other phases that were done in this project were done as an introduction to the national phase. The aim of the national phase was to evaluate a significant number of GPs across South Africa regarding their computer knowledge and opinions in order to deduce principles that programmers can use when writing programs for GPs.

5.2 Method

The data on the different GPs was taken from the Medpages database (see p17). The study population consisted of GPs with the following criteria:

All GPs phoned thus far were removed from the database.

Only General Practitioners and Family Physicians were included. (A Family Physician is a specialized General Practitioner.)

Doctors without phone numbers were removed.

Doctors who were not in private practice were removed.

Doctors outside the Republic of South Africa were removed.

Doctors who were not actively practicing were removed.

Duplicate entries for doctors were removed.

5.2.1 Random sample

The population of GPs came to 8588. The resulting database, containing the population of GPs, was transferred to a spreadsheet. In this spreadsheet a random number was allocated to every record in the database. The records were then sorted according to their random numbers in increasing order. This produced a sorted random list of doctors with their relevant information. The author started phoning doctors from the top of this list downwards until 100 interviews were completed.

The sample size calculation was based on an estimate of 50% that reflects what GPs know about computers. On the basis of this estimate and using a 95% confidence interval, the minimal sample size required was 95. The sample size used in this study was 145. The reasons for non-response of the GPs are given in table1.

Table 1

Reason for non-response	**Number**	**Percentage**
No phone number	15	33.3%
Broken phone	6	13.3%
No answer after a few attempts	11	24.4%
Not interested	13	28.9%
Total	45	100%

The response rate in terms of the bias was 69%.

5.2.2 Introduction sheet

As in the pilot phase an introduction sheet was compiled to try and reduce the bias as much as possible. The author included an offer to pay the GPs medical aid rates for their time. A copy of the project protocol was also available by fax should any GP require this. These two incentives were included as they were identified as potential problems during the pilot phase and were aimed to reduce the bias as much as possible. The introduction sheet can be seen in the Appendix 5 (English) and Appendix 6 (Afrikaans).

5.2.3 Evaluation

A new evaluation form was compiled which included most of the information that was used in the pilot phase. The author decided to make some changes in order to get more accurate results. Details of the evaluation form will be discussed later.

5.2.4 Interviews

GPs were now phoned according to the random list of GPs. Those GPs that were phoned but did not qualify according to the criteria were removed from the list and the next GP would take the GP's place. The reasons why they did not qualify were noted. GPs who could not be contacted or were not interested in participating in the project were placed on a bias list. GPs who were available for interviews were asked for an appointment. At the day and time that suited the GP the author would contact the GP and hold the interview telephonically. Where GPs were not available for an interview at the arranged time, a new appointment was made until 100 GPs had been interviewed.

5.3 The evaluation form

A copy of the evaluation form for the national phase can be seen in Appendix 7. The following changes were made to the structure of the evaluation form that was used in the pilot phase:

A. Evaluation
    1. General information
    2. Computer usage
        - Practice computers
        - Home computers
        - Computer education

B. Interview
    1. GPs that have never used a computer
        - Structured interview
        - Unstructured interview
    2. Basic computer users
        - Structured interview
        - Unstructured interview
    3. Competent computer users
        - Structured interview
        - Unstructured interview

The structure was similar to the pilot phase evaluation form, with the exception of the structured interview. The author decided to split the structured interview into three different sections according to the computer knowledge of the GP that was being interviewed. The reason for this was the number of GPs that couldn't answer some of the questions that were asked in the structured interview of the pilot phase. The GPs were divided into the groups on the basis of their own opinion of their computer knowledge (see Q12 of the evaluation form). To increase the readability of the form each group also had its own unstructured interview so the author didn't have to page around too much when interviewing a GP.

5.3.1. Evaluation

As in the previous phases the evaluation is aimed at giving some basic information about the GP's competence and attitudes towards IT.

5.3.1.1. General information

The only major change in this section was in Q7 where the GP was asked what kind of practice he/she had. The pilot phase just distinguished between single and group practice. After presenting the pilot phase results to the SDs it became apparent that the exact kind of practice was important in order to write appropriate software for the GPs. For this reason the question was made more detailed to give an indication of the distribution of the different kinds of practices among GPs.

5.3.1.2. Computer usage

As mentioned above the GPs were asked to rate their own computer competence as "never used one", "can use one very basically" or "regular computer user including Internet and email". The question about how they learnt about computers was also extended according to the most common answers received during the pilot phase.

5.3.1.3. Practice computers

As some GPs have more than one practice the author included a question about how many practices the GPs have. Where GPs had more than one practice they were asked to answer the questions according to their most computerized practice. As networking is an important feature to assist with the flow of information in the general practice setting, a question was included to determine the number of GPs that were exposed to this technology. The author also realized during the pilot phase that even though some GPs had not yet used computers, they had access to them at the practice and knew more or less what they were about. To include this information, some questions were included to ask about GP's access to computer hardware in addition to the questions about GP's usage of hardware and software.

In the pilot phase GPs were asked what kind of computer system they had. As most GPs could not really answer that question, the author simplified the question by just asking whether they had access to a Pentium computer at the practice or not. The author decided to use this as a measure of technology available to the GP.

5.3.1.4. Home computers

The format here is the same as the questions asked about the practice computers.

5.3.1.5. Computer education

This question remained unchanged from the pilot phase evaluation with the exception of Q26 of the pilot evaluation form that was moved to the structured interview. This was done as GPs who had never used computers could not answer that question. (See Q40 and Q44 of the national evaluation form)

5.3.2. Interview

5.3.2.1. GPs that have never used a computer

a. Structured interview

This was a new section that was not directly addressed in the Pilot phase. The author found that there were GPs that had never used computers and couldn't answer some

of the questions in the pilot phase. With this in mind a section was created that contained questions that anyone should be able to answer. The author wanted the GP's opinion on issues that were of benefit to SDs.

All the structured interviews started off with a question about the kind of notes that the GP used. This information is useful to companies considering the writing of electronic record keeping software.

b. Unstructured interview

This section contained a basic question that was aimed at inviting the GP to say what he wanted in GP software. The same question was used in all three groups and the answers were compared to determine which issues were most important to the GP in South Africa.

5.3.2.2. Basic computer users

a. Structured interview

This section contained all the questions that were asked in the previous section, together with some other questions that someone who had used a computer before should be able to answer. This section, as well as the last section, contains the question that was used in the pilot phase that asked what form of hardware the GP preferred out of a mouse, a roller ball and a touch screen.

b. Unstructured interview

This section contained a basic question that was aimed at inviting the GP to say what he wanted in GP software. The same question was used in all three groups and the answers were compared to determine which issues were most important to the GP in South Africa

5.3.2.3. Competent computer users

a. Structured interview

As in the previous section this section asked all the questions of the basic users, together with questions that focused on the Internet. This information was important to the author as future programs would be linked to the Internet and the GP's opinions and knowledge on this level were therefore relevant.

b. Unstructured interview

This section contained a basic question that was aimed at inviting the GP to say what he wanted in GP software. The same question was used in all three groups and the answers were compared to determine which issues were most important to the GP in South Africa

5.4. Results

5.4.1. Phoning the GPs

A total of 180 GPs were phoned, of which 100 were interviewed, 35 did not fit the criteria and 45 could not be contacted. The author had a lot of difficulty with the Medpages database with wrong or incomplete phone numbers. These phone numbers constituted to the bulk of the bias, 71%. The other 29% of the bias was made up of GPs that were not available for an interview. (See Table 1.)

5.4.2. GP details

The ages of the GPs that were interviewed varied from 27 to 79 years of age. This is a wide range and gives credibility to the project.

Table 2

Age group:	**Number**	**Percentage**
25 – 34 years	28	28%
35 – 49 years	50	50%
> 50 years	22	22%
Total	100	100%

The totals for the ages are summarized in Table 3.

Table 3

	Totals
Number	100
Standard deviation	11.5
Mean	42.2

77% of GPs were male and 23% were female (See Table 4). A further 42% were Afrikaans speaking, compared to 41% that were English speaking. The other languages that were encountered can be seen in the Table 5.

Table 4

Gender	**Number**	**Percentage**
Male	77	77%
Female	23	23%
Totals	100	100%

Table 5

First languages	Number	Percentage
Afrikaans	42	42%
English	41	41%
Tswana	5	5%
Xhosa	3	3%
Zulu	2	2%
Southern sotho	2	2%
Northern sotho	1	1%
Swazi	1	1%
German	1	1%
Ghana	1	1%
Gujerathi	1	1%
Total	100	100%

A wide range of experience in GP practice was encountered among the GPs. The range was from 1 to 49 years. The median was 11 years. It was also interesting to note that there was more than 4 years difference between the number of years since graduation and the actual private practice experience of the GP. (See Table 6) The author expected there to be a significant difference (p11), which proves that the time from graduation is not a reflection of the GP's experience.

Table 6

Category	Minimum	Maximum	Median
Years since graduation:	4	50	15.5
Years in GP practice:	1	49	11.0

5.4.3. Practice information

GPs were asked what kind of a practice they had. 59% of GPs had solo practices and 24% practice in a group practice. The other GPs worked either for a managed group company or were in a group practice, but functioned independently (IPA). (See Table 7) The statistics for the number of GPs per practice and the number of patients seen per day can be seen in Table 8. Eighty percent of GPs were dispensing to some degree and sixty eight percent had a cash practice.

Table 7

Practice	**Number**	**Percentage**
Solo practice	59	59%
Group	24	24%
Independent practice association (IPA)	8	8%
Health maintenance organization (HMO)	0	0%
Managed group, eg Medicross	9	9%
Total	100	100%

Table 8

Practice	**Mean**	**Standard deviation**
GPs per practice	2.3	2.6
Patients per day:	28.6	14.1

The cash practices were usually very small with the majority of GPs having mainly medical aid patients. (See Table 9) The fact that 80% of GPs dispensed is important to know for stock taking modules in GP software.

Table 9

Practice	Number	Percentage
Cash practice	68	68%
Dispensing	80	80%

5.4.4. Computer usage at the practice

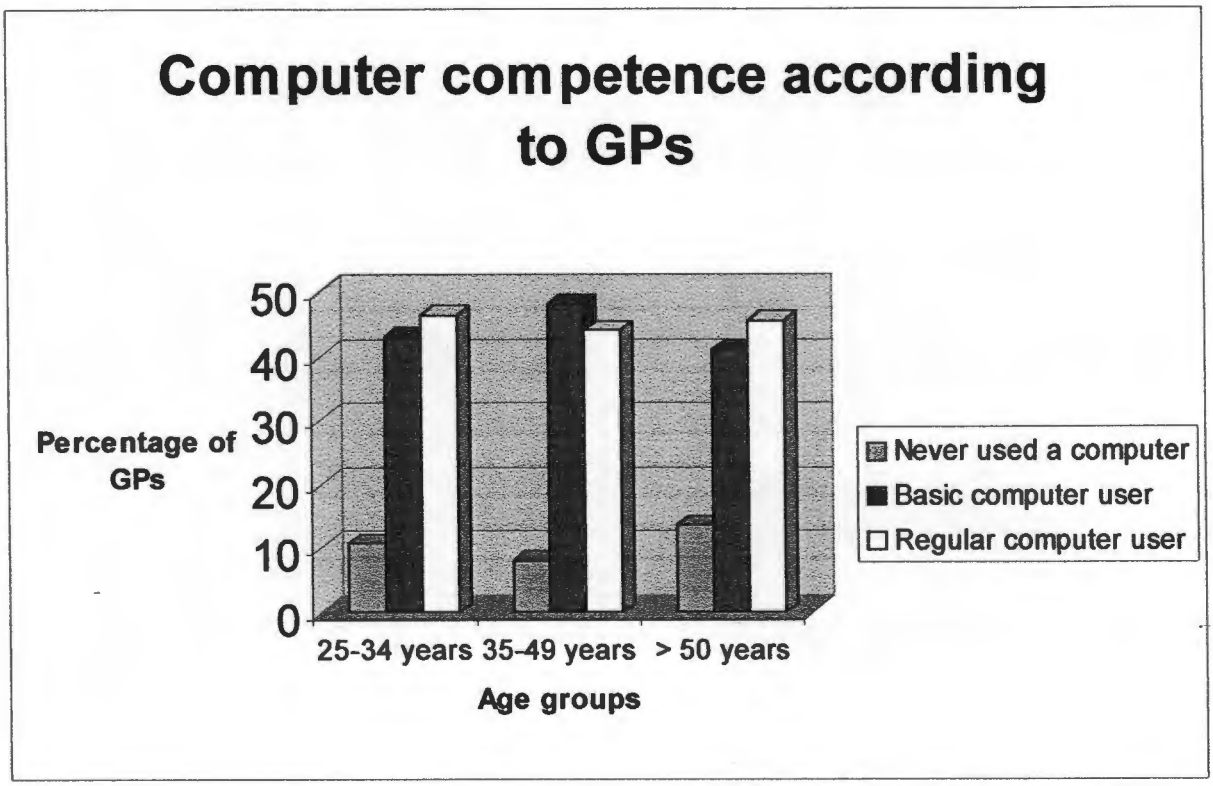
GPs were asked to rate their own computer competence according to the 3 criteria listed in the table "Computer competence". 10% of GPs had never used a computer before and 45% considered themselves as only able to do very basic functions. 45% were able to use the Internet, which is encouraging (Table 10).

Table 10

Computer competence	Number	Percentage
Never used a computer	10	10%
Can use a computer very basically	45	45%
Regular computer user including internet and email	45	45%
Total	100	100%

The computer competence according to the GPs, as in table 10, was also evaluated according to the different age groups in table 2. The results are shown in graph 1.

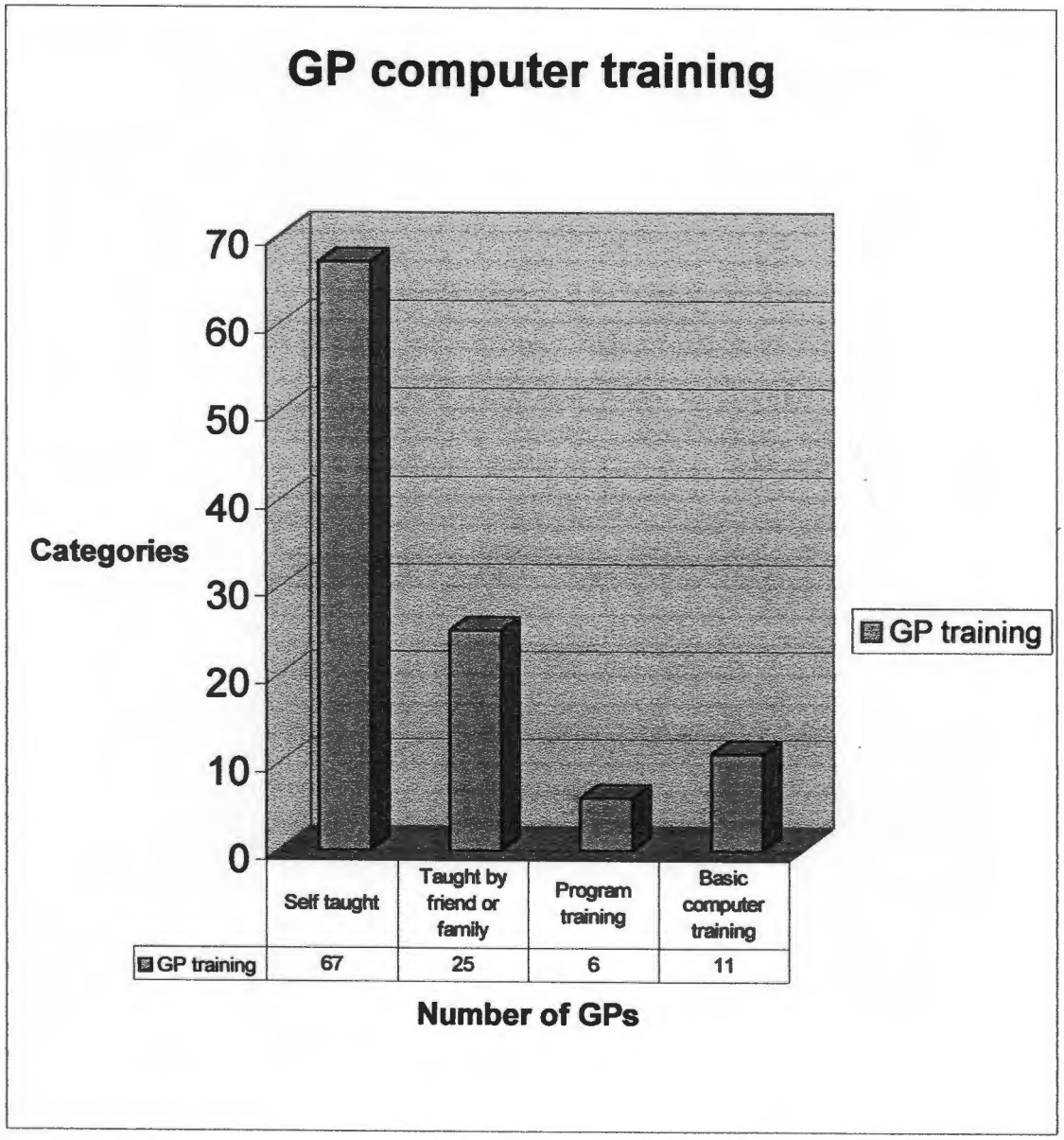
Graph 1



Graph 1 shows that although there was a larger number of the more senior group of doctors (more than 50 years of age) that had never used a computer, the percentage of GPs in the different age groups that were basic computer users or regular computers was very similar. From this author deduces that age is not a factor with regard to computer competence.

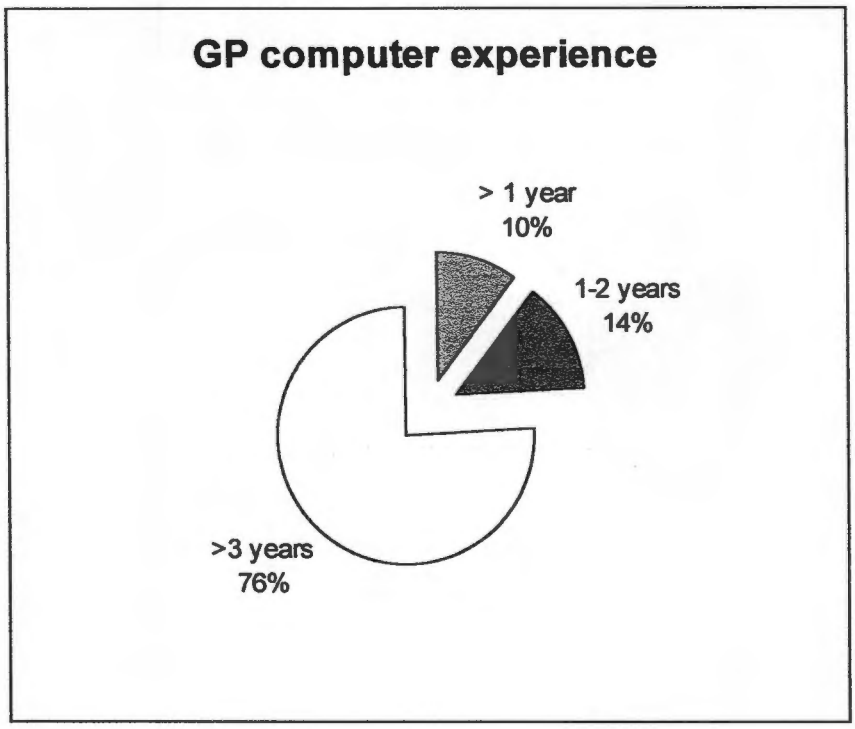
It was interesting that 67 of the 90 GPs that have used computers (74%) had taught themselves how to use a computer and only 11 (19%) had had any formal training. (Graph 2). This is due to the time constraint that GPs have and must be considered in training. The term "program training" in Graph 2, refers to the courses that some organizations offer to teach the user how to use their program and "basic computer" refers to basic computer training.

Graph 2



The computer experience of GPs showed that 76% of GPs that had computers had had more than 3 years of computer experience (Graph 3).

Graph 3



Most of the GPs had only one practice, as the mean for the number of practices per GP was 1.2 with a standard deviation of 0.4. The number of computers per practice had a median of 2 with a range of 0 to 22 computers.

13 of the 100 GPs did not have computers in their practices, while 61% of these did not intend getting their practices computerized. Only 30.8% intended to get their practices computerized within the near future. (Table 11)

Table 11

GPs that didn't have computers in their practices	**Number**	**Percentage**
Has GP considered getting his practice computerized?	5	38.5%
GP plans to get practice computerized in a few months	4	30.8%
GP plans to get practice computerized next year	1	7.7%
GP plans to get practice computerized within 2 years	0	0%
GP plans to get practice computerized in the far future	0	0%
GP does not intend getting his practice computerized	8	61.5%
Total	13	100%

The range of the ages of the GPs that were not interested to be the interviewed was from 29 to 72 years, with a median of 35.0years. This median is surprisingly low and indicates that it is not just the older GPs that are not interested in IT.

87% of GPs had computers in their practices, but only 50% of these had computers on their desks. 28.7% of the GPs that have computers in their practices don't use them personally (Table 12).

Table 12

GPs that had computers in their practices	Number	Percentage
GPs that have a computer on their desks	44	50.6%
GPs that have a network in the practice	48	55.2%
GPs that have access to the internet in the practice	58	66.7%
GPs that have access to a Pentium in the practice	72	82.8%
GPs that have access to a CD ROM in the practice	70	80.5%
GPs that use the computer in the practice personally	62	71.3%
Total	87	100%

The GPs that do use computers use them mainly for the management of the practice finances (74%), which includes a simple program that holds a basic record of each patient (partial electronic record keeping). The category "full electronic record keeping", refers to GPs that have all their patient information on computer. This includes the history and examination. (Table 13)

Table 13

GPs that used the computers in the practice personally	Number	Percentage
Full electronic record keeping	3	4.9%
Partial electronic record keeping	34	54.9%
Internet	33	53.2%
Email	33	53.2%
Practice finances	46	74.2%
Stock keeping	10	16.1%
Letters and reports	24	38.7%
Total	62	100%

More than 50% of the GPs that use computers use the Internet and email (Table 13), while 43% use computers for less than an hour a day. (Table 14)

Table 14

The amount of time that GPs spend using computers	**Number**	**Percentage**
The GP uses the computer all the time	35	56.5%
The GP uses the computer approximately one hour a day	16	25.8%
The GP uses the computer approximately one hour a week	8	12.9%
The GP uses the computer approximately one hour a month	3	4.8%
Total	62	100%

5.4.5. Computer usage at home

65% of GPs have access to the Internet at home (Table 15), but only 58% of these GPs use the Internet at home (Table 16).

Table 15

GPs that have computers at home	**Number**	**Percentage**
Number of GPs that have access to a Pentium at home	67	87%
Number of GPs that have access to a CD ROM at home	77	100%
Number of GPs that have access to the Internet at home	65	84%
Total	77	100%

Table 16

What the GP uses the computer for personally	Number	Percentage
Full electronic patient record keeping	1	1.3%
Partial electronic record keeping	4	5.2%
Internet	45	58.4%
Email	43	55.8%
Practice finances	19	24.7%
Stock keeping	30	39%
Letters and reports	2	2.6%
Spouse and children use the computer	36	46.8%
Games	9	11.7%
Research	4	5.2%
CD's	2	2.6%
Personal	2	2.6%
Own programs	2	2.6%
Learning (new computer)	2	2.6%
Statistics	1	1.3%
Hobbies	1	1.3%
Studying	1	1.3%
Total	77	100%

It is interesting to note that 46% of the GPs home computers are used mainly by the GP's spouse and children.

5.4.6. Computer education:

87% of GPs were keen to learn more about computers and 44% of these would prefer a part time course that does not take more than one evening per week of their time. 62% of these GPs prefer learning to use the computer in their own time (Table 17). The GPs that preferred full time courses were either completely computer illiterate or living in rural areas.

Table 17

The form of learning that the GP prefers:	**Number**	**Percentage**
A teaching video	22	25.3%
A teaching manual	16	18.4%
A program that teaches you how to use itself	16	18.4%
A part time course (eg. 1 evening per week)	39	44.8%
A full time course (eg. 2-3 days)	6	6.9%
A teaching video + a teaching manual	1	1.2%
A teaching manual + a program that teaches you how to use itself	1	1.2%
A teaching video + a program that teaches you how to use itself	1	1.2%
A part time course + a teaching manual	1	1.2%
Total	87	100%

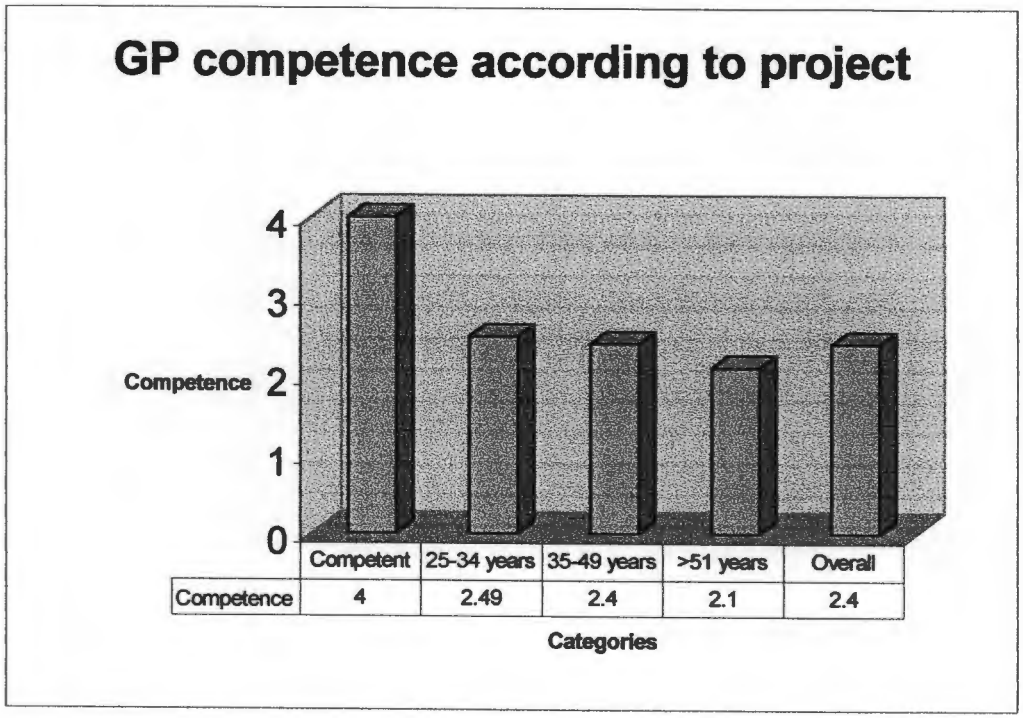
GPs were asked to rate their computer competence on a scale of 1 to 4, where "1" means they have never used that part of a computer, and "4" means they are confident users. The overall mean was 2.4. This gives one an indication of how low GPs confidence levels are regarding computers (Table 18).

Table 18

Computer competence	**Mean**	**Standard deviation**
Keyboard	2.8	1.0
Mouse	3.2	1.0
Word processor	2.1	1.0
Spreadsheet	1.7	1.0
Database	1.7	1.0
Practice management program, eg Mass	2.6	1.2
E-mail	2.4	1.2
Internet	2.3	1.2
Total competence	2.4	1.2

The GP competence according to this method was also measured within the age groups of table 2, as was done for graph 1. The results can be seen in graph 4.

Graph 4



In this graph an extra column was added to give an indication of what basic competence is in comparison with that of the GPs (See the column called "Competent"). One can see that the more senior doctors were less competent with computers than their younger colleagues. The margin with which the different groups differ is so small that one cannot say that this is significant. The author therefore comes to the same conclusion that was made after graph 1, which is that age does not really influence computer competence with GPs.

Only 65% of GPs felt that it was vital for a GP to have a computer on his desk, but 92% felt it was vital with the bookkeeper (Table 19). The author feels that this figure could be higher as the receptionists, and sometimes the GPs themselves, do the bookkeeping in some practices.

Table 19

GP's opinions as to where in a practice computers are vital:	**Number**	**Percentage**
Computer vital with receptionist	82	82%
Computer vital with bookkeeper	92	92%
Computer vital with dispensary	80	80%
Computer vital on the GP's desk	65	65%
Total	100	100%

5.4.7. Structured interview:

Most of the GPs used written notes for their patient notes (Table 20). 73% of GPs felt that a mouse is a good tool for computer use, although this information must also be seen in the context of GPs not being exposed to other forms of technology (like touch screens). (Table 21)

Table 20

Record keeping	**Number**	**Percentage**
Cards	19	19%
Written notes	63	63%
Typed notes	2	2%
Cards + written notes	11	11%
Written + typed notes	5	5%
Total	100	100%

Table 21

Hardware tool preference of GPs:	**Number**	**Percentage**
Mouse	66	73.3%
Touch screen	21	23.3%
Roller ball	3	3.3%
Total	90	100%

In the structured interview GPs were given a statement and were asked to either agree, disagree, strongly agree or strongly disagree.

The results are given in the following categories to improve readability:

1. Reasons why GPs don't use computers (Table 22)
2. Time (Table 23)
3. Confidentiality (Table 24)
4. Competence (Table 25)
5. Electronic referrals (Table 26)
6. Possible needs in GP software (Table 27)

The abbreviations used in tables 22-27 have the following meanings:

TTGP = Total number of GPs interviewed for the question

%A+SA = Percentage of GPs that agree and strongly agree

%D+SD = Percentage of GPs that disagree and strongly disagree

Table 22. Reasons why GPs don't use computers

Statement	TTGP	A+SA%	D+SD%
Computers are too expensive for GP practice	100	9%	86%
GPs feel unsure about how to use computers	100	78%	14%
Computers have to be updated too often	100	63%	30%
GPs would prefer a portable computer that they can take with them when they go home or do house calls, eg. a laptop or a palmtop.	90	57%	36%
GPs will be keen to use computers if they were on a lease contract that will keep the doctor updated on the newest technology	90	67%	21%
Computers can significantly improve the quality of patient care	90	68%	22%
Computers interfere with the doctor-patient relationship	100	39%	52%
A computer the size of an A4 book that uses mainly touch sensitive screens would make computers more accessible to GP practice.	90	78%	13%
Computers create a good impression with patients	100	72%	14%

The author wants to emphasize that GPs do feel unsure about using IT as can be seen in table 22. This tells the SD that training must be a priority. The fact that 78% of GPs liked the idea of a computer without a screen that stands between the GP and the patient, emphasizes the importance of the doctor patient relationship.

Table 23. Time

Statement	TTGP	A+SA%	D+SD%
Computers lead to longer consultations	100	37%	47%
Computers save time	90	82%	10%
GP software should require minimal typing	90	93%	3%
GPs don't have time to learn to use computers	100	33%	63%
Computers break down too easily	100	31%	61%

The fact that GPs agree that computers can save them time, refers to the fact that they are exposed to a lot of IT and know what the computer can do for them.

Table 24. Confidentiality

Statement	TTGP	A+SA%	D+SD%
GPs are afraid that other people may access their electronic records	100	27%	65%
It would improve patient care if there were a secure system in place, which would allow for patients to have access to some of their medical records via the internet with a password. Some information must be on higher security for doctors only and must not be accessible.	90	52%	37%

The majority of GPs agree that computers are fairly safe with regard to patient records, but only a small majority had enough faith in computer security to have their records on the Internet.

Table 25. Competence

Statement	TTGP	A+SA%	D+SD%
Computers are more for financial than for clinical functions	100	48%	45%
Computers are a necessity in GP practice	100	93%	4%
Computers are more for receptionists and bookkeepers than for GPs	100	34%	62%
Computers significantly improve billing and account management	100	96%	1%
Learning to use the internet and e-mail will make it easier for GPs to stay up to date with medical developments.	90	89%	7%
Computers create faster prescriptions for dispensing GPs	90	66%	19%
Computers make it easier to retrieve and reproduce patient notes	90	81%	10%

It has been clear so far that GPs do know what IT has to offer and this comes through overwhelmingly in that 93% of GPs felt that computers were a necessity in GP practice. The importance of the accounts system can also be seen in this table.

Table 26. Electronic referrals

Statement	TTGP	A+SA%	D+SD%
It would improve referrals if GPs could send a copy of the patient records via the internet instead of a written note with the patient.	90	68%	27%
Each patient needs to have a unique form of medical identification so their records can be traced electronically in case of an emergency, for example a thumb print that translates to a code	90	77%	18%
GPs will really use computers if they provided a simple form of remote access, while the GP is working in a remote clinic or from home, to the computer in the practice.	90	80%	13%
Computerized patient records are more valuable than paper records	90	49%	36%
Computers can produce more legible referrals	90	90%	6%

Computers can really make a big difference to the medical community as far as supporting the referral system. This table shows that GPs are aware of this fact.

Table 27. Possible needs in GP software

Statement	TTGP	A+SA%	D+SD%
GP software should be able to assist in patient education with appropriate printouts and graphics.	90	88%	4%
GP software should be able to give GPs differential diagnoses, should they require it	90	81%	13%
GP software should warn the GP regarding contra indications and adverse drug effects when writing a prescription	90	81%	16%
It would be nice if GP software could provide GPs with their own web site that gives trusted and credible information to their patients.	45	82%	13%
GPs should be able to give clinical advice to their patients via the web and email	45	62%	31%

Table 27 tests the GP's opinion on different options regarding the clinical use of computers, and the results are indeed very positive.

In summary, GPs seem to be in agreement about the fact that their practices cannot function without computers. This can be seen from the two highest scoring sections: (1) that computers significantly improve billing and account management (96%) and (2) that computers are a necessity in general practice (93%). Programs should require minimal typing (93%) and should assist in patient education (88%). There is also consensus that the Internet can help GPs stay up to date with medical developments (89%) and that computers can produce more legible referrals (90%).

5.4.8 Unstructured interview

GPs were also asked what advice they would give to a programmer who wants to write a program to make their practices more efficient. These were comments spontaneously made by the GPs. As it is a very long list, the results have been grouped to improve readability:

1. Easy to use (Table 28)
2. Speed and time (Table 29)
3. Patient orientated (Table 30)
4. GP orientated (Table 31)
5. Clinical support (Table 32)
6. Medical aids (Table 33)
7. Administrative (Table 34)

Table 28. Easy to use

Comments made by GPs	**Number**	**Percentage**
Easy to use	26	26%
The different parts of the program must be easily accessible	22	22%
User friendly	19	19%
Simplicity	18	18%
Effective	4	4%
Reliable	2	2%
Total	100	100%

The fact that GP software must be simple and easy to use is overwhelming in table 28, especially when one considers that these were spontaneous comments.

Table 29. Speed and time

Comments made by GPs	Number	Percentage
Fast	18	18%
The program must save the doctor time and not use more time	7	7%
There must be fast links between different parts of the program, eg. Icons	7	7%
Minimal typing	6	6%
One screen to summarize a patient (with icons)	5	5%
Touch screen	4	4%
Voice activation	4	4%
One program that does everything in the practice	4	4%
It must be better than what they already have	4	4%
There must be a good support system if things go wrong	3	3%
Program must not crash	1	1%
Drop down menus	1	1%
The system must have adequate backup	1	1%
Records must be easily available	1	1%
Total	100	100%

All these comments can improve the time of the GP and the speed with which the GP can do his work. The fact that GPs don't want to wait for the computer to work is confirmed with the 18% that mentioned that the software must be fast.

Table 30. Medical Aids

Comments made by GPs	Number	Percentage
Be able to access medical aid computers for information	13	13%
The program must have all the newest codes (medical aids, etc.)	6	6%
The program must warn the GP about high risk patients (payments)	1	1%
Total	100	100%

Medical aids are mentioned here both directly and indirectly. They are a significant part of the GP practice and GP software has to accommodate this need.

Table 31. Patient orientated

Comments made by GPs	Number	Percentage
Electronic patient record keeping	15	15%
Security and confidentiality	9	9%
The program must not interfere with the doctor patient interaction	6	6%
The program must be able to give patient education	5	5%
The program must improve patient management	2	2%
There must be no screen between the doctor and the patient	1	1%
The program must cater for patients that you only see once.	1	1%
Small computer	4	4%
The program must give patient summaries	4	4%
Total	100	100%

A lot can be said about the importance of the patient in GP practice. The comments in Table 31 are focused on this and the SD has to remember that there is a patient sitting in front of the GP when he is using GP software.

Table 32. Clinical support

Comments made by GPs	Number	Percentage
Pharmacological support	14	14%
Diagnostic support	12	12%
Dispensing	6	6%
Program must have the pharmacological prices	1	1%
Total	100	100%

The aspects in table 32 can be summarized as "clinical support", as all these factors will support the GP in improving his clinical decisions. They are therefore important.

Table 33. Administration

Comments made by GPs	Number	Percentage
You must be able to charge the patient on the system.	1	1%
A good accounts program	14	14%
Total	100	100%

GPs really need their accounts systems and the fact that most GPs use their computers mainly for this function emphasizes the importance of this function.

Table 34. GP orientated

Comments made by GPs	**Number**	**Percentage**
The program must be up to date on the newest medical knowledge	6	6%
The program must understand how doctors function	3	3%
The program must include the things mentioned in the structural interview	2	2%
A good referral system	2	2%
Mobility	1	1%
Access to Medix2000	1	1%
Word processor	1	1%
Shortcuts	1	1%
The structure must be clinically significant	1	1%
Merck manual	1	1%
Medpages	1	1%
You must be able to easily transfer information from one part of the program to another.	1	1%
Low price	9	9%
The program must remind the GP about his appointments	2	2%
The program must give good GP interaction	2	2%
Total	100	100%

The comments in Table 34 could be grouped under "clinical support" as well, but due to the low amount of GPs that made the comments they are in a separate table.

Chapter 6 - Analysis

6.1 Introduction

In this section the results of the national phase were analyzed under two headings: GP computer competence and GP attitude towards IT. Where possible the results were compared with Nielsen's Australian study (Nielsen, 1998).

6.2 Competence

As a measure of competence, the author took two approaches. The first was to compare those results that were also measured in Nielsen's Australia study with the South African results and the second was the actual measurement of competence that was used in this project.

1. Comparison with Australian results

Due to the different approaches of the two parties (SA and Australia), the author could only compare some of the results.

a. Computer access in practices

The South African project showed that 87% of GP's had access to computers in their practices. This makes the South African GPs more computerized than their Australian counterparts, where the figure was only 31%. Also of interest is that 72% of SA GPs have access to a Pentium computer, which means more than just having access to a computer. The author has to mention that although there was a 3 year difference between the two projects (Nielsen in 1997 and Vogelzang in 2000), the difference still remains significant.

b. Management programs

In the Australian project the most common IT functions of the GPs were patient registration, billing and financial management of the practices. This trend was also prominent in the SA study where 74% of GPs who used computers used computers for practice finances. 96% of SA GPs agreed that computers could significantly improve billing and account management. In table 18 (p48), one finds that GPs are more competent with the practice management program than with a word processor.

c. Internet and email

In Australia 44% of GPs had access to email and 47% to the Internet. In SA 58% of GPs had access to the Internet at the practice, while 45% actually use the computer for the Internet and 43% use the computer for email. The author would like to suggest that the SA GPs seem more competent in this area.

2. Measurement of competence

d. GP evaluation

In the beginning of the national phase evaluation, the GPs were asked to rate their own computer competence (See Q12, Appendix 8). Here only 10% of GPs said that they had never used a computer, which means that 90% of GPs consider themselves as at least very basic computer users. This is significant. The project also proved that age was not a factor with regard to computer competence. (See graph 1 and graph 4, chapter 5)

e. Author's evaluation

The author's evaluation of GP competence in Q34 (Appendix 8) showed that GP competence was shockingly low in the light of their exposure to IT. The reader must take note that the GPs were asked to rate themselves between having never used a function, and being a competent user. The overall competence in this question came to 2.4 out of a possible 4. This gives an overall competence level of 60%.

6.3 Attitudes

1. Good impression

Both the SA and the Australian studies showed that the majority of GPs feel that computers create a good impression with patients. In Australia 79% were in agreement with this statement, while the SA figure was 72%. (p52)

2. Computers a necessity in GP practice

In Australia 74% of GPs were in agreement with this statement, while 93% of SA GPs agreed with it. (p54)

3. Computer education

As mentioned in chapter 5, SA GPs are keen to learn more about computers (p47). This is further confirmed when the majority of GPs (63%), felt that GPs do have enough time to learn to use computers (p53). The fact that 78% of GPs felt that GPs are unsure about computers makes computer education for GPs a priority (p53). 74% of GPs that use computers have taught themselves (p41) and 54% prefer learning in their own time (p47). This must be remembered with future training of GPs.

4. Computerized patient records (CPR)

South African GPs are currently not exposed to CPR. This comes through on various occasions in the project. Only 65% of GPs felt that computers were vital on their desks (p50), compared with 92% that felt that computers are vital on the bookkeeper's desk. Only 49% of GPs felt that computerized patient records are more valuable than paper records and only 7% of GPs use typed patient notes. This might change in the future, as 15% of GPs mentioned CPR spontaneously in the unstructured interview as something that they would want in future software (p59). This was further confirmed by GPs' positive attitude towards electronic referrals. 68% felt that electronic referrals would improve referrals and 77% were in favor of tracing records electronically in case of an emergency (p55).

5. Patient orientated software

Here the author wants to refer to the fact that the majority of GPs did not feel that computers interfere with the doctor patient relationship. This was also found in the Nielsen study. One has to take note though, that 93% of SA GPs want their software to require minimal typing (p53), while 78% preferred a touch screen system that was flat on the desk and did not interfere with the patient.

6. Medical aids

The need for software that can assist in the gathering of payments from medical aids, came through strongly in the unstructured interview (p59).

7. GP orientated software

GPs were very positive about software that can assist them clinically in their practices. Here the author wants to refer to table 27 (p56), where on average more than 80% of GPs felt that software that assists in diagnoses and drug prescriptions should be included in GP software.

8. Time

Although 82% of GPs felt that computers do save them time (p53), there were various references to factors that would increase the speed of computer usage (p58). The author is of the opinion that this is due to the irregular and unpredictable time schedule that GPs have.

9. Easy to use

The fact that the 4 comments that were mentioned most by the GPs in the unstructured interview basically turn around ease of use is remarkable (p57). These included "Easy to use" (26%), "The different parts of the program must be easily accessible" (22%), "User friendly" (19%) and "Simplicity" (18%). It is interesting to note how this fits in with Shneiderman's principles (Sneiderman, 1992).

6.4 Principles

From the analysis the following principles emerge. The author offers these as suggestions to software developers who want to develop software for GPs:

A. Competence

a. Most SA GPs have access to computers in their practices or at home. (p62)
b. GPs use computers mostly for financial and management functions (p62)
c. The majority of GPs have access to the Internet and to email either at work or at home. (p62)
d. Very few GPs have never used a computer. (p63)
e. GPs feel 60% competent as very basic computer users. (p63)

B. Attitudes

a. GPs are positive about the CPR. (p64)
b. GPs feel that IT saves time. (p64)
c. GPs feel that IT creates a good impression with patients. (p64)
d. GPs feel unsure about computers, but are keen to learn more. (p64)
e. GPs want relevant software that includes
    i. A good Financial / Management system
    ii. Diagnostic support
    iii. Pharmacological support
    iv. Electronic referrals (p55)
f. GP software must be easy to use. (p57)
g. GP software must be fast and efficient. (p58)
h. GP software must be patient orientated
    i. It must support patient education. (p56)
    ii. It must be secure. (p53)
    iii. It must not interfere with the doctor patient interaction. (p59)
        1. Minimal typing. (p58 and p53)
        2. Touch screens. (p52)
        3. Small computer, like an A3/A4 size. (p52)
i. GP software must be able to access Medical Aid computers for patient information. (p59)

6.5 Conclusion

In summary: SA GPs were technologically more competent than their Australian counterparts when the author did this study, but have a very low competence with regard to the actual use of computers. They can use the management programs they work with, but know very little about other "basic" programs like Word processors and Spreadsheets. GPs have a very positive attitude towards IT and the majority of GPs are keen to learn more. Some of these principles were presented to SD as part of the preliminary results. The response was very positive and the SDs were grateful for the information. As the current principles cover a lot more depth than the preliminary results did, the author is of the opinion that the project does indeed offer a valuable cognitive model to SDs.

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Appendices

Appendix 1

Evaluation form for Introduction phase

1.1 Evaluation

1.1.1 General information

Name	Other qualifications
Age	Province
Gender	City/Rural
Race	Type of practice
Home language	Number of partners
MBChB graduation	Size of practice (records)
Years in GP practice	Approximate turnover

1.1.2 Computer hardware

Work	Location	CPU	Floppy drive	Stiffy drive	CD ROM	Hard drive	DVD drive
Home							

1.1.3 Computer software

Work	Operating system	Internet/ e-mail	Word processor	Spreadsheet	Practice management	Programming languages	Other
Home							

1.1.4 Computer usage

Have you ever used a computer?

Have you had any computer training?

Courses done	Self taught
	How long?

Would you like to learn more?

How much time would you be prepared to spend learning?

	None at all
	One hour a month
	One hour a week
	One hour a day
	More than one hour a day

How often do you use a computer?

Work		Home	
	Not at all		Not at all
	One hour a month		One hour a month
	One hour a week		One hour a week
	One hour a day		One hour a day
	More than one hour a day		More than one hour a day

What would you use to press a button on the screen?

	CD ROM
	Keyboard
	Mouse
	Stiffy disk
	Hard drive
	Don't know

What is a word processor? Give an example:

	Useful for surfing the internet		Access
	Handy for making graphs		Netscape
	Nice for storing data		Word
	Good for writing letters		Quatro pro
	Good for sending e-mail		Visual basic
	Don't know		Other?

What is a spreadsheet? Give an example:

	Useful for surfing the internet		Access
	Handy for making graphs		Netscape
	Nice for storing data		Word
	Good for writing letters		Quatro pro
	Good for sending e-mail		Excel
	Don't know		Other?

What is a database? Give an example:

	Useful for surfing the internet		Access
	Handy for making graphs		Netscape
	Nice for storing data		Word
	Good for writing letters		Paradox
	Good for sending e-mail		Excel
	Don't know		Other?

What is a web page? Give an example:

	Useful for surfing the internet		Access
	Handy for making graphs		Netscape
	Nice for storing data		Word
	Good for writing letters		Paradox
	Good for sending e-mail		Explorer
	Don't know		Other?

Have you ever programmed?

Which languages?

What do you use your computer for most of the time?

Work	Practice management	Home	Practice management
	E-mail / Internet		E-mail / Internet
	Diagnostic programs		Diagnostic programs
	Writing letters		Writing letters
	Finances		Finances
	Playing games		Playing games
	Never used a computer		Never used a computer

1.2 **Structured interview**

What are your thoughts on the following questions?

What changed in the practice before and after you got computers?

	Gathering in finances from medical aids is a lot easier
	We spent a lot of money with very little results
	Things didn't really change
	Managing the practice is a lot easier
	Getting hold of patient records is a lot easier
	I don't use computers

What do you dislike about computers?

	I always feel unsure about what I am doing
	I am afraid that it might crash on me
	I am scared that I might do something that will let me lose all my data
	It takes too long before you get it to do what you want
	It takes too much time to learn how to use it

Do you feel confident about learning how to use new programs?

	New programs scare me
	I don't have the time to learn to use a new program
	I prefer using programs that I know
	I'll learn a program if it gives quick and effective results
	I've never worked with a computer program before
	I enjoy the challenge of learning new programs

What makes computers difficult to use?

	Every computer looks different when you switch it on
	You have to learn how to use every aspect of a program from scratch
	You can't use what you know on new programs
	It doesn't tell you what it is doing, it just starts rumbling!
	I don't know, I've never used a computer before
	You have to remember to many things before you get it to work

What do you dislike about computers?

	They break to easily
	They waste to much time
	They cost to much money
	They're to difficult to learn to use
	They're to unpredictable

What makes computers risky?

	You can lose your data to easily
	Unwanted people may get access to your records
	They are unreliable
	It takes to long to get them fixed
	They are expensive and take to much time

What are constant irritations to you in GP practice?

	Specialists don't give you feedback on your patients
	Writing out referrals takes to long
	Medical aids that don't want to pay
	You fall behind on academic knowledge
	Illegible referrals from colleagues

How can computers improve your practice?

	By giving me feedback on my patient while he is with a specialist
	By letting me refer a patient by pressing a button
	By managing my stock taking for me
	By keeping me up to date with pharmaceuticals
	By supporting me in making a diagnosis

How do you feel about a program that does your referrals through the Internet?

	As long as I don't have to do any typing
	I prefer writing referrals by hand
	I welcome it, especially with my colleagues' illegible handwriting
	I don't like the idea of my patient records on the web
	I don't mind, as long as it doesn't take much of my time

What has really impressed you in computers?

	Being able to work it without typing
	The possibility of voice activation
	The touch screens in supermarkets
	Being able to choose from some options and not having to remember anything
	A program that teaches you how to you use itself in your own time
	Computers don't impress me

How do you feel about computers?

	Its an integral part of the future and I need to get up to date
	I would like to get training on how to do the basics
	I feel that I am falling behind on current trends, because I can't use the internet
	Computers are more for secretaries and I am not interested
	I would like training, but it must take very little time

How do you feel about a program that helps you to make a diagnosis?

	I'd rather use my textbooks
	If it can quickly answer my questions I'd be interested
	I don't need a computer to do my job for me
	I would rather use the computer than to dig through my textbooks
	I'd be interested if I can learn to use it quickly

What do you like about computers?

	They are nice for keeping records and data
	They give you access to the internet
	They help with managing the practice
	Its an easy way of keeping contact with colleagues
	They are really nice for playing games and relieving stress
	I've never used a computer before

What would you like to change in your current software?

	It must tell you what to do
	There must be more buttons and options to choose from
	It must be faster
	It must tell you what it is doing
	It must be simpler and easier to learn
	I don't have any software

Would you like to have updated medical information?

	CD's with the newest version of the SAMF
	Easy access to the newest articles on a specific subject
	Getting information on new treatment regimens by pressing a button
	Getting quick advice on a complicated patient via the internet
	A program that gives you possible diagnoses after giving it signs and symptoms
	I feel my medical information is up to date

How do you feel about patient records?

	I don't want other people to see my records
	I'd like a simple system that can easily make my records for me
	I'd like to have access to my patient's records while he is with a specialist
	I like the idea of referring a patient by sending his letter with the push of a button
	I'd like to receive better referral letters back from the specialists
	I'm happy with the current system of written referrals

What would you regard as vital in the perfect medical program?

	Internet access and e-mail
	Practice management, stocktaking and accounting
	Easy and effective retrieval of patient records
	Keeps you up to date on academic information, and diagnostic support
	Easy referral and access to patient records
	I don't need a computer

Appendix 2

Introduction form for the pilot phase

(English)

Good morning its Dr. Vogelzang speaking. Could I please speak to Dr.....?

N: When can I phone back?

Y: Good morning, it is Hanri Vogelzang speaking. Are you busy?
I'm a medical officer at Groote Schuur Hospital and have an interest in how to meet the needs of general practitioners through computers. My research project consists of interviews with private GPs in order to deduce some principles that programmers can keep in mind when writing programs for us.

Your name was drawn from a random sample of GPs in the Western Cape. Would you be available for an interview?

Appendix 3

Introduction form for the pilot phase

(Afrikaans)

Goeie more, dis Dr. Vogelzang wat praat. Kan ek asseblief met Dr..... praat?

N. Wanner kan ek terug skakel?

J. Goeie more, dis Hanri Vogelzang wat praat. Kan u praat?

J. Wanner kan ek terug skakel?

N. Ek is 'n mediese offisier by Groote Schuur Hospitaal en stel belang in hoe ek die behoeftes van die algemene praktisyn kan dek met behulp van rekenaars. As deel van my navorsings projek hou ek onderhoude met private GPs, met die doel om beginsels saam te stel wat programeerders in gedagte kan hou as hulle vir ons programme skryf.

Die onderhoude word per afspraak gereel, is telefonies en duur so 15 minute.

U naam is getrek uit 'n steekproef van die GPs in die Weskaap. Sou u beskikbaar wees vir 'n onderhoud?

Appendix 4

Evaluation form for Pilot phase

Name of doctor:

Telephone number:

Postal address:

Province:

City / Rural

4.1 Evaluation

4.1.1. General information:

These questions are asked for research purposes, and are not intended to be discriminating in any way.

How old are you?

25 - 34	35 – 49	> 50	Other

Male or Female

Male	Female

What is your home language?

When did you graduate?

Do you have any other qualifications?

How many years have you been in private general practice?

Do you have a one-man practice or a group practice?

How many partners are in the practice?

How many patients do you see per day on average?

Do you have a cash practice?

Do you dispense?

4.1.2. Computer usage

Q1. Have you ever used a computer? Y/N (If N go to Q5)

Q2. Have you had any computer training?

Q3. Have you taught yourself?

Q4. When did you start teaching yourself?

4.1.3. Computer hardware and software

Q5. Do you have any computers in your practice? Y/N (If Y go to Q8)

Q6. Have you considered getting your practice computerized? Y/N (If N go to Q17)

Q7. When do you plan to do this?

Within the next few months	Next year
Within the next 2 years	Maybe in the far future

Go to Q17

Q8. How many computers are in your practice?

Q9. Do you ever use the computer/s personally? Y/N (If N go to Q15)

Q10. Do you use it/them for any of the following? (Just answer Y/N)

Electronic patient record keeping	Diagnostic programs
Internet	E-mail
Practice management	Research
Programming	Other

Q11. Do you have a computer on your desk?

Q12. Tell me about the computer that you use most of the time within the practice:

Q13. What size computer is it? (386/486/Pentium/etc)

Q14. Does it have a CD-ROM?

Q15. Which operating system does it use? (Windows, DOS, etc.)

Q16. How often do you use the computer?

	One hour a month
	One hour a week
	One hour a day
	All the time

Q17. Do you have a computer at home? (Or in your house) Y/N (If N go to Q23)

Q18. What size computer is it? (386/486/Pentium/etc)

Q19. Does it have a CD-ROM?

Q20. Which operating system does it use? (Windows, DOS, etc.)

Q21. Does it have internet/e-mail access?

Q22. What do you use the computer for?

Electronic patient record keeping	Diagnostic programs
Internet	Financial management
Research	E-mail
Programming	Other

Q23. Would you like to learn more about computers? Y/N (If N go to Q26)

Q24. Which form of learning would you prefer?

A teaching video	
A teaching manual	
A program that teaches you how to use itself	
A part time course (eg. 1 evening per week)	
A full time course (eg. 2-3 days)	

Q25. Rate your competence with the following from 1 to 4. ("1" means you've never used it before and "4" means you are a confident user)

Keyboard	1	2	3	4
Mouse	1	2	3	4
Word processor	1	2	3	4
Spreadsheet	1	2	3	4
Database	1	2	3	4
Practice management program	1	2	3	4
E-mail	1	2	3	4
Internet	1	2	3	4

Q26. Do you think that a mouse is a good tool for computer use, or would you rather prefer another tool that performs the same function? (Eg. touch screens, roller ball)

Q27. Where in the practice are computers vital?

Receptionist	Bookkeeper
Pharmacist	GP's desk
Other?	

4.2 Structured Interview

4.2.1 All users.

Q28. What system do you use to make your patient notes? (eg. cards, written notes, typed notes, etc.)

Score the following statements by saying for each statement whether you strongly agree, agree, disagree or strongly disagree. A score of 1 means you strongly agree and a score of 4 means you strongly disagree.

Q29. GPs do not use computers because:

Computers are too expensive for GP practice	1	2	3	4	DK
GPs don't have time to learn to use computers	1	2	3	4	DK
GPs feel unsure about how to use computers	1	2	3	4	DK
GPs are afraid that other people may access their electronic records	1	2	3	4	DK
Computers have to be updated too often	1	2	3	4	DK
Computers break down too easily	1	2	3	4	DK
Computers lead to longer consultations	1	2	3	4	DK
Computers interfere with the doctor-patient relationship	1	2	3	4	DK
Other reasons?					

Q30. What is your opinion on the following?

Computers are more for administrative than for clinical functions	1	2	3	4	DK
Computers are a necessity in GP practice	1	2	3	4	DK
Computers are ideal for giving GPs advise on tricky patients by suggesting some diagnoses	1	2	3	4	DK
GPs need computers or else they will fall behind on current trends	1	2	3	4	DK
Computers are more for secretaries and bookkeepers than for GPs	1	2	3	4	DK
GPs have to learn to use the internet and e-mail to stay up to date	1	2	3	4	DK
It would improve patient care if there were a secure system in place, which would allow for patients to have access to some of their medical records via the internet with a password. Some information must be on higher security for doctors only and must not be accessible.	1	2	3	4	DK
Electronic patient referrals will significantly improve referrals from GPs to Government hospitals	1	2	3	4	DK
Electronic patient referrals will significantly improve referrals from GPs to Specialists and visa versa	1	2	3	4	DK
Each patient needs to have a unique form of medical identification so their records can be traced electronically in case of an emergency, for example a thumb print that translates to a code	1	2	3	4	DK

GPs will really use computers if they provided a simple form of remote access to the computer in the practice, while the GP is doing house calls or is working in a remote clinic.	1	2	3	4	DK
GPs would prefer a portable computer that they can take with them when they go home or do house calls.	1	2	3	4	DK
GPs will be keen to use computers if they were on a lease contract that will keep the doctor updated on the newest technology	1	2	3	4	DK
Computers can really improve GP practice by assisting in the collection of outstanding payments.	1	2	3	4	DK
Do you have any other opinions regarding computers?					

4.2.2 Regular users

Q31. Computers are good for GP practice because:

Computers create a good impression with patients	1	2	3	4	DK
Computers significantly improve the quality of patient care	1	2	3	4	DK
Computerized patient records are more valuable than paper records	1	2	3	4	DK
Computers create faster prescriptions	1	2	3	4	DK
Computers make it easier to retrieve and reproduce patient notes	1	2	3	4	DK

(Q31 continue)

Computers create easy access to journals and academic information	1	2	3	4	DK
Computers improve patient education	1	2	3	4	DK
Computers can produce more legible referrals	1	2	3	4	DK
Computers save time	1	2	3	4	DK
Computers significantly improve billing and account management	1	2	3	4	DK
Computers improve patient summaries	1	2	3	4	DK
Other reason?					

Q32. Unstructured interview:

If you had a programmer sitting in front of you who wants to write a program to make your practice more efficient, what advice would you give him about such a program? What are the things that would be important in such a program?

Appendix 5

Result tables for the Pilot phase

5.1 GP details

The results of the basic details of the GPs in the pilot phase can be seen in tables 1 to 3. These results are similar in structure to the national phase results.

Table 1

Age categories	Number	Percentages
Age25-34	11	18.3%
Age35-49	32	53.3%
Age>50	17	28.3%
Total	60	100%

Table 2

Gender categories	Number	Percentages
Male	51	85%
Female	9	15%
Total	60	100%

Table 3

First language	Number	Percentages
English	25	41.7%
Afrikaans	30	50%
Tsonga	1	1.7%
Flemish	1	1.7%
French	1	1.7%
Pedi	1	1.7%
Yoruba	1	1.7%
Total	60	100%

Table 4

	Mean	Standard deviation
Years since graduation	20.6 years	9.5
Years in private general practice	16.1 years	9.9

In the national phase it was also found that there is approximately a 4 year difference between the date of graduation and the time that the GP starts practicing in private.

Table 5

Practice details:	Number of GPs	Percentage
Solo practice	32	53.3%
Group practice	28	46.7%
Cash practice	39	65%
Dispensing	46	76.7%
Total	60	100%

The percentage of GP's in the national phase that was in solo practice was 59%, while only 24% were in group practice (table 7, p38). This is probably because the national phase is more representative than the pilot phase.

The amount of GPs per practice ranged from 1 to 20 with a median of 1.0, while the amount of patients seen daily per GP interviewed came to a mean of 28.2 with a standard deviation of 11.2.

5.2 Computer usage

Only 48 of the GPs admitted to ever using a computer in their lives before. This came to 80% of the GPs interviewed. Regarding basic computer training GPs were asked whether they had ever used a computer, had any official training, taught themselves and how long they had been working with computers. The results are in table 5.

Table 5

Category	Number of GPs	Percentage
Official computer training	7	14.6%
Self taught	36	75%
Friend taught	5	10.4%
Total	48	100%

The years of computer experience of the GPs came to a mean of 8.1 years with a standard deviation of 5.4.

Four GPs didn't have computers in their practices and didn't want them either, while a further three didn't have computers in their practices but intended to get them within the year. The group of GPs that were not interested in computers at all had ages of 33, 43, 59 and 59 respectively. It is interesting how these ages cover both junior and senior doctors.

88.3% of GPs had computers in their practices (53 GPs). The amount of computers per practice had a range of 1 to 20 with a median of 2. The details of these computers are in table 6.

Table 6

Category	Number	Percentage
Pentium in the practice	40	75.5%
CD ROM on the terminal	24	45.3%
Microsoft windows on the terminal	28	52.8%
Total	53	100%

Only 66% of the 53 GPs used the computer personally (35 GPs) and 35.9% had computers on their desks (19 GPs). The details of what the GPs (who used computers in the practice) used the computers for are shown in table 7.

Table 7

Category	Number	Percentage
GP used computer for internet	16	45.7%
GP used computer for e-mail	17	48.6%
GP used computer for practice management	31	88.6%
GP used computer for other things	12	34.3%
Total	35	100%

The amount of time spent by the GPs on the computers is shown in table 8.

Table 8

Category	Number	Percentage
GP uses computer for 1 hour a month	3	8.6%
GP uses computer for 1 hour a week	7	13.2%
GP uses computer for 1 hour a day	7	20%
GP uses computer all the time	18	51.4%
Total	35	100%

5.3 Computer at home

Most of the GPs seemed to have computers at home, although a lot of the computers were being used by their spouses and children. Regarding Pentiums it was interesting to note, that 90% of the GPs interviewed had access to a Pentium either at home, at work or both.

The details of the home computers can be seen in table 9.

Table 9

Category	Number of GPs	Percentage
Computer at home	50	83.3%
Pentium at home	40	66.7%
Microsoft windows at home	45	75%
CD ROM at home	44	73.3%
Internet at home	35	58.3%
GP used computer for internet	24	40%
GP used computer for e-mail	22	36.7%
GP used computer for accounts	15	25%
Total	60	100%

5.4 Computer education

In this section, GPs were asked whether they wanted to learn more about computers and the form of teaching they would prefer. GPs were also asked whether they preferred the mouse or another tool (eg. roller ball/touch screen) and where in the practice they felt computers were vital.

The results were can be seen in table 10.

Table 10

Category	Number	Percentage
GP wants to learn more about IT	50	83.3%
GP prefers a teaching video	17	28.3%
GP prefers a teaching manual	5	8.3%
GP prefers a teaching program	17	28.3%
GP prefers a part time course	24	40%
GP prefers a full time course	4	6.7%
GP likes the mouse	36	60%
Computer vital with receptionist	38	63.3%
Computer vital with bookkeeper	48	80%
Computer vital with dispensary	32	53.3%
Computer vital on the GP's desk	33	55%
Total	60	100%

GPs were also asked to judge their own competence with computer features. (Competence was numbered at "1" if the GP had never used the feature before and "4" if he considered himself a confident user.)

Table 11

Feature	Mean	Standard deviation
Keyboard competence	2.8	1.1
Mouse competence	2.7	1.3
Word processor competence	2.1	1.2
Spreadsheet competence	1.6	1.0
Database competence	1.5	0.7
Management program competence	2.3	1.3
Internet competence	2.0	1.3
E-mail competence	2.0	1.2
Total competence	2.1	1.2

It was interesting to note that only 54.4% of GPs who dispensed felt that computers were vital in the dispensary. This could also be because a lot of the GPs dispense from the GP's office and don't have a separate dispensary.

5.5 Structured interview

In the structured interview GPs were asked whether they agreed, disagreed, strongly agreed and strongly disagreed on some questions. The idea was to evaluate their attitude towards some issues. The results are in tables 12 to 15. The results were grouped in these categories to improve readability.

Table 12. Reasons why GPs don't use computers

Question	TG	%A+SA	%D+SD
Computers are too expensive for GP practice	60	10%	90%
GPs don't have time to learn to use computers	60	40%	60%
GPs feel unsure about how to use computers	60	81.7%	18.7%
GPs are afraid that other people may access their electronic records	59	27.1%	72.9%
Computers have to be updated too often	55	56.4%	43.6%
Computers break down too easily	57	31.6%	68.4%
Computers lead to longer consultations	51	49%	51%
Computers interfere with the doctor-patient relationship	60	56.7%	43.3%
GPs would prefer a portable computer that they can take with them when they go home or do house calls.	59	61%	39%
GPs will be keen to use computers if they were on a lease contract that will keep the doctor updated on the newest technology	56	67.9%	32.1%
Total	60	100%	100%

The important result in this table is the amount of GPs that feel that GPs feel unsure about using IT. This came through strongly in national phase as well.

Table 13. Computer competence

Question	TG	%A+SA	%D+SD
Computers are more for administrative than for clinical functions	58	70.7%	29.3%
Computers are a necessity in GP practice	59	88.1%	11.9%
Computers are ideal for giving GPs advise on tricky patients by suggesting some diagnoses	57	68.4%	31.6%
GPs need computers or else they will fall behind on current trends	60	66.7%	33.3%
Computers are more for secretaries and bookkeepers than for GPs	58	22.4%	77.6%
GPs have to learn to use the internet and e-mail to stay up to date	60	90%	10%
Computers can really improve GP practice by assisting in the collection of outstanding payments.	59	95%	5.1%
Total	60	100%	100%

These results clearly show that GPs know what IT can produce and that IT can improve their workplace.

Table 14. Electronic referrals

Question	TG	%A+SA	%D+SD
It would improve patient care if there were a secure system in place, which would allow for patients to have access to some of their medical records via the internet with a password. Some information must be on higher security for doctors only and must not be accessible.	59	55.9%	44.1%
Electronic patient referrals will significantly improve referrals from GPs to Government hospitals	58	75.9%	24.1%
Electronic patient referrals will significantly improve referrals from GPs to Specialists and visa versa	58	81%	19%
Each patient needs to have a unique form of medical identification so their records can be traced electronically in case of an emergency, for example a thumb print that translates to a code	59	86.4%	13.6%
GPs will really use computers if they provided a simple form of remote access to the computer in the practice, while the GP is doing house calls or is working in a remote clinic.	57	73.7%	26.3%
Total	60	100%	100%

As in national phase GPs are keen on the idea of electronic referrals. This can be seen with the high percentages of GPs that agreed on the related statements.

Table 15. Regular users of computers

Question	TG	%A+SA	%D+SD
Computers create a good impression with patients	44	47.7%	52.3%
Computers significantly improve the quality of patient care	47	55.3%	44.7%
Computerized patient records are more valuable than paper records	45	55.6%	44.4%
Computers create faster prescriptions	46	67.4%	32.6%
Computers make it easier to retrieve and reproduce patient notes	45	84.4%	15.6%
Computers create easy access to journals and academic information	44	95.5%	4.6%
Computers improve patient education	44	84.1%	15.9%
Computers can produce more legible referrals	47	97.9%	2.1%
Computers save time	47	78.7%	21.3%
Computers significantly improve billing and account management	47	97.9%	2.1%
Computers improve patient summaries	39	92.3%	7.7%
Total	60	100%	100%

These results also show that GPs know what IT has to offer. The importance of an accounts problem seems to be well ingrained into GPs.

5.6 Unstructured interview

The results for the unstructured interview were grouped according to the percentages. The results can be seen in tables 16 to 18. To remind the reader, these were spontaneous comments made by GPs when asked what they would tell an SD who wants to develop software for them.

Table 16. More than 8% of GP's comments

Comment	Number	Percentage
Easy to use	19	38%
Simplicity	10	20%
User friendly	10	20%
Time efficient	8	16%
Accounts	6	12%
Diagnostic support	6	12%
Patient record keeping	5	10%
Access to medical aid computer	5	10%
Practice management	5	10%
Fast	5	10%
Cheaper	4	8%
Information on medical aid policies	4	8%
Electronic payments by medical aid	4	8%
Total	50	100%

The amount of comments related to ease of use is really prominent and probably refers to the poor software designs of the past. The author trusts that software ergonomics will change this.

Table 17. From 4% to 6% of GP's comments

Windows based	3	6%
Email lab results	3	6%
No typing	3	6%
Shortcuts	2	4%
Logical	2	4%
Scanner	2	4%
Reliable	2	4%
Backups	2	4%
Printouts	2	4%
Updated information on medicines	2	4%
Easy recall of patient information	2	4%
Prescriptions	2	4%
No teething problems!	2	4%
Diary	2	4%
Integrate other databases	2	4%
Security of information	2	4%
Electronic referrals	2	4%
Two separate programs, one for admin, one for clinical that interact with each other.	2	4%
Foolproof	2	4%
Total	50	100%

With most of these comments the GPs are saying that they want a fast program that works well and will not break down unnecessarily.

Table 18. Les than 4% of GP's comments

Backtracking	1	2%
Medical dictionary	1	2%
Family and members together	1	2%
Up to date on medical aid changes	1	2%
Diagnostic codes (ICD10, etc.)	1	2%
Standardized data	1	2%
Network	1	2%
It must reduce the amount of people in the practice	1	2%
Things must be accessible with "one click"	1	2%
Patient summaries	1	2%
It must be in the format in which GPs work	1	2%
Queuing	1	2%
Compatible with other systems	1	2%
Messages to others in the practice via network	1	2%
Detailed clinical notes	1	2%
List of specialists and contact details	1	2%
Patient education leaflets	1	2%
Templates for parts often used	1	2%
The program must have a guarantee	1	2%
The program must be written knowing how little GPs know	1	2%
Easy to learn	1	2%
The program must not interfere with the doctor patient interaction	1	2%
The program must cater for big practices	1	2%
The program must have audio and visual feedback	1	2%
The program must be able to do stock control	1	2%
The information on the program must be accurate	1	2%
Total	50	100%

These comments are merely there for completeness sake.

Appendix 6

Introduction sheet to national phase

(English)

Good morning its Dr. Vogelzang speaking. Could I please speak to Dr.....?

N: When can I phone back?

Y: Good morning, it is Hanri Vogelzang speaking. Can you talk?

I am a medical officer at Groote Schuur hospital in Cape Town and would like to consult you to see how I can improve the efficacy of South African general practice. The consultation consists of a telephonic interview lasting approximately 15 minutes.

The interview is part of a master's degree in Ergonomics through the university of Cape Town. As you are part of a random sample of GPs across South Africa it is vital for the credibility of the research that I interview you. I can fax you a copy of my protocol, should it be required. I am also willing to pay medical aid rates for your time.

Can we arrange for an appointment that would suit both of us?

Appendix 7

Introduction sheet to national phase.

(Afrikaans)

Goeie more, dis Dr. Vogelzang wat praat. Kan ek asseblief met Dr..... praat?

N. Wanner kan ek terug skakel?

J. Goeie more, dis Hanri Vogelzang wat praat. Kan u praat?

N. Wanner kan ek terug skakel

J. Ek is 'n mediese offisier by Groote Schuur hospitaal in Kaapstad en wil u graag konsulteer om te sien hoe ek Suid Afrikaanse algemene praktyk meer effektief kan maak. Die konsultasie bestaan uit 'n telefoniese onderhoud van ongeveer 15 minute.

Die onderhoud is deel van 'n meesters graad in Ergonometrie by die universiteit van Kaapstad. Aangesien u deel is van 'n steekproef van algemene praktisyns in Suid Afrika is dit noodsaaklik vir die betroubaarheid van my navorsing dat ek 'n onderhoud met u voer. Indien nodig kan ek 'n afskrif van die protokol vir u fax. Ek is ook bereid om u te betaal vir die konsultasie.

Kan ons dalk 'n afspraak maak wat ons albei sal pas?

Appendix 8

Evaluation form for National phase

GP details:

Name of doctor:	
Medpages number:	
Telephone number:	
Postal address:	

5.1 Evaluation

8.1.1 General information:

Q1 How old are you?

25 – 34	35 – 49	>50	Other

Q2 Male or Female

Male	Female

Q3 What is your home language?

English	Afrikaans	Other

Q4 When did you graduate?

Q6 How many years have you been in private general practice?

Q7 What kind of practice do you have?

One man	Group practice	IPA (Independent practice association)
HMO (Health maintenance association)	Managed group practice	Other

Q8 How many GP's are in the practice?

Q9 How many patients do you see per day on average?

Q10 Do you have a cash practice?

Yes	Percentage	No

Q11 Do you dispense?

Yes	No

8.1.2. Computer usage

Q12 Rate your computer competence.

Never used one
Can use one very basically
Regular computer user including internet and email
Other

If "Never used one" go to Q15

Q13 How did you learn about computers?

Taught yourself	Taught by friend or family
Program training (Mass)	Basic computer course
Other	

Q14 How many years have you been using computers?

8.1.2.1 Practice computers:

Q15 How many practices do you have?

Q16 Do you have any computers in your practice?

Yes	No

Yes go to **Q19**

No

Q17 Have you considered getting your practice computerized?

Yes	No

No go to Home computers **Q28**

Q18 When do you plan to do this?

Within the next few months	Next year
Within the next 2 years	Maybe in the far future

Go to Home Computers **Q28**

Yes

(Take the GP's most computerized practice of he has more than one practice)

Q19 How many computers are in your practice?

Q20 Do you have a network?

Yes	No

Q21 Do you have access to internet/e-mail at the practice?

Yes	No

Q22 Do you have access to a Pentium computer at the practice?

Yes	No

Q23 Do you have access to a CD ROM at the practice?

Yes	No

Q24 Do you ever use the computer/s personally?

Yes	No

No go to Home Computers (Q 28)

Q25 What do you use the computer for?

Full electronic patient record keeping	Partial electronic record keeping
Internet	E-mail
Practice finances	Letters and reports
Stock keeping	Other

Q26 Do you have a computer on your desk?

Yes	No

Q27 How often do you use a computer at the practice?

	One hour a month
	One hour a week
	One hour a day
	All the time
	Other

8.1.2.2. Home Computers

Q28 Do you have access to a Pentium computer at home?

Yes	No

Q29 Do you have access to a CD ROM at home?

Yes	No

Q30 Do you have access to internet/e-mail at home?

Yes	No

Q31 What do you use the computer at home for?

Full electronic patient record keeping	Partial electronic record keeping
Internet	E-mail
Practice finances	Letters and reports
Stock keeping	Wife and kids use it
Other	

8.1.2.3. Computer education

Q32 Would you like to learn more about computers?

Yes	No

No go to Q34

Q33 Which form of learning would you prefer?

A teaching video	
A teaching manual	
A program that teaches you how to use itself	
A part time course (eg. 1 evening per week)	
A full time course (eg. 2-3 days)	

Q34 Rate your competence with the following from 1 to 4. ("1" means you've never used it before and "4" means you are a confident user)

Keyboard	1	2	3	4
Mouse	1	2	3	4
Word processor	1	2	3	4
Spreadsheet	1	2	3	4
Database	1	2	3	4
Practice management program, eg Medsolve/Mass	1	2	3	4
E-mail	1	2	3	4
Internet	1	2	3	4

Q35 Are computers vital in any of the following places in a practice?

Receptionist	Yes	No
Bookkeeper	Yes	No
Pharmacist	Yes	No
GP's desk	Yes	No
Other?	Yes	No

8.2 Interview

8.2.1 GP's that have never used a computer

8.2.1.1 Structured interview

Q36 Do you use cards, written notes or typed notes for your patient notes?

Cards	Written notes	Typed notes

Q37 Score the following statements by saying for each statement whether you agree, disagree strongly agree or strongly disagree

Computers are too expensive for GP practice	SA	A	N	D	SD	DK
GP's don't have time to learn to use computers	SA	A	N	D	SD	DK
GP's feel unsure about how to use computers	SA	A	N	D	SD	DK
GP's are afraid that other people may access their electronic records	SA	A	N	D	SD	DK
Computers have to be updated too often	SA	A	N	D	SD	DK
Computers break down too easily	SA	A	N	D	SD	DK
Computers are more for financial than for clinical functions	SA	A	N	D	SD	DK
Computers are a necessity in GP practice	SA	A	N	D	SD	DK
Computers are more for receptionists and bookkeepers than for GP's	SA	A	N	D	SD	DK
Computers create a good impression with patients	SA	A	N	D	SD	DK
Computers significantly improve billing and account management	SA	A	N	D	SD	DK

Q38 The following statements regard computers on the GP's desk. The format is the same as above.

Computers lead to longer consultations	SA	A	N	D	SD	DK
Computers interfere with the doctor-patient relationship	SA	A	N	D	SD	DK

8.2.1.2. Unstructured interview:

If you had a programmer sitting in front of you who wants to write a program to make your practice more efficient, what advice would you give him about such a program? What are the things that would be important in such a program?

Thank you for your time.

8.2.2. Basic computer users

8.2.2.1. Structured interview

Q39 Do you use cards, written notes or typed notes for your patient notes?

Cards	Written notes	Typed notes

Q40 Do you think that a mouse is a good tool for computer use, or would you rather prefer a touch screen or roller ball?

Mouse	Touch screen	Roller ball

Q41 Score the following statements by saying for each statement whether you agree, disagree, strongly agree or strongly disagree

Computers are too expensive for GP practice	SA	A	N	D	SD	DK
GP's don't have time to learn to use computers	SA	A	N	D	SD	DK
GP's feel unsure about how to use computers	SA	A	N	D	SD	DK
GP's are afraid that other people may access their electronic records	SA	A	N	D	SD	DK
Computers have to be updated too often	SA	A	N	D	SD	DK
Computers break down too easily	SA	A	N	D	SD	DK
Computers are more for financial than for clinical functions	SA	A	N	D	SD	DK
Computers are a necessity in GP practice	SA	A	N	D	SD	DK
Computers are more for receptionists and bookkeepers than for GP's	SA	A	N	D	SD	DK
Computers create a good impression with patients	SA	A	N	D	SD	DK
Computers significantly improve billing and account management	SA	A	N	D	SD	DK
Learning to use the internet and e-mail will make it easier for GP's to stay up to date with medical developments.	SA	A	N	D	SD	DK
It would improve referrals if GP's could send a copy of the patient records via the internet instead of a written note with the patient.	SA	A	N	D	SD	DK

(Q41 continue)

Each patient needs to have a unique form of medical identification so their records can be traced electronically in case of an emergency, for example a thumb print that translates to a code	SA	A	N	D	SD	DK
GP's will really use computers if they provided a simple form of remote access, while the GP is working in a remote clinic or from home, to the computer in the practice.	SA	A	N	D	SD	DK
GP's would prefer a portable computer that they can take with them when they go home or do house calls, eg. a laptop or a palmtop.	SA	A	N	D	SD	DK
GP's will be keen to use computers if they were on a lease contract that will keep the doctor updated on the newest technology	SA	A	N	D	SD	DK
Computers can significantly improve the quality of patient care	SA	A	N	D	SD	DK
Computerized patient records are more valuable than paper records	SA	A	N	D	SD	DK
Computers create faster prescriptions for dispensing GP's	SA	A	N	D	SD	DK
Computers make it easier to retrieve and reproduce patient notes	SA	A	N	D	SD	DK
Computers can produce more legible referrals	SA	A	N	D	SD	DK
Computers save time	SA	A	N	D	SD	DK

Q42 The following statements regard computers on the GP's desk. The format is the same as above.

Computers lead to longer consultations	SA	A	N	D	SD	DK
Computers interfere with the doctor-patient relationship	SA	A	N	D	SD	DK
A computer the size of an A4 book that uses mainly touch sensitive screens would make computers more accessible to GP practice.	SA	A	N	D	SD	DK
GP software should be able to assist in patient education with appropriate printouts and graphics.	SA	A	N	D	SD	DK
GP software should be able to give GP's differential diagnoses, should they require it	SA	A	N	D	SD	DK
GP software should warn the GP regarding contra indications and adverse drug effects when writing a prescription	SA	A	N	D	SD	DK
GP software should not require any typing	SA	A	N	D	SD	DK
It would improve patient care if there was a secure system in place which would allow for patients to have access to some of their medical records via the internet with a password. Some information must be on higher security for doctors only and must not be accessible.	SA	A	N	D	SD	DK

8.2.2.2. Unstructured interview:

If you had a programmer sitting in front of you who wants to write a program to make your practice more efficient, what advice would you give him about such a program? What are the things that would be important in such a program?

Thank you for your time.

8.2.3. Competent computer users

8.2.3.1. Structured interview

Q43 Do you use cards, written notes or typed notes for your patient notes?

Cards	Written notes	Typed notes

Q44 Do you think that a mouse is a good tool for computer use, or would you rather prefer a touch screen or roller ball?

Mouse	Touch screen	Roller ball

Q45 Score the following statements by saying for each statement whether you agree, disagree, strongly agree or strongly disagree

Computers are too expensive for GP practice	SA	A	N	D	SD	DK
GP's don't have time to learn to use computers	SA	A	N	D	SD	DK
GP's feel unsure about how to use computers	SA	A	N	D	SD	DK
GP's are afraid that other people may access their electronic records	SA	A	N	D	SD	DK
Computers have to be updated too often	SA	A	N	D	SD	DK
Computers break down too easily	SA	A	N	D	SD	DK
Computers are more for financial than for clinical functions	SA	A	N	D	SD	DK
Computers are a necessity in GP practice	SA	A	N	D	SD	DK
Computers are more for receptionists and bookkeepers than for GP's	SA	A	N	D	SD	DK
Computers create a good impression with patients	SA	A	N	D	SD	DK
Computers significantly improve billing and account management	SA	A	N	D	SD	DK
Learning to use the internet and e-mail will make it easier for GP's to stay up to date with medical developments.	SA	A	N	D	SD	DK

(Q45 continue)

It would improve referrals if GP's could send a copy of the patient records via the internet instead of a written note with the patient.	SA	A	N	D	SD	DK
Each patient needs to have a unique form of medical identification so their records can be traced electronically in case of an emergency, for example a thumb print that translates to a code	SA	A	N	D	SD	DK
GP's will really use computers if they provided a simple form of remote access, while the GP is working in a remote clinic or from home, to the computer in the practice.	SA	A	N	D	SD	DK
GP's would prefer a portable computer that they can take with them when they go home or do house calls, eg. a laptop or a palmtop.	SA	A	N	D	SD	DK
GP's will be keen to use computers if they were on a lease contract that will keep the doctor updated on the newest technology	SA	A	N	D	SD	DK
Computers can significantly improve the quality of patient care	SA	A	N	D	SD	DK
Computerized patient records are more valuable than paper records	SA	A	N	D	SD	DK
Computers create faster prescriptions for dispensing GP's	SA	A	N	D	SD	DK
Computers make it easier to retrieve and reproduce patient notes	SA	A	N	D	SD	DK
Computers can produce more legible referrals	SA	A	N	D	SD	DK
Computers save time	SA	A	N	D	SD	DK

Q46 The following statements regard computers on the GP's desk. The format is the same as above.

Computers lead to longer consultations	SA	A	N	D	SD	DK
Computers interfere with the doctor-patient relationship	SA	A	N	D	SD	DK
A computer the size of an A4 book that uses mainly touch sensitive screens would make computers more accessible to GP practice.	SA	A	N	D	SD	DK
GP software should be able to assist in patient education with appropriate printouts and graphics.	SA	A	N	D	SD	DK
GP software should be able to give GP's differential diagnoses, should they require it	SA	A	N	D	SD	DK
GP software should require minimal typing	SA	A	N	D	SD	DK
GP software should warn the GP regarding contra indications and adverse drug effects when writing a prescription	SA	A	N	D	SD	DK
It would be nice if GP software could provide GP's with their own web site that gives trusted and credible information to their patients.	SA	A	N	D	SD	DK
It would improve patient care if there was a secure system in place which would allow for patients to have access to some of their medical records via the internet with a password. Some information must be on higher security for doctors only and must not be accessible.	SA	A	N	D	SD	DK
GP's should be able to give clinical advice to their patients via the web and email	SA	A	N	D	SD	DK

8.2.3.2 Unstructured interview

If you had a programmer sitting in front of you who wants to write a program to make your practice more efficient, what advice would you give him about such a program? What are the things that would be important in such a program?

Thank you for your time.